



*State of Utah Department of  
Agriculture and Food*

# **2003 State of Utah Ground-Water Program**



**By**

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*&*

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## ACKNOWLEDGMENTS

The Utah Department of Agriculture and Food's (UDAF's) 2003 Ground-Water Sampling Program is successful because of contributions made by many people. UDAF's ground-water steering committee consists of Commissioner Cary Peterson; Directors Randy Parker, Dick Wilson, and Dr. David Clark; and Section and Program leaders George Hopkin and Clark Burgess. This committee gives guidance, support, and direction to the program.

Efforts by members of the Utah Association of Conservation Districts (UACD) have also contributed greatly to the success of the 2003 sampling program. They helped select sampling sites and navigated us to locations of wells to be sampled. Their knowledge of local areas and contact with people who desired well sampling proves invaluable.

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Finally, thanks are extended to the owners of wells without whose participation and trust this program would not have functioned.

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Front Cover: Rich Riding of UDAF Plant Industry measuring depth to ground water in well.

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# Utah Department of Agriculture & Food

## State Ground-Water Program

### Report 2003

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Utah Department of Agriculture and Food's (UDAF's) State Ground-Water Program is funded by the legislature to assist private well owners and other agencies, organizations and concerned citizens to have a better understanding of water quality. Provisions of the Federal Clean Water Act requiring drinking water testing exclude private wells used for drinking water, irrigation, and livestock watering even though these wells account for the majority of ground-water use in the State of Utah.

This report covers activities of UDAF's State Ground-Water Program for 2003.

#### **Cooperative Effort**

UDAF has a memorandum of understanding with the Utah Division of Water Rights (WR) for collecting ground-water data from Pahvant and Curlew valleys. Sample analyses were done for inorganic and organic constituents that influence water quality. Guidance from WR has helped in selecting sampling sites and sharing data.

UDAF also works closely with the Department of Environmental Quality (DEQ) in providing expertise for the State Pesticide Management Plan and other ground-water programs. This relationship benefits UDAF by allowing agriculture's voice to be heard and its ideas considered during the planning process. UDAF is an essential link between DEQ and farmers and ranchers of the state regarding environmental issues.

The State Ground-Water Program works with members of local Soil Conservation Districts (SCDs) and Utah Association of Conservation Districts (UACD) to identify private wells for sampling. SCD cooperation and knowledge of the local area has been very beneficial in identifying wells for sampling, meeting well owners, and distributing information. The work of local district members who advertise, collect names, and organize sampling events helps to make the program successful.

#### **UDAF's Ground-Water Sampling Procedures**

UDAF meets with SCDs to inform and update members on ground-water issues. Districts then select wells for sampling in their area and obtain preliminary sample information by using UDAF's Pre-Sample Information Form (Fig. 1). For Pahvant and Curlew valleys, WR selected wells to be sampled.

Local SCD members escorted UDAF personnel to selected well sites. At each well, location was determined using a Global Positioning System (GPS) receiver. Water was then collected for inorganic, bacteria, and pesticide analyses at each well using established protocol. Samples were packed in ice and taken to the laboratory for analysis. Reports summarizing laboratory results were sent to each well owner. GPS information was provided to UDAF's GIS administrator who provided maps of the sampled areas.

During 2003, UDAF tested all samples for coliform and E. coli bacteria using IDEXX Colilert MUG kits in the field. This has been a significant addition to the program. We also conducted nitrate testing in the laboratory using an enzyme procedure from Nitrate Elimination Company, Incorporated, located in Lake Linden, Michigan. We found this procedure to be more dependable and accurate than cadmium reduction procedures that we have used in the past.

#### **Areas Sampled**

During 2003, 291 samples were taken from wells, drains, and springs in all of the seven UACD zones in the state. Each UACD district sampled is addressed in this report, with a map showing sample location

and a table of chemical analyses. Narrative reports are also provided for each sampled district. Below is a general summary of ground-water quality for sampling during 2003 based on EPA standards.

## **Summary of Water Quality for 2003**

There were no confirmed pesticide detections in the 291 samples taken during the 2003 sampling season based on EPA standards. Results show that water quality is diverse throughout the state with electrical conductivity (EC) ranging from 65 to 32,300  $\mu\text{mhos/cm}$  with a mean of 1,180  $\mu\text{mhos/cm}$ . Standards for EC are rendered as Total Dissolved Solids (TDS) for livestock watering and culinary use; for purposes of comparison, EC values are converted to TDS for these standards. TDS values are proportional to EC at a ratio of 3:5. Water having EC values exceeding 750  $\mu\text{mhos/cm}$  may cause damage to sensitive plants when the water is used for irrigation. When EC exceeds 3,000  $\mu\text{mhos/cm}$  severe damage to all but the most salt-tolerant plants is expected. One hundred and thirty-eight exceeded the 750  $\mu\text{mhos/cm}$  level and 16 exceeded the 3,000  $\mu\text{mhos/cm}$  level. The Federal Clean Water Act sets an aesthetic standard of 500 ppm (500 ppm TDS) for drinking water. Water that exceeds this level may have an objectionable flavor. Two hundred and nineteen samples exceeded this value. When EC exceeds 3,333  $\mu\text{mhos/cm}$  (2,000 ppm TDS) it becomes a health issue. Fourteen samples exceeded this value. Since livestock have a much higher tolerance for saline water, the critical value for livestock watering is 8,333  $\mu\text{mhos/cm}$  (5,000 ppm TDS). Only 3 samples exceeded this level.

Variation in water temperature also demonstrates the great diversity of ground water quality throughout the state. For samples collected in 2003, sampled water temperature ranges from at 8.3 °C to a high of 27.3 °C. The average temperature was 15.4 °C.

An important chemical characteristic of water is pH. Generally the groundwater in Utah is slightly alkaline, with a mean pH of 8.04 for all samples taken this year. The range of pH for samples collected this year is 6.15 to 9.73. The value of pH can help estimate types of dissolved minerals and compounds likely to be found in the water. Water on either end of this range has characteristics that adversely affect water quality. A pH value less than 6.5 indicates the possible presence of heavy minerals, whereas a pH value greater than 9.0 may indicate the presence of excessive sodium.

Hardness of water is determined on the basis of how much calcium (Ca) and magnesium (Mg) are in the water. In Utah, Ca and Mg are plentiful in the soils and also in ground water. Hardness values based on grains per gram (gpg) of water, range from 0.05 (soft) to 65.81 (very hard) with an average of 6.61 (moderate-hard). Soft water can have high sodium values and may not be fit for culinary use even though it is classified as "soft."

Sodium (Na) affects water quality and soil in various ways. Na causes soil particles to separate, freeing organic matter. Soils with high Na levels appear as dark, slick waterlogged areas. These soils are not suitable for crop production because air and water cannot pass through them. The Sodium Absorption Ratio (SAR) indicates whether irrigation water is likely to degrade soils due to excess Na. When the SAR value reaches 3, soils may begin to degrade. When the SAR value reaches 9, damage is severe. SAR values for samples this year range from 0.1 to 84.5, with a mean of 3.98. Special irrigation practices are required when using water with a high SAR value.

As found in previous years, bacteria are a major problem for private water systems. Thirty-one percent of the wells and springs sampled this year tested positive for coliform bacteria, as compared to 59% in 1999, 36% in 2000, 29% in 2001, and 27% in 2002. Although most coliform bacteria do not pose a health problem, their presence in well water indicates that surface waters, soil, or other contamination is getting into the well. Bacteria problems are usually seen in older wells, wells with improper casing and caps, wells that are too shallow or systems that have been improperly maintained. Of greater concern is the presence of *E. coli* in water samples. During 2003, 5.8% of the wells and springs sampled tested positive for *E. coli* as compared to 34% in 1999, 7% in 2000, 4% in 2001, and 3.4% in 2002. These wells have been contaminated with mammalian fecal material, the only source for this bacterium. The source could be effluent from septic systems near the well, poor well construction with livestock near the well head, or open wells in areas where animals and manure are present.

Specific elements that exceed irrigation, livestock, or drinking water standards are discussed in the district reports as described below.

More detailed descriptions of water quality for each sampled area are presented in this report. The report covers specific UACD zones and districts where sampling was conducted, and in some cases separate areas within districts are presented where circumstances warrant separate treatment. A map for each area is presented that shows sampling site locations. Tables of chemical, bacterial, and physical characteristics of sampled water are also presented. Measured values on the tables that exceed primary drinking water standards are shaded, whereas those exceeding secondary standards are underlined. Measured values that exceed livestock health standards are also shaded, and values that indicate minor animal health problems are underlined. Measured values that exceed irrigation standards are underlined, with levels in the severe range being shaded.

Sample site locations can be identified on the map using the "Id#" column from the associated table. Values of -0.1000 indicate that this element or compound was not measured above the detection limit of the procedure used to test for the element or compound.

The generic Pesticide Management Plan(PMP) for the State of Utah identifies five pesticides which have the potential to be a threat to the ground water supply. Each of these pesticides are broad-spectrum herbicides. The pesticides are: (1) Alachlor, (2) Atrazine, (3) Cyanazine, (4) Metolachlor, and (5) Simazine. In addition to these pesticides, the UDAF laboratory also screens for a broad range of other pesticides which are sold and used in the state which have the potential to contaminate ground water resources according to the following list.

#### **List of Pesticides**

Hexachlorocyclopentadiene	Alpha Chlordane	2,4,5-TP (Silvex)
Hexachlorobenzene	Dieldrin	Picloram
Simazine *	Endrin	Aldicarb
Atrazine *	Methoxychlor	Aldicarb sulfone
Gamma-Lindane	Chlordane "T"	Aldicarb sulfoxide
Heptachlor	Toxaphene "T"	Carbofuran
Alachlor *	Prometon	Methomyl
Aldrin	Dicamba	Oxamyl (Vydate)
Heptachlor-Epoxyde	2,4-D	3-OH Carbofuran
Gamma Chlordane	PCP	3-Keto Carbofuran
Disulfoton	Diazinon	Metolachlor *

\* Pesticide identified for restriction under the proposed PMP rule.

#### **Laboratory Screening for Pesticides**

The UDAF laboratory performs a screening analysis of all water samples using four different EPA approved screening methods. The methods are as follows: (1) EPA Method 515.1 used for detecting chlorinated phenoxy acid, (2) EPA Method 505 for detection of chlorinated pesticides and organophosphates, (3) EPA Method 531.1 for detection of carbamates, and (4) an immunoassay method for pesticide residue screening used for detection of chlorinated phenoxy acid and carbamates. The immunoassay method indicates the presence or absence of pesticides in the ground water sample. In the event that a sample tests positive for the presence of pesticides using the screening procedure, a more extensive laboratory process utilizing Gas Chromatography(GC) or High Performance Liquid Chromatography(HPLC) is used to determine the actual contamination level of the suspected pesticide.

Water wells constructed of materials containing Poly-Vinyl Chloride (PVC) can produce "false positives" using the immunoassay method for pesticide screening. Other environmental conditions can also combine to produce "hits" in the screening procedure which include: welding done on the well head, which can release compounds from the PVC well casing, dead animals in the wells during sampling, and large diameter shallow wells located in the middle of agricultural fields. When these conditions cause positive

“hits” in the screening method, the samples are subjected to the more rigorous GC analysis for further quantification and evaluation.

During laboratory screening of water samples for the 2003 sampling season, five samples tested positive for the pesticide 2,4-D, using the pesticide residue screening procedure. The samples were located in five distinct areas of the state, during separate sampling collection periods. Each of these samples was subjected to evaluation using the GC analysis method, and all of the five samples tested negative for pesticides.

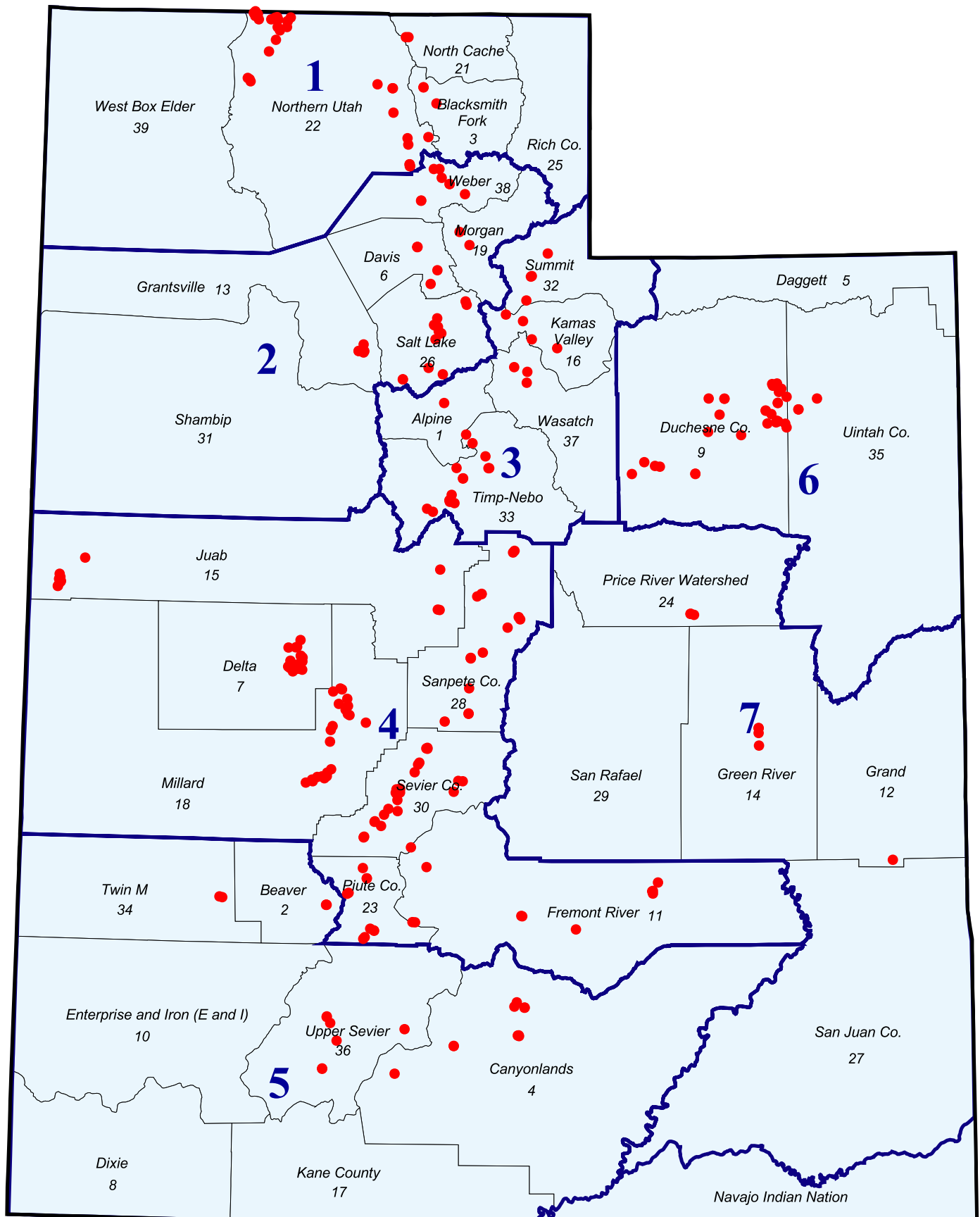
A field investigation conducted by UDAF personnel concluded that the contamination could have originated in the air, or by the sampling personnel passing through treated areas. One of the above means of contamination may have caused the initial positive indication during the screening process. The five wells were pumped and purged prior to resampling to verify the presence of pesticides in the aquifer. Subsequent sampling and analysis of the well showed no indication of pesticide contamination.

Sample ID	Date	Location	Pesticide
3062	6/25/2003	Angle, Utah	2,4-Dichlorophenoxyacetic
3131	8/14/2003	Erda, Utah	2,4-Dichlorophenoxyacetic
3143	8/20/2003	Clarkston, Utah	2,4-Dichlorophenoxyacetic
3174	8/26/2003	Hatton, Utah	2,4-Dichlorophenoxyacetic
3186	9/09/2003	Richfield, Utah	2,4-Dichlorophenoxyacetic

None of the five ground water samples tested positive for pesticide contamination using GC analysis.

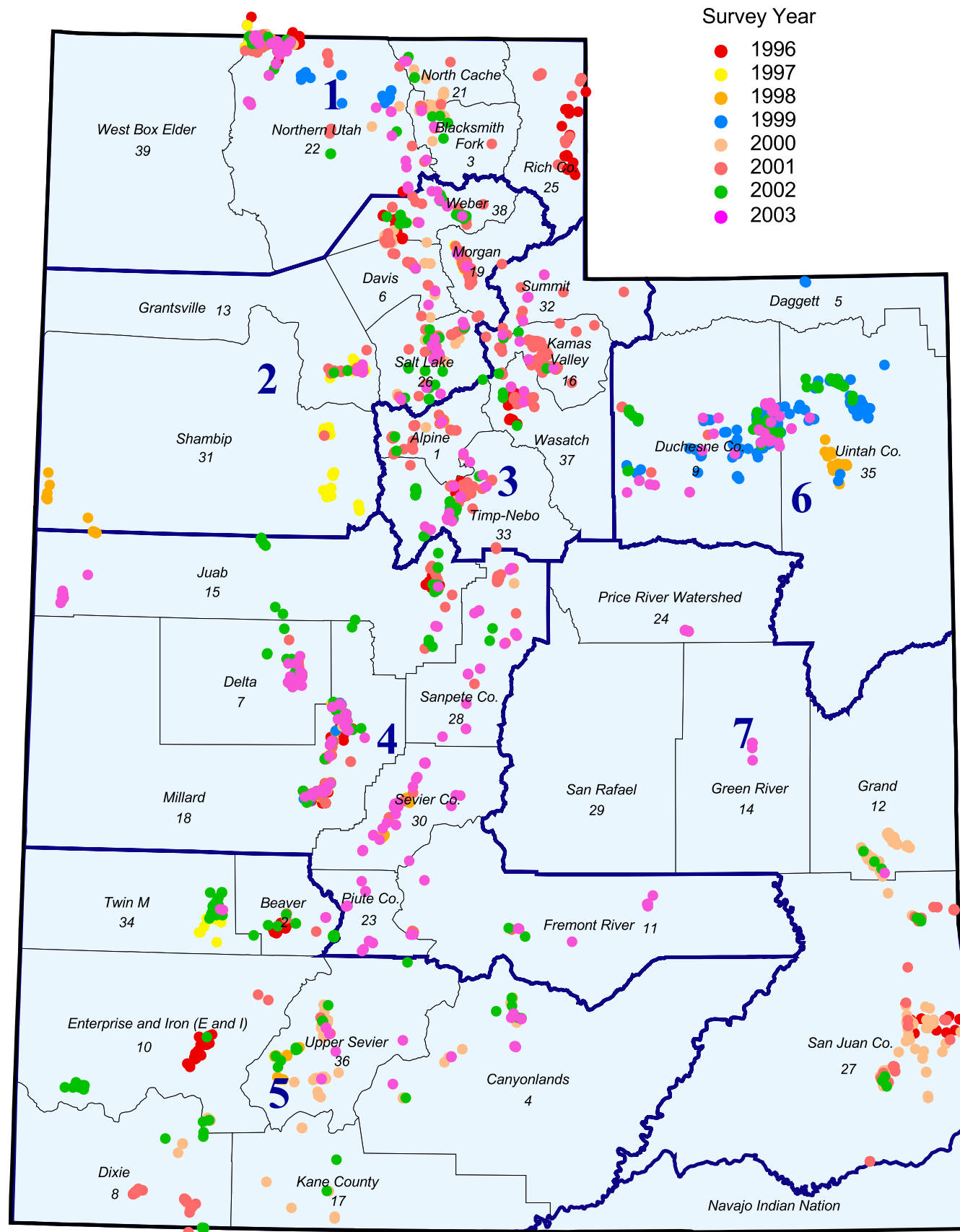
No pesticides were detected in any of the other samples collected during the 2003 sampling year.

Map 1. 2003 Ground Water Sample Locations





Map 2. Historic Ground Water Sample Locations 1996-2003



## UDAF PRE-SAMPLE INFORMATION FORM

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(This is a non-regulatory program. Data from sampling this well will be for your use and information)

Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
City: \_\_\_\_\_  
Telephone #: \_\_\_\_\_

Water Right #: \_\_\_\_\_  
Depth of Well: \_\_\_\_\_  
Depth of Water: \_\_\_\_\_  
Conservation District: \_\_\_\_\_

Please sketch a map showing how to locate your well (North is the top of the page.) Please give street name, and distances from major intersections or any other landmarks.

May we turn on your water or pump without you being present? \_\_\_\_\_

Are there instructions we need to sample your well? \_\_\_\_\_  
\_\_\_\_\_

By signing this form you are giving permission for the State of Utah Department of Agriculture and Food to cross your property and sample your well.

I the undersigned am the lawful agent of the above described well and grant permission to the State of Utah Department of Agriculture and Food to sample said well. I also grant access permission to the well.

\_\_\_\_\_  
Sign on the above line

\_\_\_\_\_  
Date

For any further information contact:

Mark Quilter, Ground-Water Specialist  
UDAF, 350 North Redwood Road  
Box 146500, Salt Lake City, UT 84114-6500  
(801) 538-9905 Fax: (801) 538-9436

**FIG. 1. Pre-Sample Information Form.**

# Zone 1

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UACD Zone 1 consists of four districts in three counties comprising the northern tier of the state including Box Elder, Cache, and Rich counties.

Thirty-eight sites were sampled in three districts in Zone 1 during the spring, summer, and fall of 2003. These included three sampled in the Blacksmith Fork District, two in the North Cache District and thirty-three in the Northern Utah District. A separate narrative report is presented for each district, with maps showing approximate locations of the sample sites. Each report covers three categories of water quality criteria: irrigation, livestock and culinary. Data are presented in four tables for each zone, grouped according to district—namely, general parameters (temperature, pH, total dissolved solids (TDS), and chemicals for which there are no standards); irrigation, livestock and drinking water parameters.

## Blacksmith Fork District

### General:

Three samples were collected in the Blacksmith Fork District. Water sampled in this district is moderate-hard with grains per gallon (gpg) ranging from 3.8 to 7.0, with a mean of 5.30 gpg. Water temperature ranges from 13.8 °C to 16.4 °C, with a mean of 15.46 °C. The pH for the district ranges from 7.57 to 7.63, with a mean of 7.59.

### Irrigation:

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in  $\mu\text{mhos/cm}$ . Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressure, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750  $\mu\text{mhos/cm}$ , salt-sensitive plants begin to be affected. When EC exceeds 3,000  $\mu\text{mhos/cm}$ , most plants would be severely injured. No samples in this district exceed the 750  $\mu\text{mhos/cm}$  standard.

The sodium absorption ratio (SAR) measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 mark the beginning of problems and values greater than 9 indicate severe problems. None of the water sampled in this district has elevated SAR values.

Bicarbonate ( $\text{HCO}_3$ ) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l and severe problems appear when it exceeds 8.5 meq/l. All of the samples collected in this area have high bicarbonate, which is common for water in Utah.

No other elements were detected above concentration levels harmful to plants.

### Livestock:

All of the tested water samples meet livestock quality standards.

### **Culinary:**

Iron (Fe) was found in **all** samples to exceed the aesthetic drinking water quality standard. This can cause discoloration of plumbing fixtures and promote the growth of iron bacteria, which stain anything they contact. Again, this is an aesthetic issue, not a health concern.

EPA has set an aesthetic standard of 0.05 ppm for manganese (Mn). Water with high concentrations may cause discoloration of plumbing fixtures and have poor flavor. Samples 3141 and 3142 also have high manganese concentrations.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil whereas *E. coli*, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of *E. coli* in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well casing, improper grouting, or lack of a casing. *E. coli* contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables.

No samples from this district were found to have bacterial contamination.

## Sample Site Test Data for Blacksmith Fork District

### General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
3140	-0.1000	56.45	10.50	0.5200	31.60	52.33	-0.10	7.57	16.4	436
3141	-0.1000	54.50	3.45	0.1800	10.40	38.32	0.22	7.63	13.8	332
3142	-0.1000	97.85	8.74	0.3800	21.42	31.31	-0.10	7.57	16.2	436

Values of -0.1 are below detection limits of testing procedure.

### Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
3140	-0.1000	0.13	31.14	-0.10	0.0500	0.4800	<u>6.46</u>	-0.1000	-0.1000	0.10	1.4	727
3141	-0.1000	0.07	23.89	-0.10	0.0300	1.4400	<u>4.86</u>	0.1600	-0.1000	-0.10	1.2	553
3142	-0.1000	0.08	21.18	-0.10	0.0200	0.3600	<u>5.62</u>	0.0600	-0.1000	-0.10	0.7	726

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

### Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
3140	-0.1000	-0.1000	0.13	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	10.16	-0.1000	436	-0.1000	0.10
3141	-0.1000	-0.1000	0.07	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.60	-0.1000	332	-0.1000	-0.10
3142	-0.1000	-0.1000	0.08	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	10.72	-0.1000	436	-0.1000	-0.10

Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

### Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
3140	-0.1000	0.0900	-0.1000	-0.1000	0.0500	<u>0.4800</u>	-0.1000	-0.1	-0.1000	10.16	-0.1000	436	0.10	7.57	0	0	5.1
3141	-0.1000	0.0900	-0.1000	-0.1000	0.0300	<u>1.4400</u>	<u>0.1600</u>	-0.1	-0.1000	1.60	-0.1000	332	-0.10	7.63	0	0	3.8
3142	-0.1000	0.0600	-0.1000	-0.1000	0.0200	<u>0.3600</u>	<u>0.0600</u>	-0.1	-0.1000	10.72	-0.1000	436	-0.10	7.57	0	0	7.0

Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.

## North Cache District

### **General:**

Two samples were collected in the North Cache District. Water sampled in this district tested moderate-hard, with grains per gallon (gpg) readings from 5.7 to 5.5, with a mean of 5.6 gpg. Sampled water temperature ranges from 11.2 °C to 12.3 °C, with a mean of 11.75 °C. The pH for the district ranges from 7.8 to 8.0, with a mean of 7.9.

### **Irrigation:**

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in  $\mu\text{mhos/cm}$ . Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750  $\mu\text{mhos/cm}$ , salt-sensitive plants begin to be affected. When EC exceeds 3,000  $\mu\text{mhos/cm}$ , most plants would be severely injured. Neither sample in this district exceeds the 750  $\mu\text{mhos/cm}$  standard.

SAR measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 marks the beginning of problems and values greater than 9 indicate severe problems. None of the water sampled in this district has elevated SAR values.

Bicarbonate ( $\text{HCO}_3$ ) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l and severe problems appear when it exceeds 8.5 meq/l. Both samples collected in this district, have high bicarbonate levels, which is common for water in Utah.

Manganese (Mn) above 0.2 ppm can injure plants and cause reduction in dry matter production. Excess manganese interferes with the plant's ability to use other nutrients such as calcium (Ca). Both samples have elevated manganese.

No other elements were detected above concentrations that are harmful to plants.

### **Livestock:**

All of the tested water samples meet livestock quality standards.

### **Culinary:**

Dissolved salts in water are measured in the field as Electrical Conductivity (EC). Culinary standards, however, are designated as Total Dissolved Solids (TDS), calculated from EC. Neither sample exceeds the ascetic standard for TDS.

EPA has set an aesthetic standard of 0.05 ppm for manganese (Mn). Water with high concentrations may cause discoloration of plumbing fixtures and have poor flavor. Both samples, 3143 and 3223, have high manganese levels.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil, whereas E. coli, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water,



soil, or other contaminants are entering the well. Presence of E. coli in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well casing, improper grouting, or lack of a casing. E. coli contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables.

Neither sample from this district was found to have bacterial contamination.

## Sample Site Test Data for North Cache District

### General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
3143	-0.1000	79.65	6.33	0.1500	17.52	25.52	-0.10	7.80	12.3	370
3223	-0.1000	77.19	6.29	0.1300	16.87	25.43	-0.10	8.02	11.2	368

Values of -0.1 are below detection limits of testing procedure.

### Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
3143	-0.1000	-0.10	22.23	-0.10	0.0400	0.1800	<u>4.77</u>	<u>1.1200</u>	-0.1000	-0.10	0.7	617
3223	-0.1000	-0.10	22.33	-0.10	0.0600	0.1900	<u>6.46</u>	<u>1.1500</u>	-0.1000	-0.10	0.7	613

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

### Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
3143	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	9.85	-0.1000	370	-0.1000	-0.10
3223	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	10.74	-0.1000	368	-0.1000	-0.10

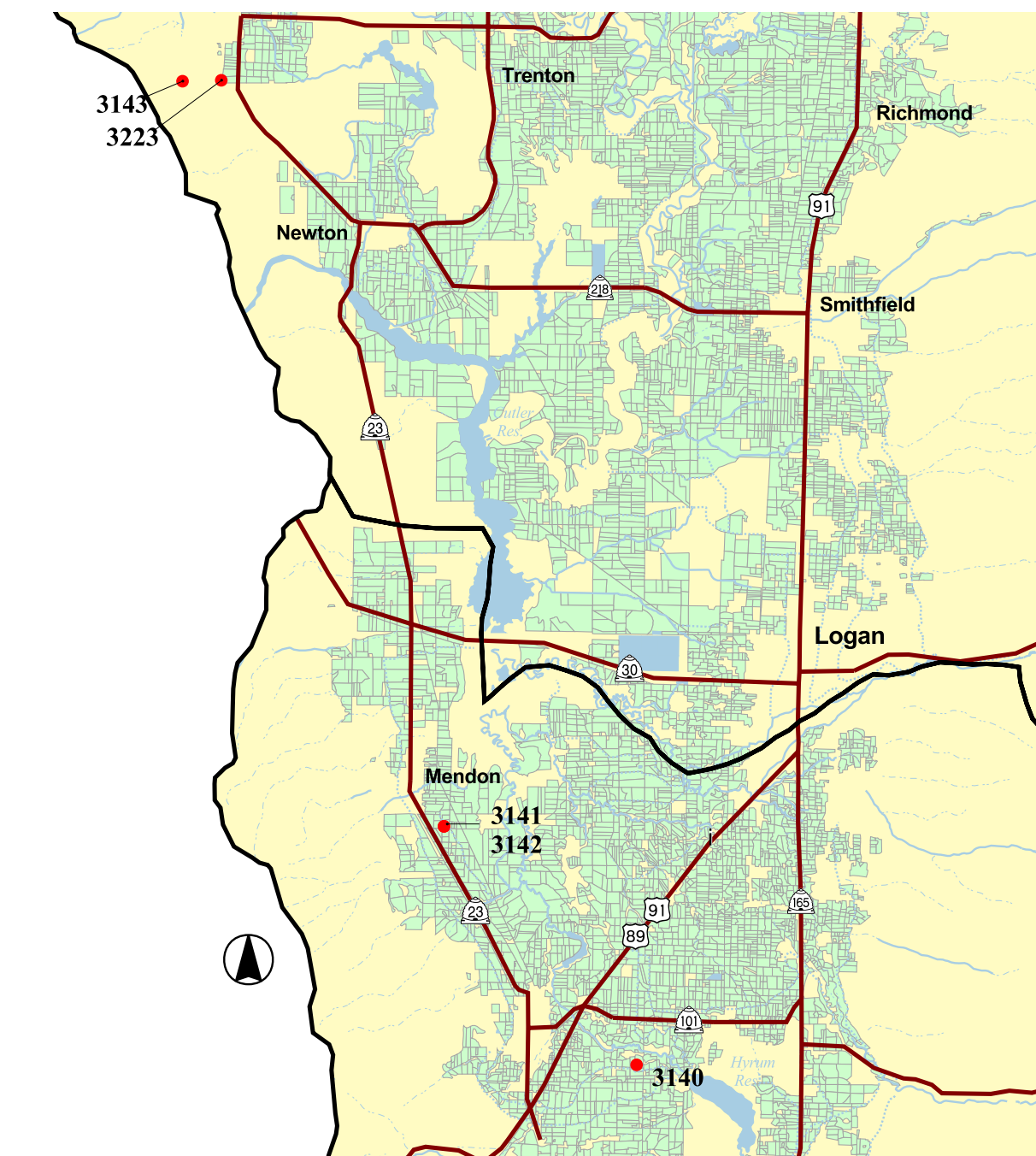
Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

### Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
3143	-0.1000	0.1400	-0.1000	-0.1000	0.0400	0.1800	<u>1.1200</u>	-0.1	-0.1000	9.85	-0.1000	370	-0.10	7.80	0	0	5.7
3223	-0.1000	0.1500	-0.1000	-0.1000	0.0600	0.1900	<u>1.1500</u>	-0.1	-0.1000	10.74	-0.1000	368	-0.10	8.02	0	0	5.5

Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.

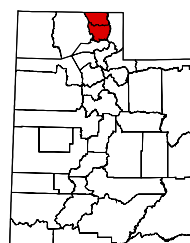
Map 3. Blacksmith Fork and North Cache Districts



- Sample Site
- Irrigated Land
- Water Body
- SCD Boundary
- Major Road
- Other Road
- Water Course
- Ditch or Canal
- Intermittent Stream

Map Scale 1:200,000 (1 inch = 3.2 miles)

District Location



## Northern Utah District

### General:

Thirty-three samples were collected in the Northern Utah District. Water sampled in this district varies from soft to very hard, with grains per gallon (gpg) ranging from 1.71 to 65.81 with a mean of 11.9. Sampled water temperature ranges from 12.8 °C to 27.3 °C, with a mean of 18.6 °C. The pH for the district ranges from 7.07 to 8.89, with a mean of 7.90.

### Irrigation:

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in  $\mu\text{mhos/cm}$ . Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750  $\mu\text{mhos/cm}$ , salt-sensitive plants begin to be affected. When EC exceeds 3,000  $\mu\text{mhos/cm}$ , most plants would be severely injured. Only seven of the thirty-three samples have EC values less than 750  $\mu\text{mhos/cm}$  - 3089 through 3091, 3148 through 3150, and 3234. Nine samples exceed the severe-injury level of 3,000  $\mu\text{mhos/cm}$  - 3096 through 3100, 3106, 3112, 3113, and 3147.

SAR measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 marks the beginning of problems and values greater than 9 indicate severe problems. Most water samples in this district, 3092, 3095, through 3100, 3102 through 3107, 3109, 3110, 3112, 3113, 3144, 3146, and 3147 have elevated SAR values. Samples 3096 through 3100, 3102, 3144, and 3147 exceed the severe level of 9.

Bicarbonate ( $\text{HCO}_3$ ) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l and severe problems appear when it exceeds 8.5 meq/l. All of the samples collected this year have high bicarbonate, except 3099 which is common for water in Utah. Samples 3144 through 3147 exceed 8.5, the level above which severe problems appear.

Some specific elements can be toxic to plants. Samples 3096, 3144, 3146, and 3147 have elevated boron (B), which is toxic to sensitive plants when it exceeds concentrations of 0.7 ppm. Boron causes severe injury at 10.0 ppm. However, boron in trace amounts is required for proper plant growth. It is important to monitor this element because the margin separating health from toxicity is small.

Chlorine (Cl), found in the form of chloride ( $\text{Cl}^-$ ), can damage sensitive plants at concentrations above 145 ppm, and concentrations exceeding 355 ppm can cause severe damage to almost all plants. Damage increases under sprinkler irrigation and is more severe in windy conditions. Samples 3092, 3094, 3095, 3101 through 3111, 3114, 3144, and 3146 have elevated Cl. Many of these samples also exceed the severe level, samples 3092, 3095, and 3103 through 3110.

Iron (Fe) is a micro-nutrient and is required for plant growth. However, when it exceeds concentrations above 5 ppm it can injure plants. Sample 3097 has excess iron.

Manganese (Mn) is a micro-nutrient and is required for plant growth, yet in excess it can damage plants. Manganese above 0.2 ppm can injure plants and cause reduction in dry matter production. Excess manganese interferes with the plant's ability to use other nutrients such as calcium (Ca). Sample 3097 has elevated concentrations of manganese.

No other elements were detected in concentrations harmful to plants.

## **Livestock:**

Dissolved salts in water are measured in the field as Electrical Conductivity (EC). Livestock watering standards, however, are designated as Total Dissolved Solids (TDS), calculated from EC. Values above 5,000 ppm are too high in salts for most livestock. Usually livestock will not drink water of this quality unless forced. Samples 3096 and 3097 exceed the salinity standard for livestock. Sample 3096 is exceedingly high in dissolved solids and could cause severe injury if used to water livestock.

Sulfur (S) in the form of sulfate can cause water to be off flavored and causes diarrhea in animals not used to drinking it. Problems start when the sulfur level in water exceeds 167 ppm. Sample 3147 has sulfur at a concentration of 208.33 ppm, which exceeds the livestock standard for sulfur.

Livestock eating plants irrigated with water that has molybdenum (Mo) concentration greater than 0.01 ppm may be harmed. High concentrations of molybdenum interfere with copper nutrition in livestock. Samples 3144, 3146, and 3147 have elevated molybdenum

## **Culinary:**

Dissolved salts in water are measured in the field as Electrical Conductivity (EC). Culinary standards, however, are designated as Total Dissolved Solids (TDS), calculated from EC. TDS for all samples except 3089 through 3091, 3148 through 3150, and 3234 exceed the EPA aesthetic standard of 500 ppm. Above this level the water may be off-flavored, but it is not a health problem until TDS reaches 2,000 ppm. Samples 3096 through 3100, 3106, 3112, 3113, and 3147 exceed the health standard for TDS.

Arsenic (As) exceeded the primary drinking water standard in sample 3147 with a value of 0.0630 ppm.

High iron (Fe) can cause discoloration of plumbing fixtures and promote the growth of iron bacteria, which stains anything that it contacts. Again, this is an aesthetic issue, not a health concern. Samples 3096, 3097, 3146, and 3234 have high iron.

EPA has set an aesthetic standard of 0.05 ppm for manganese (Mn). Water with high concentrations may cause discoloration of plumbing fixtures and have poor flavor. Samples, 3096, 3097, 3149, and 3234, have high manganese levels.

Sulfate (S) is a soluble form of sulfur that can cause flavor problems in drinking water if its concentration is greater than 83 ppm sulfur. Bacteria in the water use sulfur and produce hydrogen sulfide gas (rotten egg gas). The bacteria that produce this compound can live in plumbing fixtures and even hot water heaters. It is not uncommon to get strong odors when the hot water is turned on in areas where there is high sulfate. Generally, people cannot tolerate the odor from this gas. Even if the gas is not present, high sulfate concentrations can cause diarrhea in people not used to drinking it. Samples 3095, 3096, 3103, 3110, and 3147 have high sulfur.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil, whereas *E. coli*, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of *E. coli* in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well casing, improper grouting, or lack of a casing. *E. coli* contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables.

Seventeen of the thirty-three samples tested positive for coliform bacteria. These include samples 3094, 3098 through 3104, 3106, 3107, 3110, 3112, and 3144 through 3148. Samples 3094, 3098, 3100

through 3102, 3104, and 3144 tested positive for E. coli. Wells from which these samples were collected should be inspected carefully to determine the source of contamination and should not be used for culinary purposes until the problem is corrected.



## Sample Site Test Data for Northern Utah District

### General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
3089	-0.1000	54.26	1.70	0.1300	10.45	15.45	-0.10	7.25	15.9	236
3090	-0.1000	43.08	1.74	0.0600	9.16	13.04	-0.10	7.50	14.5	199
3091	-0.1000	48.03	0.80	-0.1000	8.58	12.07	-0.10	7.30	16.1	192
3092	-0.1000	84.51	10.73	0.6900	35.49	226.82	-0.10	7.55	12.8	1047
3094	-0.1000	56.62	9.32	0.4500	30.22	104.91	-0.10	8.39	23.0	602
3095	-0.1000	183.97	23.16	1.0800	92.28	384.13	-0.10	7.73	13.2	1698
3096	-0.1000	356.24	273.21	28.5900	137.31	7413.59	-0.10	7.07	20.0	19380
3097	-0.1000	181.57	114.82	7.5200	111.05	2437.40	-0.10	8.88	16.5	7938
3098	-0.1000	105.89	44.51	2.7900	61.56	608.63	-0.10	8.89	21.2	2130
3099	-0.1000	122.88	88.93	6.4200	86.17	1270.12	-0.10	8.89	23.6	3528
3100	-0.1000	120.69	37.89	2.3800	71.33	864.43	-0.10	8.05	19.2	2442
3101	-0.1000	93.64	15.02	1.0800	82.64	160.13	-0.10	7.80	23.2	1069
3102	-0.1000	33.32	12.66	1.1200	14.51	297.18	-0.10	8.06	18.8	933
3103	-0.1000	149.67	20.12	1.1400	69.41	311.43	-0.10	7.51	21.8	1284
3104	-0.1000	154.51	17.41	1.0600	61.60	258.51	-0.10	7.78	20.9	1272
3105	-0.1000	160.79	22.82	1.2200	76.65	254.31	-0.10	7.44	18.3	1374
3106	-0.1000	121.98	10.85	0.6900	54.59	250.22	2.83	8.02	27.3	2580
3107	-0.1000	158.12	26.37	0.9300	48.71	330.34	-0.10	7.80	21.1	1422
3108	-0.1000	228.98	20.19	0.4100	55.84	121.86	-0.10	7.61	20.2	1146
3109	-0.1000	123.98	9.49	0.6900	55.30	252.10	-0.10	7.80	20.7	1198
3110	-0.1000	141.86	21.01	1.2600	104.47	361.98	-0.10	7.73	20.4	1548
3111	-0.1000	124.38	12.59	0.2200	29.51	47.92	-0.10	8.02	17.8	665
3112	-0.1000	547.46	38.71	1.0000	129.76	505.26	-0.10	7.46	21.8	3108
3113	-0.1000	933.04	71.61	2.0000	192.34	919.80	-0.10	7.36	24.4	4992
3114	-0.1000	119.82	13.88	0.2300	29.22	46.49	-0.10	7.94	19.1	706
3144	-0.1000	9.13	30.60	2.2700	20.17	487.48	0.23	8.55	13.7	1254
3145	-0.1000	65.40	16.10	1.8800	80.31	111.78	-0.10	7.90	16.3	835
3146	-0.1000	54.77	28.74	2.1400	64.76	331.55	-0.10	8.15	13.4	1152
3147	-0.1000	25.40	84.06	8.9600	36.20	1659.22	0.26	8.64	19.0	3966
3148	-0.1000	48.61	0.78	-0.1000	15.68	10.81	-0.10	7.67	13.0	247
3149	-0.1000	56.61	1.52	0.0600	23.60	13.28	-0.10	7.48	16.0	326
3150	-0.1000	47.23	0.73	-0.1000	8.43	11.19	-0.10	7.80	13.7	191
3234	-0.1000	25.80	4.67	0.4300	14.74	42.82	0.17	8.53	16.6	263

Values of -0.1 are below detection limits of testing procedure.

## Sample Site Test Data for Northern Utah District

### Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
3089	-0.1000	-0.10	10.19	-0.10	0.0300	0.0200	<u>3.14</u>	-0.1000	-0.1000	0.07	0.5	393
3090	-0.1000	-0.10	8.01	-0.10	-0.1000	-0.1000	<u>3.02</u>	-0.1000	-0.1000	-0.10	0.5	332
3091	-0.1000	-0.10	6.01	-0.10	-0.1000	0.0800	<u>3.22</u>	-0.1000	-0.1000	-0.10	0.4	320
3092	-0.1000	0.14	<u>379.93</u>	-0.10	-0.1000	-0.1000	<u>5.33</u>	-0.1000	-0.1000	-0.10	<u>5.2</u>	<u>1,745</u>
3094	0.2200	0.12	<u>159.54</u>	-0.10	-0.1000	0.1500	<u>4.57</u>	-0.1000	-0.1000	-0.10	2.8	<u>1,004</u>
3095	-0.1000	0.19	<u>701.50</u>	-0.10	-0.1000	-0.1000	<u>4.92</u>	-0.1000	-0.1000	-0.10	<u>5.8</u>	<u>2,830</u>
3096	-0.1000	<u>1.25</u>	-0.10	-0.10	0.0400	0.5300	<u>4.63</u>	0.0900	-0.1000	0.04	<u>84.5</u>	<u>32,300</u>
3097	-0.1000	0.38	-0.10	-0.10	-0.1000	<u>10.9600</u>	0.64	<u>1.2800</u>	-0.1000	1.91	<u>35.1</u>	<u>13,230</u>
3098	-0.1000	0.28	-0.10	-0.10	-0.1000	-0.1000	<u>2.28</u>	-0.1000	-0.1000	-0.10	<u>11.6</u>	<u>3,550</u>
3099	-0.1000	0.50	-0.10	0.54	-0.1000	-0.1000	1.47	-0.1000	-0.1000	-0.10	<u>21.5</u>	<u>5,880</u>
3100	-0.1000	0.24	-0.10	-0.10	-0.1000	-0.1000	<u>3.23</u>	0.0200	-0.1000	-0.10	<u>15.4</u>	<u>4,070</u>
3101	-0.1000	0.15	<u>345.00</u>	-0.10	-0.1000	-0.1000	<u>3.82</u>	-0.1000	-0.1000	0.31	2.9	<u>1,781</u>
3102	-0.1000	0.27	<u>314.67</u>	-0.10	-0.1000	-0.1000	<u>4.55</u>	-0.1000	-0.1000	-0.10	<u>10.8</u>	<u>1,555</u>
3103	-0.1000	0.19	<u>536.18</u>	-0.10	0.0300	-0.1000	<u>4.48</u>	-0.1000	-0.1000	0.06	<u>5.3</u>	<u>2,140</u>
3104	-0.1000	0.15	<u>607.00</u>	-0.10	0.0200	-0.1000	<u>3.45</u>	-0.1000	-0.1000	-0.10	<u>4.4</u>	<u>2,120</u>
3105	-0.1000	0.16	<u>636.15</u>	-0.10	-0.1000	0.0200	<u>3.68</u>	-0.1000	-0.1000	-0.10	<u>4.1</u>	<u>2,290</u>
3106	-0.1000	0.16	<u>512.49</u>	-0.10	-0.1000	0.0700	<u>3.47</u>	-0.1000	-0.1000	-0.10	<u>4.7</u>	<u>4,300</u>
3107	-0.1000	0.13	<u>671.46</u>	-0.10	0.0300	-0.1000	<u>4.09</u>	-0.1000	-0.1000	0.07	<u>5.9</u>	<u>2,370</u>
3108	-0.1000	0.09	<u>599.26</u>	-0.10	0.0200	-0.1000	<u>2.26</u>	-0.1000	-0.1000	-0.10	1.9	<u>1,910</u>
3109	-0.1000	0.12	<u>501.56</u>	-0.10	0.0300	0.0200	<u>3.47</u>	-0.1000	-0.1000	0.06	<u>4.7</u>	<u>1,996</u>
3110	-0.1000	0.30	<u>616.92</u>	-0.10	0.0600	-0.1000	<u>4.77</u>	-0.1000	-0.1000	0.04	<u>5.6</u>	<u>2,580</u>
3111	-0.1000	0.07	<u>255.22</u>	-0.10	-0.1000	0.0300	<u>2.46</u>	-0.1000	-0.1000	0.04	1.0	<u>1,109</u>
3112	-0.1000	0.12	-0.10	-0.10	-0.1000	0.0200	<u>2.01</u>	-0.1000	-0.1000	-0.10	<u>5.0</u>	<u>5,180</u>
3113	-0.1000	0.16	-0.10	-0.10	-0.1000	-0.1000	<u>1.82</u>	-0.1000	-0.1000	-0.10	<u>7.2</u>	<u>8,320</u>
3114	-0.1000	0.07	<u>306.05</u>	-0.10	0.0400	-0.1000	<u>2.36</u>	-0.1000	-0.1000	0.05	1.0	<u>1,177</u>
3144	-0.1000	<u>1.25</u>	<u>308.25</u>	-0.10	0.0400	-0.1000	<u>11.48</u>	0.0200	-0.1000	-0.10	<u>20.6</u>	<u>2,090</u>
3145	-0.1000	0.54	143.00	-0.10	0.0800	0.0300	<u>9.50</u>	0.0400	-0.1000	-0.10	2.2	<u>1,392</u>
3146	-0.1000	<u>0.97</u>	<u>270.02</u>	-0.10	0.0600	1.0200	<u>8.86</u>	0.0400	-0.1000	0.04	<u>7.2</u>	<u>1,920</u>
3147	-0.1000	<u>2.33</u>	-0.10	-0.10	0.0600	0.0200	<u>16.68</u>	-0.1000	-0.1000	-0.10	<u>49.5</u>	<u>6,610</u>
3148	-0.1000	-0.10	14.30	-0.10	0.0200	-0.1000	<u>4.96</u>	-0.1000	-0.1000	-0.10	0.3	412
3149	-0.1000	0.07	19.63	-0.10	0.0300	0.0400	<u>7.21</u>	0.1300	-0.1000	0.04	0.4	543
3150	-0.1000	-0.10	6.01	-0.10	0.0400	0.0800	<u>5.04</u>	-0.1000	-0.1000	0.53	0.4	318
3234	-0.1000	0.09	18.73	-0.10	0.0400	0.3700	<u>4.32</u>	0.1300	-0.1000	-0.10	1.7	439

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

## Sample Site Test Data for Northern Utah District

### Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
3089	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	6.30	-0.1000	236	-0.1000	0.07
3090	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	5.49	-0.1000	199	-0.1000	-0.10
3091	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	4.85	-0.1000	192	-0.1000	-0.10
3092	-0.1000	-0.1000	0.14	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	22.75	-0.1000	1,047	-0.1000	-0.10
3094	0.2200	-0.1000	0.12	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	19.81	-0.1000	602	-0.1000	-0.10
3095	-0.1000	-0.1000	0.19	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	130.51	-0.1000	1,698	-0.1000	-0.10
3096	-0.1000	-0.1000	1.25	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	158.36	-0.1000	19,380	-0.1000	0.04
3097	-0.1000	-0.1000	0.38	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	39.72	-0.1000	7,938	-0.1000	1.91
3098	-0.1000	-0.1000	0.28	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	42.74	-0.1000	2,130	-0.1000	-0.10
3099	-0.1000	-0.1000	0.50	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	69.37	-0.1000	3,528	-0.1000	-0.10
3100	-0.1000	-0.1000	0.24	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	48.18	-0.1000	2,442	-0.1000	-0.10
3101	-0.1000	-0.1000	0.15	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	72.91	-0.1000	1,069	-0.1000	0.31
3102	-0.1000	-0.1000	0.27	-0.1000	-0.1000	-0.1000	0.0100	-0.1000	-0.1000	24.05	-0.1000	933	-0.1000	-0.10
3103	-0.1000	-0.1000	0.19	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	90.65	-0.1000	1,284	-0.1000	0.06
3104	-0.1000	-0.1000	0.15	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	47.36	-0.1000	1,272	-0.1000	-0.10
3105	-0.1000	-0.1000	0.16	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	70.10	-0.1000	1,374	-0.1000	-0.10
3106	-0.1000	-0.1000	0.16	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	38.71	-0.1000	2,580	0.0100	-0.10
3107	-0.1000	-0.1000	0.13	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	70.14	-0.1000	1,422	-0.1000	0.07
3108	-0.1000	-0.1000	0.09	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	18.90	-0.1000	1,146	-0.1000	-0.10
3109	-0.1000	-0.1000	0.12	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	36.44	-0.1000	1,198	-0.1000	0.06
3110	-0.1000	-0.1000	0.30	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	158.67	-0.1000	1,548	-0.1000	0.04
3111	-0.1000	-0.1000	0.07	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	13.09	-0.1000	665	-0.1000	0.04
3112	-0.1000	-0.1000	0.12	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	27.22	-0.1000	3,108	-0.1000	-0.10
3113	-0.1000	-0.1000	0.16	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	37.72	-0.1000	4,992	-0.1000	-0.10
3114	-0.1000	-0.1000	0.07	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	11.71	-0.1000	706	-0.1000	0.05
3144	-0.1000	0.0300	1.25	-0.1000	-0.1000	-0.1000	0.0700	-0.1000	-0.1000	65.73	-0.1000	1,254	0.0100	-0.10
3145	-0.1000	-0.1000	0.54	-0.1000	-0.1000	-0.1000	0.0100	-0.1000	-0.1000	33.49	-0.1000	835	-0.1000	-0.10
3146	-0.1000	-0.1000	0.97	-0.1000	-0.1000	-0.1000	0.1100	-0.1000	-0.1000	74.48	-0.1000	1,152	-0.1000	0.04
3147	-0.1000	0.0700	2.33	-0.1000	-0.1000	-0.1000	0.1100	-0.1000	-0.1000	208.33	-0.1000	3,966	0.0200	-0.10
3148	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	3.58	-0.1000	247	-0.1000	-0.10
3149	-0.1000	-0.1000	0.07	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	16.24	-0.1000	326	-0.1000	0.04
3150	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	5.17	-0.1000	191	-0.1000	0.53
3234	-0.1000	-0.1000	0.09	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	6.53	-0.1000	263	-0.1000	-0.10

Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

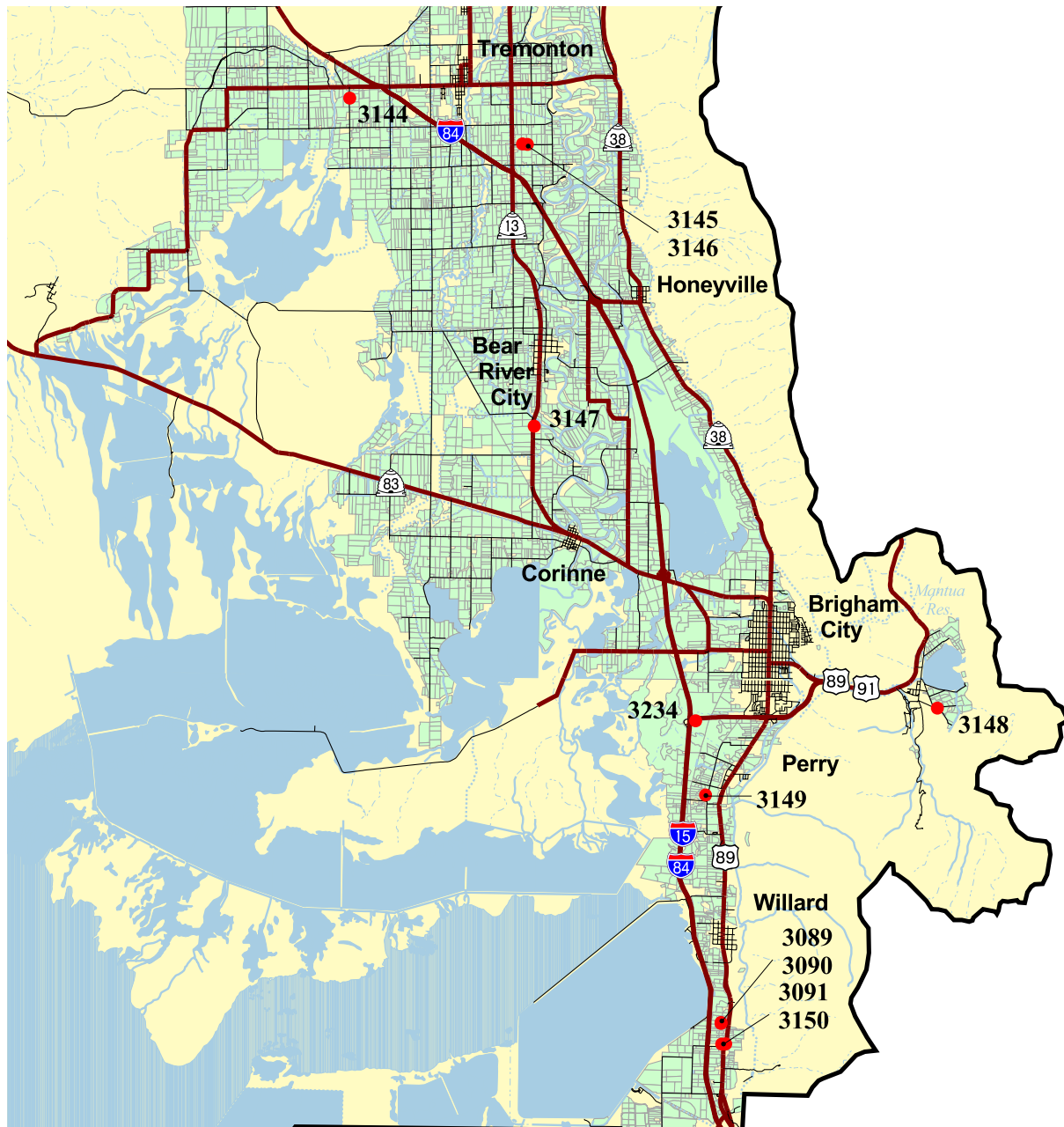
## Sample Site Test Data for Northern Utah District

### Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
3089	-0.1000	0.0800	-0.1000	-0.1000	0.0300	0.0200	-0.1000	3.5	-0.1000	6.30	-0.1000	236	0.07	7.25	0	0	3.8
3090	-0.1000	0.0500	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.3	-0.1000	5.49	-0.1000	199	-0.10	7.50	0	0	3.1
3091	-0.1000	0.0600	-0.1000	-0.1000	-0.1000	0.0800	-0.1000	0.2	-0.1000	4.85	-0.1000	192	-0.10	7.30	0	0	3.3
3092	-0.1000	0.1100	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.3	-0.1000	22.75	-0.1000	1,047	-0.10	7.55	0	0	7.0
3094	-0.1000	0.0800	-0.1000	-0.1000	-0.1000	0.1500	-0.1000	0.3	-0.1000	19.81	-0.1000	602	-0.10	8.39	1	1	5.1
3095	-0.1000	0.0600	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.0	-0.1000	130.51	-0.1000	1,698	-0.10	7.73	0	0	16.2
3096	-0.1000	0.0500	-0.1000	-0.1000	0.0400	0.5300	0.0900	-0.1	-0.1000	158.36	-0.1000	19,380	0.04	7.07	0	0	28.9
3097	-0.1000	0.3300	-0.1000	-0.1000	-0.1000	10.9600	1.2800	0.3	-0.1000	39.72	-0.1000	7,938	1.91	8.88	0	0	17.1
3098	-0.1000	0.0900	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1	-0.1000	42.74	-0.1000	2,130	-0.10	8.89	1	1	9.8
3099	-0.1000	0.1700	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1	-0.1000	69.37	-0.1000	3,528	-0.10	8.89	1	0	12.2
3100	-0.1000	0.0700	-0.1000	-0.1000	-0.1000	-0.1000	0.0200	0.3	-0.1000	48.18	-0.1000	2,442	-0.10	8.05	1	1	11.2
3101	-0.1000	0.0600	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.7	-0.1000	72.91	-0.1000	1,069	0.31	7.80	1	1	10.3
3102	-0.1000	0.0700	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.4	-0.1000	24.05	-0.1000	933	-0.10	8.06	1	1	2.8
3103	-0.1000	0.0800	-0.1000	-0.1000	0.0300	-0.1000	-0.1000	0.4	-0.1000	90.65	-0.1000	1,284	0.06	7.51	1	0	12.8
3104	-0.1000	0.2100	-0.1000	-0.1000	0.0200	-0.1000	-0.1000	1.4	-0.1000	47.36	-0.1000	1,272	-0.10	7.78	1	1	12.6
3105	-0.1000	0.1800	-0.1000	-0.1000	-0.1000	0.0200	-0.1000	1.7	-0.1000	70.10	-0.1000	1,374	-0.10	7.44	0	0	13.9
3106	-0.1000	0.1400	-0.1000	-0.1000	-0.1000	0.0700	-0.1000	1.1	-0.1000	38.71	-0.1000	2,580	-0.10	8.02	1	0	10.3
3107	-0.1000	0.0800	-0.1000	-0.1000	0.0300	-0.1000	-0.1000	1.7	-0.1000	70.14	-0.1000	1,422	0.07	7.80	1	0	12.1
3108	-0.1000	0.3200	-0.1000	-0.1000	0.0200	-0.1000	-0.1000	3.0	-0.1000	18.90	-0.1000	1,146	-0.10	7.61	0	0	16.7
3109	-0.1000	0.1600	-0.1000	-0.1000	0.0300	0.0200	-0.1000	0.7	-0.1000	36.44	-0.1000	1,198	0.06	7.80	0	0	10.5
3110	-0.1000	0.0400	-0.1000	-0.1000	0.0600	-0.1000	-0.1000	2.7	-0.1000	158.67	-0.1000	1,548	0.04	7.73	1	0	14.4
3111	-0.1000	0.2600	-0.1000	-0.1000	-0.1000	0.0300	-0.1000	1.5	-0.1000	13.09	-0.1000	665	0.04	8.02	0	0	9.0
3112	-0.1000	0.8300	-0.1000	-0.1000	-0.1000	0.0200	-0.1000	2.1	-0.1000	27.22	-0.1000	3,108	-0.10	7.46	1	0	39.6
3113	-0.1000	0.9400	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.5	-0.1000	37.72	-0.1000	4,992	-0.10	7.36	0	0	65.8
3114	-0.1000	0.2900	-0.1000	-0.1000	0.0400	-0.1000	-0.1000	1.0	-0.1000	11.71	-0.1000	706	0.05	7.94	0	0	8.7
3144	0.0300	0.0200	-0.1000	-0.1000	0.0400	-0.1000	0.0200	7.8	-0.1000	65.73	-0.1000	1,254	-0.10	8.55	1	1	1.7
3145	-0.1000	0.1200	-0.1000	-0.1000	0.0800	0.0300	0.0400	5.8	-0.1000	33.49	-0.1000	835	-0.10	7.90	1	0	8.5
3146	-0.1000	0.0500	-0.1000	-0.1000	0.0600	1.0200	0.0400	8.1	-0.1000	74.48	-0.1000	1,152	0.04	8.15	1	0	7.0
3147	0.0700	0.0400	-0.1000	-0.1000	0.0600	0.0200	-0.1000	7.8	-0.1000	208.33	-0.1000	3,966	-0.10	8.64	1	0	3.6
3148	-0.1000	0.0300	-0.1000	-0.1000	0.0200	-0.1000	-0.1000	2.1	-0.1000	3.58	-0.1000	247	-0.10	7.67	1	0	3.8
3149	-0.1000	0.0500	-0.1000	-0.1000	0.0300	0.0400	0.1300	2.6	-0.1000	16.24	-0.1000	326	0.04	7.48	0	0	4.7
3150	-0.1000	0.0600	-0.1000	-0.1000	0.0400	0.0800	-0.1000	1.2	-0.1000	5.17	-0.1000	191	0.53	7.80	0	0	3.3
3234	-0.1000	0.1100	-0.1000	-0.1000	0.0400	0.3700	0.1300	-0.1	-0.1000	6.53	-0.1000	263	-0.10	8.53	0	0	2.4

Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.

# Map 4. Northern Utah District - Eastern Section

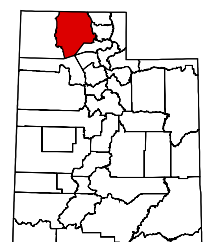


Map Scale 1: 264,465 (1 inch = 4.2 miles)

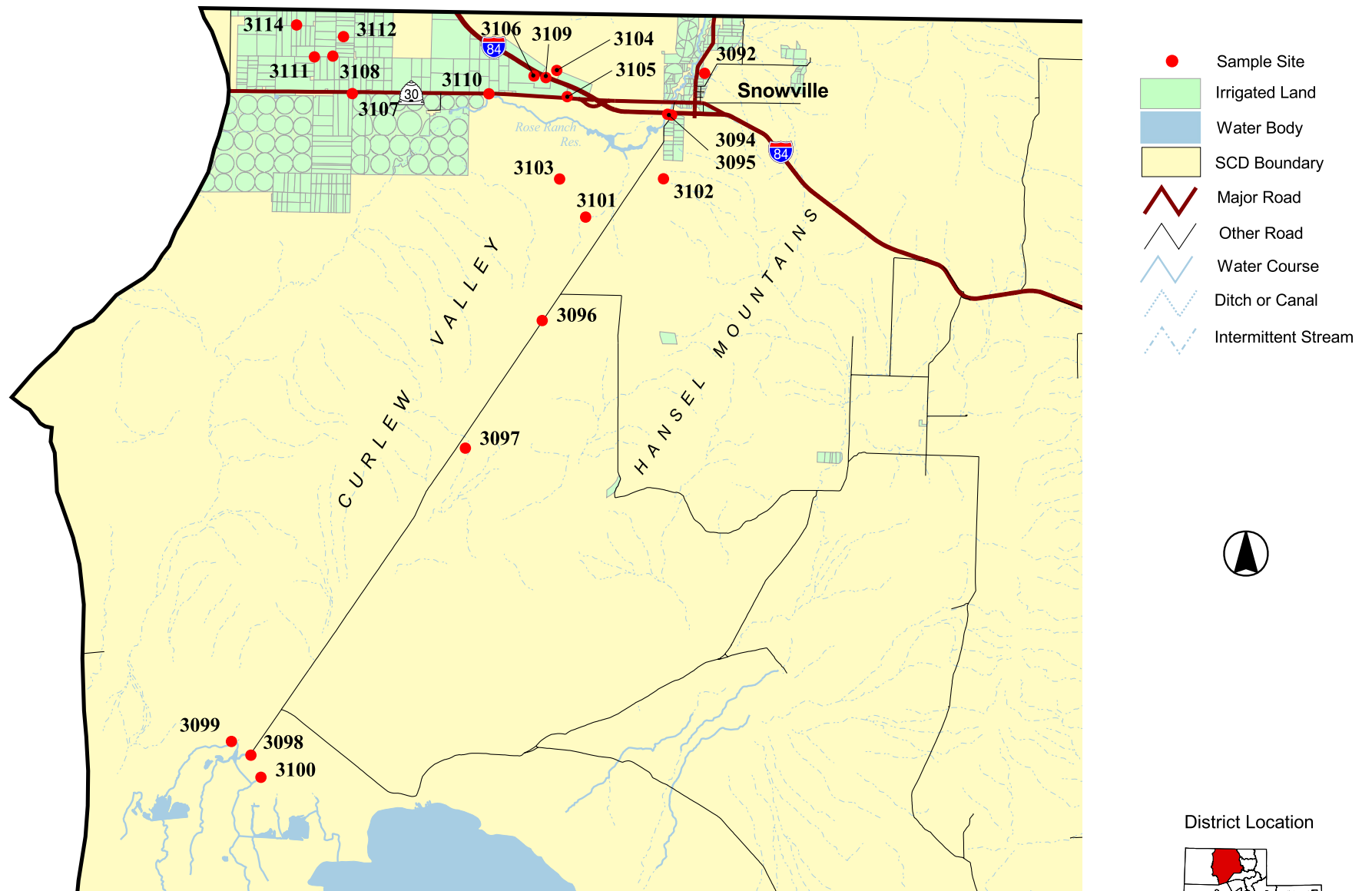
- Sample Site
- Irrigated Land
- Water Body
- SCD Boundary
- Major Road
- Other Road
- Water Course
- Ditch or Canal
- Intermittent Stream



District Location



Map 5. Northern Utah District - Western Section



Map Scale 1:220,439 (1 inch = 3.5 miles)



## Zone 2

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UACD Zone 2 consists of six districts in six counties including Weber, Morgan, Davis, Salt Lake, and Tooele counties.

Thirty-three sites were sampled in the six districts of Zone 2 during the spring, summer, and fall of 2003 with five sampled in the Davis County District, five in the Grantsville District, two in Morgan, thirteen in the Salt Lake District, and eight in the Weber District. A separate narrative report is presented for each district with maps showing the location of the sample sites. Each report covers three categories of water quality criteria: irrigation, livestock and culinary. Data are presented in four tables for each zone. These include general parameters: temperature, pH, total dissolved solids (TDS) and chemicals for which there are no standards; irrigation, livestock, and drinking water parameters.

### Davis County District

#### General:

Five samples were collected in the Davis County District. Samples in this district tested soft to moderate with grains per gallon (gpg) values of 0.4 to 6.9. Sampled water temperature ranges from 12.8 °C to 15.7 °C, with a mean of 14.0 °C. The pH for the district ranges from 7.28 to 9.14 with a mean of 8.22.

#### Irrigation:

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in  $\mu\text{mhos/cm}$ . Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750  $\mu\text{mhos/cm}$ , salt-sensitive plants begin to be affected. When EC exceeds 3,000  $\mu\text{mhos/cm}$ , most plants would be severely injured. Samples 3021, 3023, and 3069 exceed the irrigation standard of 750  $\mu\text{mhos/cm}$ .

The sodium absorption ratio (SAR) measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 marks the beginning of problems and values greater than 9 indicate severe problems. Samples 3021 and 3023 exceed the SAR standard of 3.

Bicarbonate ( $\text{HCO}_3$ ) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l, and severe problems appear when it exceeds 8.5 meq/l. All samples have high bicarbonate, which is common for water in Utah with samples 3021 and 3023 exceeding the 8.5 severe standard.

Some specific elements can be toxic to plants. Boron (B) causes severe injury at 10.0 ppm. However, boron in trace amounts is required for proper plant growth. It is important to monitor this element because the margin separating health from toxicity is small. Samples 3021 and 3023 have elevated boron which is toxic to sensitive plants when it exceeds concentrations of 0.7 ppm.

No other elements were above concentrations that are harmful to plants.

**Livestock:**

No livestock standards were exceeded.

**Culinary:**

Dissolved salts in water are measured in the field as Electrical Conductivity (EC). Culinary standards, however, are designated as Total Dissolved Solids (TDS), calculated from EC. TDS for samples 3021, 3023, and 3069 exceed the EPA aesthetic standard of 500 ppm. In excess of 500 ppm the water may be off-flavored, but it is not a health problem until TDS reaches 2,000 ppm.

High iron (Fe) can cause discoloration of plumbing fixtures and promote the growth of iron bacteria, which stains anything that it contacts. Again, this is an aesthetic issue, not a health concern. Sample 3021 has high iron concentrations.

EPA has set an aesthetic standard of 0.05 ppm for manganese. Water with high concentrations may cause discoloration of plumbing fixtures and have poor flavor. Sample 3022 has high manganese (Mn) levels.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil, whereas *E. coli*, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of *E. coli* in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well casing, improper grouting, or lack of a casing. *E. coli* contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables. Sample 3023 from this district was found to have coliform bacterial contamination.

## Sample Site Test Data for Davis County District

### General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
3021	-0.1000	4.35	15.42	0.9000	3.42	273.88	1.02	8.71	13.3	723
3022	-0.1000	32.52	1.80	0.0700	7.16	21.76	-0.10	7.28	13.3	174
3023	-0.1000	4.22	14.94	0.8600	3.17	316.12	1.29	8.69	15.0	728
3069	-0.1000	87.47	2.57	0.2000	30.71	83.78	-0.10	7.30	15.7	622
3299	-0.1000	66.99	4.40	0.2200	32.53	89.15	-0.10	9.14	12.8	187

Values of -0.1 are below detection limits of testing procedure.

### Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
3021	0.5300	<u>0.71</u>	87.73	-0.10	-0.1000	0.4100	<u>10.26</u>	-0.1000	-0.1000	-0.10	<u>24</u>	<u>1,205</u>
3022	-0.1000	-0.10	13.46	-0.10	-0.1000	0.2700	<u>2.81</u>	0.1100	-0.1000	-0.10	1	290
3023	0.1400	<u>0.85</u>	73.28	-0.10	-0.1000	0.2100	<u>12.41</u>	-0.1000	-0.1000	-0.10	<u>28</u>	<u>1,214</u>
3069	-0.1000	0.10	92.23	-0.10	0.0200	-0.1000	<u>6.42</u>	-0.1000	-0.1000	0.14	2	<u>1,036</u>
3299	-0.1000	0.28	63.29	-0.10	0.0200	-0.1000	<u>6.32</u>	-0.1000	-0.1000	0.63	2	312

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

### Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
3021	0.5300	0.0300	0.71	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.04	-0.1000	723	-0.1000	-0.10
3022	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.89	-0.1000	174	-0.1000	-0.10
3023	0.1400	0.0400	0.85	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.99	-0.1000	728	-0.1000	-0.10
3069	-0.1000	-0.1000	0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	37.56	-0.1000	622	-0.1000	0.14
3299	-0.1000	-0.1000	0.28	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	34.67	-0.1000	187	-0.1000	0.63

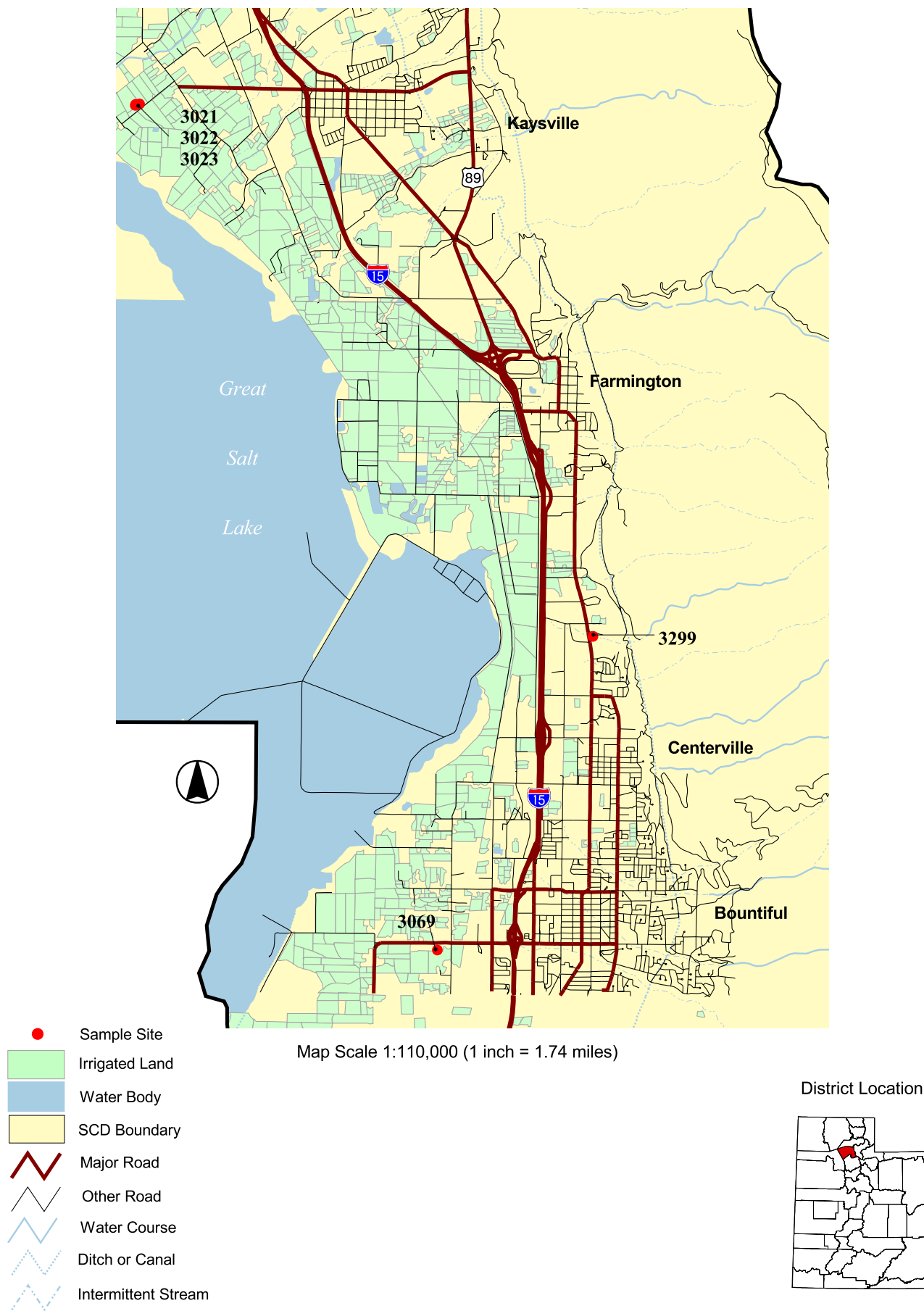
Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

### Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
3021	0.0300	0.1900	-0.1000	-0.1000	-0.1000	<u>0.4100</u>	-0.1000	-0.1	-0.1000	1.04	-0.1000	<u>723</u>	-0.10	<u>8.71</u>	0	0	0.5
3022	-0.1000	0.2600	-0.1000	-0.1000	-0.1000	0.2700	<u>0.1100</u>	-0.1	-0.1000	0.89	-0.1000	174	-0.10	7.28	0	0	2.3
3023	0.0400	0.1600	-0.1000	-0.1000	-0.1000	0.2100	-0.1000	-0.1	-0.1000	0.99	-0.1000	<u>728</u>	-0.10	<u>8.69</u>	<u>1</u>	0	0.4
3069	-0.1000	0.0900	-0.1000	-0.1000	0.0200	-0.1000	-0.1000	2.8	-0.1000	37.56	-0.1000	<u>622</u>	0.14	7.30	0	0	6.9
3299	-0.1000	0.0400	-0.1000	-0.1000	0.0200	-0.1000	-0.1000	-0.1	-0.1000	34.67	-0.1000	187	0.63	<u>9.14</u>	0	0	5.8

Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.

Map 6. Davis County District



## **Grantsville District**

### **General:**

Five wells were samples in the Grantsville District. The water sampled in this district varies from moderate to hard, with grains per gallon (gpg) readings from 5.6 to 7.5 with a mean of 6.5. Sampled water temperature ranges from 13.3 °C to 19.6 °C, with a mean of 16.46 °C. The pH for this district ranges from 7.63 to 8.23 with a mean of 7.87.

### **Irrigation:**

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in  $\mu\text{mhos/cm}$ . Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750  $\mu\text{mhos/cm}$ , salt-sensitive plants begin to be affected. When EC exceeds 3,000  $\mu\text{mhos/cm}$ , most plants would be severely injured. All wells in this area exceeded the irrigation standard of 750  $\mu\text{mhos/cm}$ . None exceed the severe level of 3,000  $\mu\text{mhos/cm}$ .

SAR measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3, marks the beginning of problems and values greater than 9 indicate severe problems. No samples have elevated SAR.

Bicarbonate ( $\text{HCO}_3$ ) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l and severe problems appear when it exceeds 8.5 meq/l. All samples collected in this area have high bicarbonate, which is common for water in Utah. No samples exceeded the severe level of 8.5 meq/l.

Some elements are toxic to plants. Chlorine, found in the form of Chloride ( $\text{Cl}^-$ ), can damage sensitive plants at concentrations above 145 ppm and concentrations exceeding 355 ppm can cause severe damage to almost all plants. Damage increases under sprinkler irrigation and is more severe in windy conditions. Water from sample 3129 could cause damage to plants.

No other elements were above concentrations that are harmful to plants.

### **Livestock:**

No water quality standards for livestock were exceeded.

### **Culinary:**

Dissolved salts in water are measured in the field as Electrical Conductivity (EC). Culinary standards, however, are designated as Total Dissolved Solids (TDS), calculated from EC. TDS for all samples exceed the EPA aesthetic standard of 500 ppm. In excess of 500 ppm the water may be off-flavored but it is not a health problem until TDS reaches 2,000 ppm.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil, whereas *E. coli*, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of *E. coli* in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the

result of well construction problems. Contamination may result from inadequate capping, a leaking well casing, improper grouting, or lack of a casing. E. coli contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables. A coliform bacterium was detected in sample 3068.

## Sample Site Test Data for Grantsville District

### General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
3068	-0.1000	64.90	2.93	0.2100	30.26	58.01	-0.10	7.76	16.3	512
3129	-0.1000	84.79	2.86	0.2400	38.08	54.89	-0.10	7.63	19.6	597
3130	-0.1000	86.64	1.63	0.1100	42.20	69.23	-0.10	7.73	16.0	635
3131	-0.1000	79.68	1.72	0.1600	26.79	85.89	-0.10	8.02	17.1	587
3221	-0.1000	79.14	1.86	0.1700	26.75	85.85	-0.10	8.23	13.3	553

Values of -0.1 are below detection limits of testing procedure.

### Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
3068	-0.1000	0.07	106.58	-0.10	-0.1000	-0.1000	<u>5.62</u>	-0.1000	-0.1000	0.06	1.5	<u>854</u>
3129	-0.1000	-0.10	<u>145.15</u>	-0.10	-0.1000	-0.1000	<u>4.86</u>	-0.1000	-0.1000	0.25	1.2	<u>995</u>
3130	-0.1000	0.09	93.18	-0.10	-0.1000	-0.1000	<u>4.65</u>	-0.1000	-0.1000	0.10	1.5	<u>1,058</u>
3131	-0.1000	-0.10	103.89	-0.10	-0.1000	0.0300	<u>3.93</u>	-0.1000	-0.1000	-0.10	2.1	<u>979</u>
3221	-0.1000	0.07	84.15	-0.10	0.0300	-0.1000	<u>3.43</u>	-0.1000	-0.1000	-0.10	2.1	<u>921</u>

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

### Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
3068	-0.1000	-0.1000	0.07	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	15.94	-0.1000	512	-0.1000	0.06
3129	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	23.68	-0.1000	597	-0.1000	0.25
3130	-0.1000	-0.1000	0.09	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	66.31	-0.1000	635	-0.1000	0.10
3131	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	58.32	-0.1000	587	-0.1000	-0.10
3221	-0.1000	-0.1000	0.07	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	65.55	-0.1000	553	-0.1000	-0.10

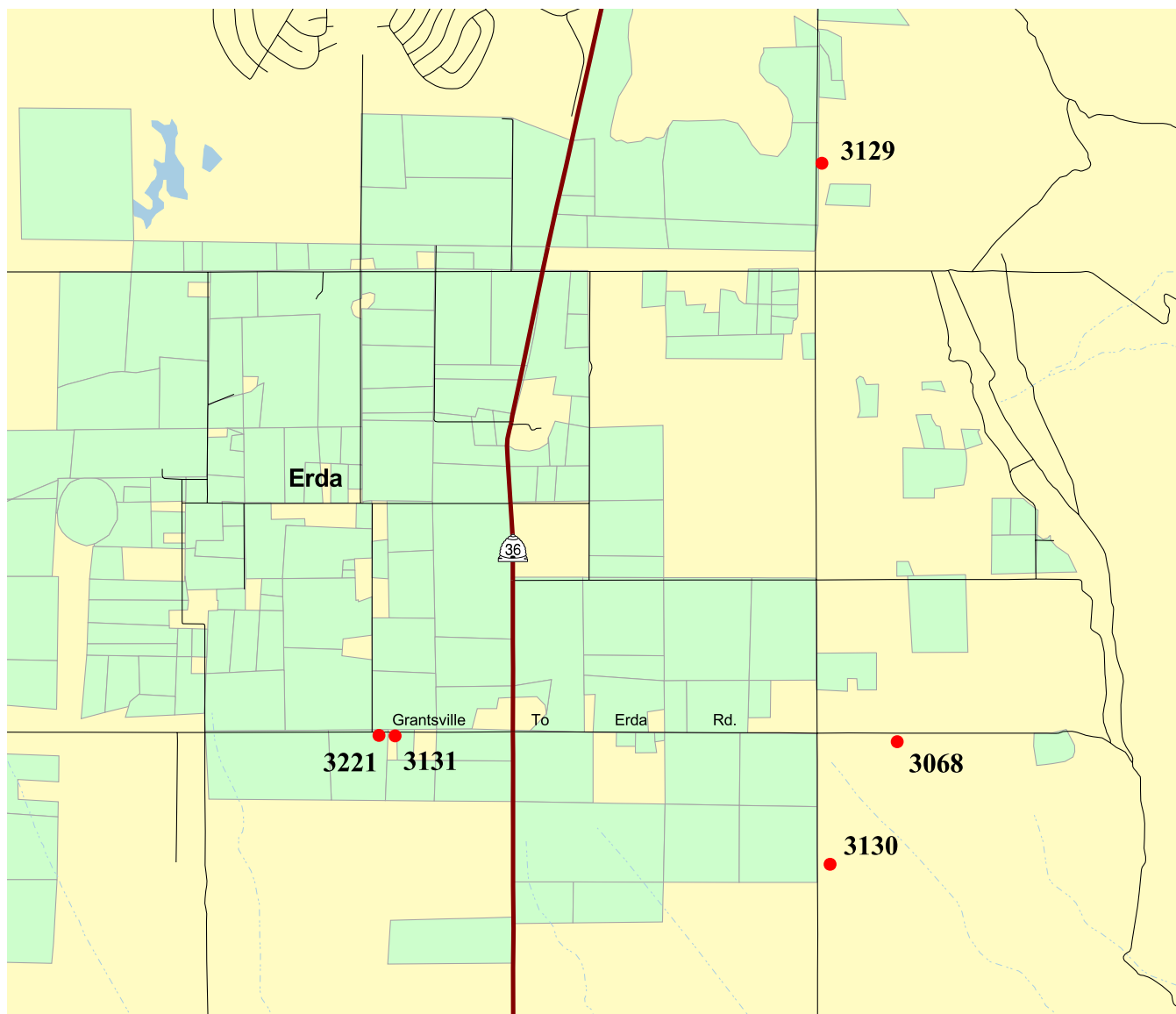
Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

### Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
3068	-0.1000	0.1300	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.8	-0.1000	15.94	-0.1000	<u>512</u>	0.06	7.76	1	0	5.6
3129	-0.1000	0.1100	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	2.5	-0.1000	23.68	-0.1000	<u>597</u>	0.25	7.63	0	0	7.2
3130	-0.1000	0.0400	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	3.8	-0.1000	66.31	-0.1000	<u>635</u>	0.10	7.73	0	0	7.5
3131	-0.1000	0.1200	-0.1000	-0.1000	-0.1000	0.0300	-0.1000	2.8	-0.1000	58.32	-0.1000	<u>587</u>	-0.10	8.02	0	0	6.2
3221	-0.1000	0.1200	-0.1000	-0.1000	0.0300	-0.1000	-0.1000	3.8	-0.1000	65.55	-0.1000	<u>553</u>	-0.10	8.23	0	0	6.2

Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.

## Map 7. Grantsville District

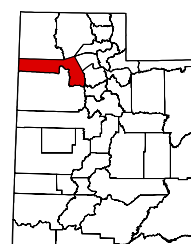


Map Scale 1:35,000 (1 inch = 0.55 miles)

- Sample Site
- Irrigated Land
- Water Body
- SCD Boundary
- Major Road
- Other Road
- Water Course
- Ditch or Canal
- Intermittent Stream



District Location





## **Morgan District**

### **General:**

Two samples were collected in the Morgan District. Samples in this district tested soft to moderate with grains per gallon (gpg) values of 4.8 and 7.46 with a average 6.1. Sampled water temperature ranges from 11.7 °C to 14.4 °C, with a mean of 13.0 °C. The pH for the district ranges from 7.19 to 7.42 with a mean of 7.31.

### **Irrigation:**

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in  $\mu\text{mhos/cm}$ . Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750  $\mu\text{mhos/cm}$ , salt-sensitive plants begin to be affected. When EC exceeds 3,000  $\mu\text{mhos/cm}$ , most plants would be severely injured. No samples exceed the irrigation standard of 750  $\mu\text{mhos/cm}$ .

The sodium absorption ratio (SAR) measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 marks the beginning of problems and values greater than 9 indicate severe problems. No samples exceed the SAR standard of 3.

Bicarbonate ( $\text{HCO}_3$ ) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l, and severe problems appear when it exceeds 8.5 meq/l. Both samples have high bicarbonate, which is common for water in Utah neither sample exceeds the 8.5 severe standard.

No other elements were above concentrations that are harmful to plants.

### **Livestock:**

No livestock standards were exceeded.

### **Culinary:**

Dissolved salts in water are measured in the field as Electrical Conductivity (EC). Culinary standards, however, are designated as Total Dissolved Solids (TDS), calculated from EC. In excess of 500 ppm the water may be off-flavored, but it is not a health problem until TDS reaches 2,000 ppm. Neither sample exceeds the 500 ppm level.

EPA has set an aesthetic standard of 0.05 ppm for manganese (Mn). Water with high concentrations may cause discoloration of plumbing fixtures and have poor flavor. Sample 3027 has high manganese levels.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil, whereas *E. coli*, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of *E. coli* in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the

result of well construction problems. Contamination may result from inadequate capping, a leaking well casing, improper grouting, or lack of a casing. E. coli contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables.

Sample 3027 from this district was found to have coliform bacterial contamination.

## Sample Site Test Data for Morgan District

### General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
3027	-0.1000	67.05	4.09	0.0900	15.12	25.02	-0.10	7.42	14.4	277
3028	-0.1000	106.26	2.70	0.1100	21.42	33.65	-0.10	7.19	11.7	440

Values of -0.1 are below detection limits of testing procedure.

### Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
3027	-0.1000	-0.10	31.31	-0.10	-0.1000	0.0200	<u>4.03</u>	0.0800	-0.1000	0.06	0.7	462
3028	-0.1000	-0.10	61.43	-0.10	-0.1000	-0.1000	<u>5.08</u>	-0.1000	-0.1000	0.08	0.8	734

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

### Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
3027	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	5.37	-0.1000	277	-0.1000	0.06
3028	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	16.87	-0.1000	440	-0.1000	0.08

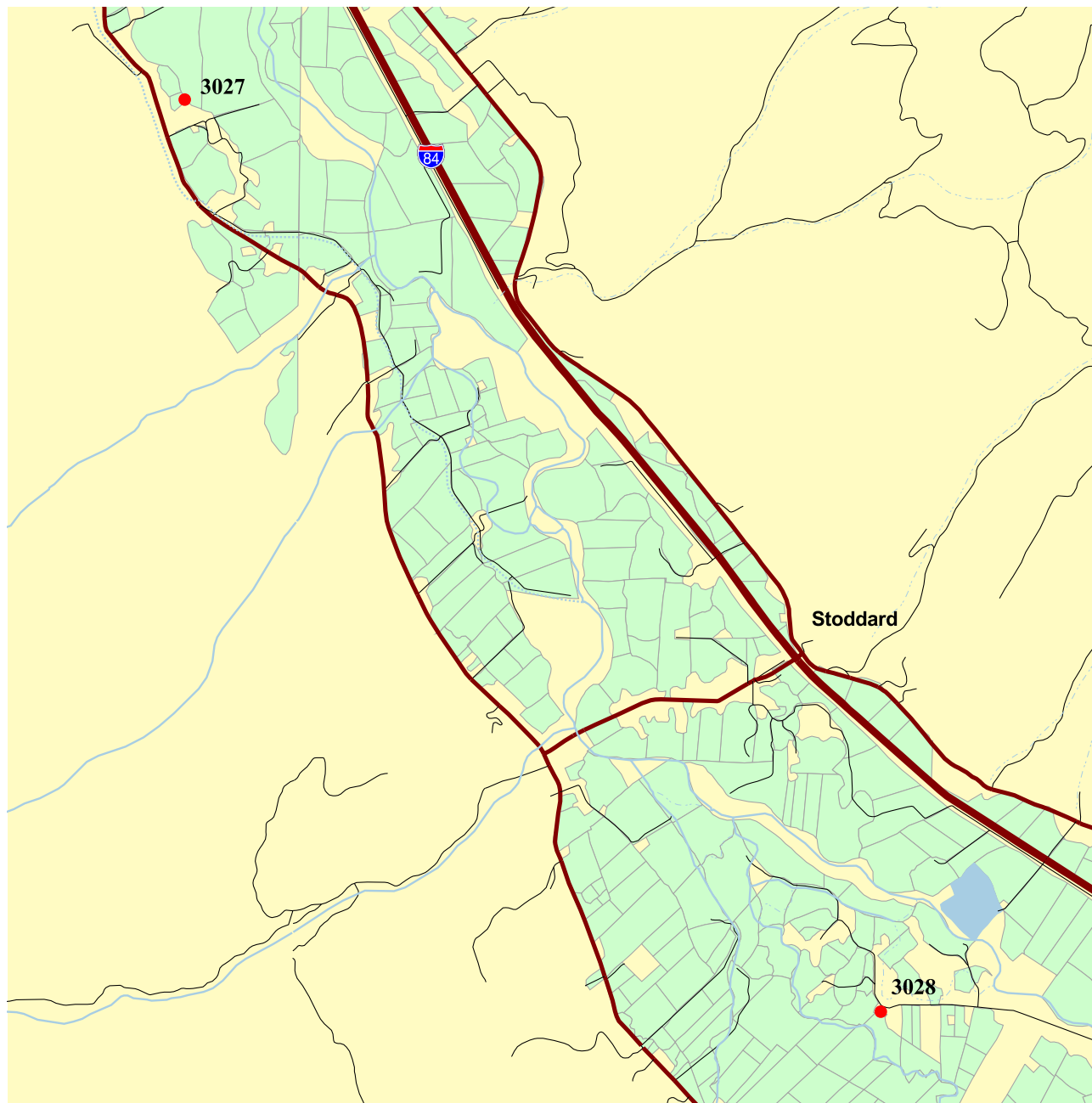
Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

### Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
3027	-0.1000	0.2900	-0.1000	-0.1000	-0.1000	0.0200	<u>0.0800</u>	2.3	-0.1000	5.37	-0.1000	277	0.06	7.42	<u>1</u>	0	4.8
3028	-0.1000	0.2000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	3.2	-0.1000	16.87	-0.1000	440	0.08	7.19	0	0	7.5

Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.

## Map 8. Morgan District

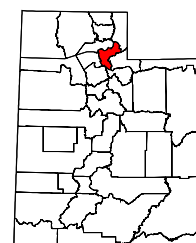


Map Scale 1:42,384 (1 inch = 0.67 miles)

- Sample Site
- Irrigated Land
- Water Body
- SCD Boundary
- Major Road
- Other Road
- Water Course
- Ditch or Canal
- Intermittent Stream



District Location



# Salt Lake District

## General:

Thirteen samples were collected in the Salt Lake District during 2003. Water in this district varies from soft to very hard, with grains per gallon (gpg) ranging from 0.1 to 11.1 with a mean of 7.0. Sampled water temperature ranges from 13.8 °C to 18.2 °C, with a mean of 15.92 °C. The pH for the district ranges from 7.15 to 9.43 with a mean of 8.05.

## Irrigation:

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in  $\mu\text{mhos/cm}$ . Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750  $\mu\text{mhos/cm}$ , salt-sensitive plants begin to be affected. When EC exceeds 3,000  $\mu\text{mhos/cm}$ , most plants would be severely injured. **Only two** of the thirteen samples have EC values **less** than 750  $\mu\text{mhos/cm}$ : samples 3066 and 3071.

SAR measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 marks the beginning of problems and values greater than 9 indicate severe problems. Two of the wells sampled in this district, 3072 and 3218, have elevated SAR values. Sample 3072 exceeds 9  $\mu\text{mhos/cm}$  and will most likely cause severe damage to the soil if used for irrigation.

Bicarbonate ( $\text{HCO}_3$ ) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l and severe problems appear when it exceeds 8.5 meq/l. All of the samples have high bicarbonate, which is common for water in Utah. Sample 3072 exceeds the 8.5 level, and is likely to cause plant damage.

Some specific elements can be toxic to plants. Chlorine, found in the form of Chloride ( $\text{Cl}^-$ ), can damage sensitive plants at concentrations above 145 ppm and concentrations exceeding 355 ppm can cause severe damage to almost all plants. Damage increases under sprinkler irrigation and is more severe in windy conditions. Samples 3072, 3152, and 3218 have elevated chlorine. Sample 3218 has over 355 ppm of chlorine and will likely cause severe injury to plants.

No other elements were found in concentrations harmful to plants.

## Livestock:

No livestock standards were exceeded.

## Culinary:

Dissolved salts in water are measured in the field as Electrical Conductivity (EC). Culinary standards, however, are designated as Total Dissolved Solids (TDS), calculated from EC. TDS for samples 3066, 3071, and 3153 did **not** exceed the EPA aesthetic standard of 500 ppm. The remaining samples with salinity values above this level may have water off-flavored. This is not a health problem until TDS reaches 2,000 ppm. No samples exceed the 2,000 ppm level.

Several minerals were found to exceed the aesthetic drinking water quality standard. Sample 3066 has high barium (Ba) and exceeds the primary drinking water standard.

EPA has set an aesthetic standard of 0.05 ppm for manganese (Mn). Water with high concentrations may cause discoloration of plumbing fixtures and have poor flavor. Sample 3070 has a high manganese concentration.

Sulfate (S) is a soluble form of sulfur that can cause flavor problems in drinking water if there is more than 83 ppm sulfur. Bacteria in the water metabolize sulfur and produce hydrogen sulfide gas (rotten egg gas). The bacteria that produce this compound can live in plumbing fixtures and even hot water heaters. It is not uncommon to get strong odors when the hot water is turned on in areas where there is high sulfate. Generally, people cannot tolerate the odor from this gas. Even if the gas is not present high sulfate concentrations can cause diarrhea in people not used to drinking it. Samples 3152 and 3218 have high sulfur.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil, whereas *E. coli*, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of *E. coli* in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well casing, improper grouting, or lack of a casing. *E. coli* contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables.

Samples 3066, 3072, 3153, 3154, and 3218 are contaminated with coliform. Sample 3218 is contaminated with *E. coli*. Wells from which these samples were collected should be inspected carefully to determine the source of contamination and should not be used for culinary purposes until the problem is corrected.

## Sample Site Test Data for Salt Lake District

### General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
3066	-0.1000	19.23	4.52	0.0500	7.37	29.68	-0.10	8.48	18.2	210
3067	-0.1000	119.13	3.36	0.2100	44.24	36.69	-0.10	7.15	15.1	642
3070	-0.1000	80.56	4.33	0.2800	34.92	93.64	-0.10	7.69	17.2	632
3071	-0.1000	84.48	1.64	0.1000	26.66	23.57	-0.10	7.21	15.7	412
3072	-0.1000	1.91	3.51	0.2200	0.54	394.55	-0.10	9.43	15.2	1073
3132	-0.1000	123.50	3.79	0.2600	41.04	43.94	-0.10	7.65	16.1	644
3152	-0.1000	139.36	5.62	0.3500	50.78	113.05	-0.10	7.84	16.1	1024
3153	-0.1000	77.36	3.44	0.0700	27.89	60.22	-0.10	7.86	17.7	494
3154	-0.1000	99.63	2.15	0.1000	36.00	40.78	-0.10	8.05	14.6	535
3218	-0.1000	46.14	26.69	2.4000	82.12	306.03	-0.10	9.18	16.6	1182
3219	-0.1000	88.87	4.67	0.2100	24.14	50.89	-0.10	8.10	13.8	518
3220	-0.1000	91.28	4.62	0.2100	24.60	51.99	-0.10	7.92	16.2	510
3300	-0.1000	130.01	2.96	0.2000	45.71	43.15	-0.10	8.05	14.5	678

Values of -0.1 are below detection limits of testing procedure.

### Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
3066	-0.1000	-0.10	88.64	-0.10	-0.1000	0.1500	<u>2.32</u>	-0.1000	-0.1000	0.08	1.5	350
3067	-0.1000	0.09	71.35	-0.10	-0.1000	0.0300	<u>4.55</u>	-0.1000	-0.1000	-0.10	0.7	<u>1,070</u>
3070	-0.1000	0.15	62.54	-0.10	-0.1000	0.1200	<u>6.49</u>	0.1500	-0.1000	-0.10	2.2	<u>1,054</u>
3071	-0.1000	0.11	15.32	-0.10	-0.1000	-0.1000	<u>7.21</u>	0.0200	-0.1000	0.47	0.6	687
3072	-0.1000	0.50	<u>244.13</u>	1.90	0.0300	0.1500	<u>9.07</u>	-0.1000	-0.1000	-0.10	<u>64.9</u>	<u>1,788</u>
3132	-0.1000	0.12	74.58	-0.10	-0.1000	-0.1000	<u>5.19</u>	-0.1000	-0.1000	-0.10	0.9	<u>1,074</u>
3152	-0.1000	0.10	<u>323.32</u>	-0.10	0.0300	-0.1000	<u>6.40</u>	-0.1000	-0.1000	0.04	2.1	<u>1,707</u>
3153	-0.1000	0.10	104.45	-0.10	-0.1000	0.1000	<u>4.81</u>	-0.1000	-0.1000	1.03	1.5	<u>824</u>
3154	-0.1000	-0.10	63.20	-0.10	0.0500	0.0500	<u>5.56</u>	0.0200	-0.1000	-0.10	0.9	<u>891</u>
3218	0.1700	0.57	<u>434.06</u>	-0.10	0.0300	0.1100	<u>4.46</u>	-0.1000	-0.1000	-0.10	<u>6.3</u>	<u>1,970</u>
3219	-0.1000	0.11	80.66	-0.10	0.0500	0.0200	<u>6.01</u>	-0.1000	-0.1000	-0.10	1.2	<u>864</u>
3220	-0.1000	0.11	80.03	-0.10	0.0600	0.0200	<u>6.11</u>	-0.1000	-0.1000	-0.10	1.2	<u>850</u>
3300	-0.1000	0.10	101.18	-0.10	0.0200	-0.1000	<u>7.25</u>	-0.1000	-0.1000	-0.10	0.8	<u>1,130</u>

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

## Sample Site Test Data for Salt Lake District

### Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
3066	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.03	-0.1000	210	-0.1000	0.08
3067	-0.1000	-0.1000	0.09	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	73.18	-0.1000	642	-0.1000	-0.10
3070	-0.1000	-0.1000	0.15	0.0100	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	67.05	-0.1000	632	-0.1000	-0.10
3071	-0.1000	-0.1000	0.11	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	15.13	-0.1000	412	-0.1000	0.47
3072	-0.1000	-0.1000	0.50	-0.1000	-0.1000	-0.1000	0.0100	-0.1000	-0.1000	31.00	-0.1000	1,073	0.0200	-0.10
3132	-0.1000	-0.1000	0.12	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	79.85	-0.1000	644	-0.1000	-0.10
3152	-0.1000	-0.1000	0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	84.26	-0.1000	1,024	-0.1000	0.04
3153	-0.1000	-0.1000	0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	39.22	-0.1000	494	-0.1000	1.03
3154	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	63.21	-0.1000	535	-0.1000	-0.10
3218	0.1700	-0.1000	0.57	-0.1000	-0.1000	-0.1000	0.0100	-0.1000	-0.1000	124.85	-0.1000	1,182	-0.1000	-0.10
3219	-0.1000	-0.1000	0.11	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	31.46	-0.1000	518	-0.1000	-0.10
3220	-0.1000	-0.1000	0.11	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	33.05	-0.1000	510	0.0100	-0.10
3300	-0.1000	-0.1000	0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	67.20	-0.1000	678	-0.1000	-0.10

Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

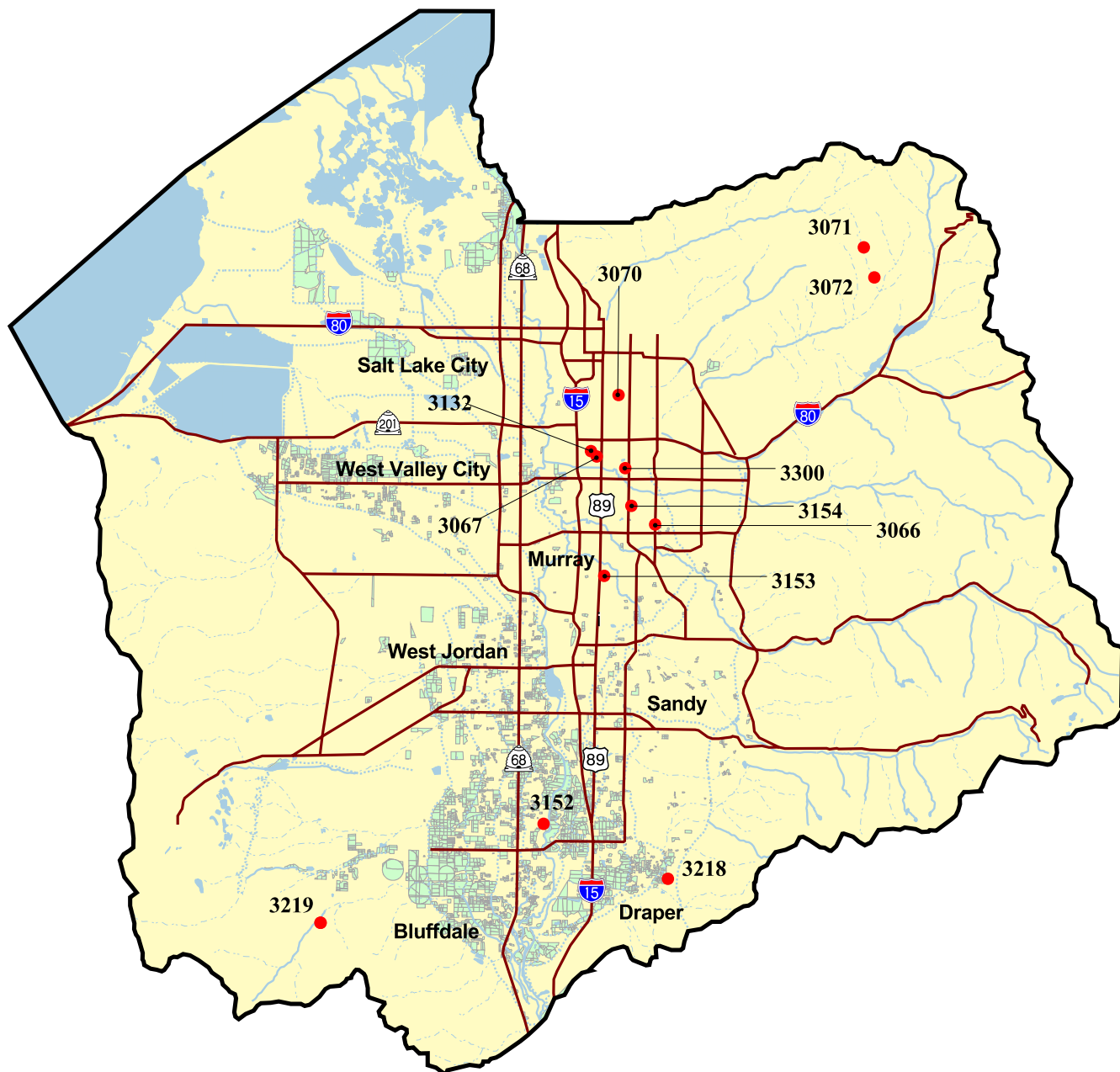
### Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
3066	-0.1000	1.0800	-0.1000	-0.1000	-0.1000	0.1500	-0.1000	0.3	-0.1000	1.03	-0.1000	210	0.08	8.48	1	0	1.6
3067	-0.1000	0.0300	-0.1000	-0.1000	-0.1000	0.0300	-0.1000	3.3	-0.1000	73.18	-0.1000	642	-0.10	7.15	0	0	9.6
3070	-0.1000	0.1200	0.0100	-0.1000	-0.1000	0.1200	0.1500	-0.1	-0.1000	67.05	-0.1000	632	-0.10	7.69	0	0	6.8
3071	-0.1000	0.0900	-0.1000	-0.1000	-0.1000	-0.1000	0.0200	-0.1	-0.1000	15.13	-0.1000	412	0.47	7.21	0	0	6.5
3072	-0.1000	0.0300	-0.1000	-0.1000	0.0300	0.1500	-0.1000	0.5	-0.1000	31.00	-0.1000	1,073	-0.10	9.43	1	0	0.1
3132	-0.1000	0.0200	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	2.5	-0.1000	79.85	-0.1000	644	-0.10	7.65	0	0	9.6
3152	-0.1000	0.0600	-0.1000	-0.1000	0.0300	-0.1000	-0.1000	2.6	-0.1000	84.26	-0.1000	1,024	0.04	7.84	0	0	11.1
3153	-0.1000	0.0900	-0.1000	-0.1000	-0.1000	0.1000	-0.1000	-0.1	-0.1000	39.22	-0.1000	494	1.03	7.86	1	0	6.2
3154	-0.1000	0.0600	-0.1000	-0.1000	0.0500	0.0500	0.0200	2.9	-0.1000	63.21	-0.1000	535	-0.10	8.05	1	0	7.9
3218	-0.1000	0.0900	-0.1000	-0.1000	0.0300	0.1100	-0.1000	-0.1	-0.1000	124.85	-0.1000	1,182	-0.10	9.18	1	1	7.5
3219	-0.1000	0.1400	-0.1000	-0.1000	0.0500	0.0200	-0.1000	0.7	-0.1000	31.46	-0.1000	518	-0.10	8.10	0	0	6.6
3220	-0.1000	0.1400	-0.1000	-0.1000	0.0600	0.0200	-0.1000	0.7	-0.1000	33.05	-0.1000	510	-0.10	7.92	0	0	6.8
3300	-0.1000	0.0200	-0.1000	-0.1000	0.0200	-0.1000	-0.1000	2.4	-0.1000	67.20	-0.1000	678	-0.10	8.05	0	0	10.3

Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.



Map 9. Salt Lake District

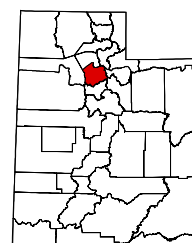


Map Scale 1:435,000 (1 inch = 6.9 miles)

- Sample Site
- Irrigated Land
- Water Body
- SCD Boundary
- Major Road
- Other Road
- Water Course
- Ditch or Canal
- Intermittent Stream



District Location



## Weber District

### General:

Eight samples were collected in the Weber District. Water in this district varies from soft to very hard, with grains per gallon (gpg) ranging from 1.2 to 13.2 with a mean of 4.7. Sampled water temperature ranges from 11.1 °C to 22.9°C, with a mean of 14.8 °C. The pH for the district ranges from 6.15 to 8.6 with a mean of 7.33.

### Irrigation:

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in  $\mu\text{mhos/cm}$ . Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750  $\mu\text{mhos/cm}$ , salt-sensitive plants begin to be affected. When EC exceeds 3,000  $\mu\text{mhos/cm}$ , most plants would be severely injured. Two of the samples in this area, 3044 and 3045, exceeded the 750  $\mu\text{mhos/cm}$  standard. None of the samples exceeded the severe-injury level of 3,000  $\mu\text{mhos/cm}$ , which would affect most plants.

SAR measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 marks the beginning of problems and values greater than 9 indicate severe problems. No samples from this area exceed the SAR standard with values greater than 3.

Bicarbonate ( $\text{HCO}_3$ ) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l and severe problems appear when it exceeds 8.5 meq/l. All **but one** of the samples, 3025, has high bicarbonate, which is common for water in Utah. Sample 3044 exceeds the 8.5 level.

Manganese (Mn) above 0.2 ppm can injure plants and cause reduction in dry matter production. Excess manganese interferes with the plant's ability to use other nutrients such as calcium (Ca). Samples 3024 and 3045 have elevated manganese

No other elements were found in concentrations harmful to plants.

### Livestock:

No water quality standards for livestock were exceeded.

### Culinary:

Dissolved salts in water are measured in the field as Electrical Conductivity (EC). Culinary standards, however, are designated as Total Dissolved Solids (TDS), calculated from EC. Two of the samples, 3044 and 3045, exceed the EPA aesthetic standard of 500 ppm for salinity. At this level the water may be off-flavored but it is not a health problem until TDS reaches 2,000 ppm.

Two minerals, iron (Fe) and manganese (Mn), were found to exceed the aesthetic drinking water quality standard. Sample 3024 has high iron. This can cause discoloration of plumbing fixtures and promote the growth of iron bacteria, which stain anything they contact. Again, this is an aesthetic issue, not a health concern.

EPA has set an aesthetic standard of 0.05 ppm for manganese (Mn). Water with high concentrations may cause discoloration of plumbing fixtures and have poor flavor. Four samples have high manganese concentrations: 3024, 3044, 3045, and 3137.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil, whereas *E. coli*, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of *E. coli* in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well casing, improper grouting, or lack of a casing. *E. coli* contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables.

Samples 3025, 3026, 3138, and 3139 are contaminated with coliform. Wells from which these samples were collected should be inspected carefully to determine the source of contamination and should not be used for culinary purposes until the problem is corrected.

## Sample Site Test Data for Weber District

### General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
3024	-0.1000	13.05	0.85	-0.1000	6.87	16.85	-0.10	6.84	11.1	106
3025	-0.1000	15.82	0.78	-0.1000	4.41	7.52	-0.10	6.15	11.7	86
3026	-0.1000	60.59	1.12	-0.1000	16.77	10.81	-0.10	7.30	12.8	238
3044	-0.1000	99.03	25.46	0.4800	60.31	76.38	-0.10	8.52	22.9	1521
3045	-0.1000	176.53	13.24	1.1900	48.54	140.24	-0.10	8.60	17.7	793
3137	-0.1000	38.54	0.68	0.0600	16.80	9.75	-0.10	7.42	13.2	212
3138	-0.1000	34.25	2.13	0.0500	8.53	20.28	-0.10	6.86	13.9	192
3139	-0.1000	33.66	0.56	0.0500	8.39	20.51	-0.10	6.94	15.2	196

Values of -0.1 are below detection limits of testing procedure.

### Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
3024	-0.1000	-0.10	7.94	-0.10	-0.1000	1.2400	<u>1.66</u>	<u>0.2700</u>	-0.1000	-0.10	0.9	177
3025	-0.1000	-0.10	11.02	-0.10	-0.1000	0.0300	0.95	-0.1000	-0.1000	0.08	0.4	144
3026	-0.1000	-0.10	12.32	-0.10	-0.1000	-0.1000	<u>3.84</u>	-0.1000	-0.1000	0.05	0.3	397
3044	-0.1000	0.16	143.28	-0.10	-0.1000	-0.1000	<u>8.78</u>	0.0900	-0.1000	-0.10	1.5	<u>2.535</u>
3045	-0.1000	-0.10	-0.10	-0.10	-0.1000	0.0200	<u>2.44</u>	<u>0.5500</u>	-0.1000	-0.10	2.4	<u>1.322</u>
3137	-0.1000	-0.10	7.78	-0.10	0.0500	0.1400	<u>3.02</u>	0.0700	-0.1000	0.23	0.3	354
3138	-0.1000	-0.10	19.18	-0.10	0.0300	-0.1000	<u>2.48</u>	-0.1000	-0.1000	-0.10	0.8	320
3139	-0.1000	-0.10	21.45	-0.10	0.0400	0.0600	<u>2.54</u>	-0.1000	-0.1000	-0.10	0.8	326

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

## Sample Site Test Data for Weber District

### Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
3024	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.40	-0.1000	106	-0.1000	-0.10
3025	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	3.83	-0.1000	86	-0.1000	0.08
3026	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	4.71	-0.1000	238	-0.1000	0.05
3044	-0.1000	-0.1000	0.16	-0.1000	-0.1000	-0.1000	0.0100	-0.1000	-0.1000	21.08	-0.1000	1,521	-0.1000	-0.10
3045	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	8.59	-0.1000	793	-0.1000	-0.10
3137	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	10.36	-0.1000	212	-0.1000	0.23
3138	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	3.90	-0.1000	192	-0.1000	-0.10
3139	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	4.41	-0.1000	196	-0.1000	-0.10

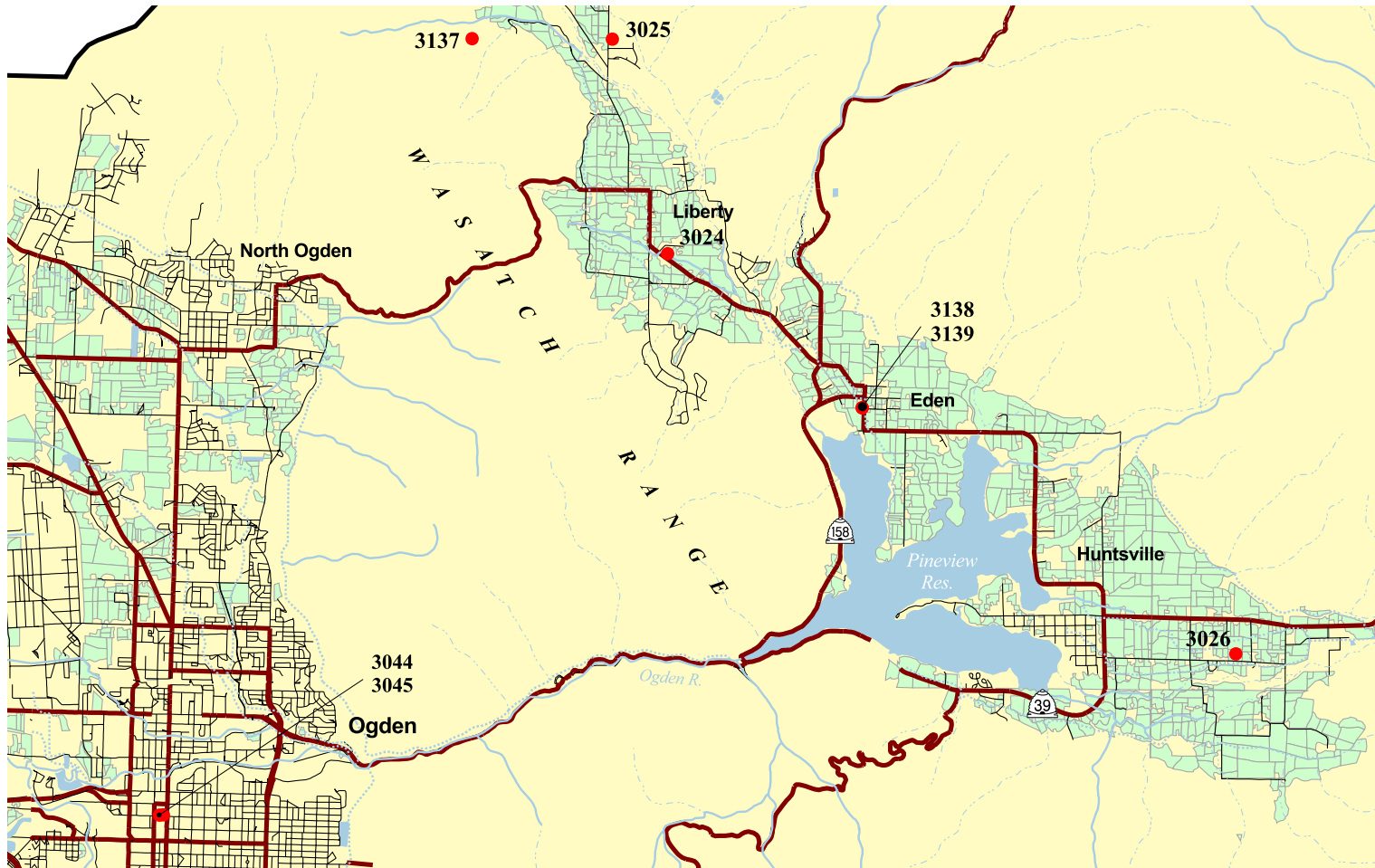
Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

### Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
3024	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	<u>1.2400</u>	<u>0.2700</u>	0.1	-0.1000	1.40	-0.1000	106	-0.10	6.84	0	0	1.2
3025	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.0300	-0.1000	2.3	-0.1000	3.83	-0.1000	86	0.08	<u>6.15</u>	<u>1</u>	0	1.2
3026	-0.1000	0.0500	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.5	-0.1000	4.71	-0.1000	238	0.05	7.30	<u>1</u>	0	4.5
3044	-0.1000	0.1500	-0.1000	-0.1000	-0.1000	-0.1000	<u>0.0900</u>	0.6	-0.1000	21.08	-0.1000	<u>1,521</u>	-0.10	<u>8.52</u>	0	0	9.3
3045	-0.1000	0.2900	-0.1000	-0.1000	-0.1000	0.0200	<u>0.5500</u>	-0.1	-0.1000	8.59	-0.1000	<u>793</u>	-0.10	<u>8.60</u>	0	0	13.2
3137	-0.1000	0.0500	-0.1000	-0.1000	0.0500	0.1400	<u>0.0700</u>	-0.1	-0.1000	10.36	-0.1000	212	0.23	7.42	0	0	3.2
3138	-0.1000	0.0400	-0.1000	-0.1000	0.0300	-0.1000	-0.1000	0.9	-0.1000	3.90	-0.1000	192	-0.10	6.86	<u>1</u>	0	2.5
3139	-0.1000	0.0200	-0.1000	-0.1000	0.0400	0.0600	-0.1000	-0.1	-0.1000	4.41	-0.1000	196	-0.10	6.94	<u>1</u>	0	2.5

Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.

**Map 10. Weber District**

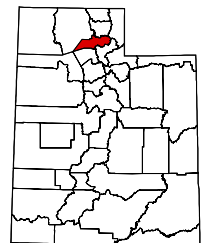


Map Scale 1: 102,295 (1 inch = 1.6 miles)

- Sample Site
- Irrigated Land
- Water Body
- SCD Boundary
- Major Road
- Other Road
- Water Course
- Ditch or Canal
- Intermittent Stream



District Location



## Zone 3

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UACD Zone 3 consists of five districts in three counties, including Summit, Utah, and Wasatch counties.

Twenty-seven sites were sampled in the five districts of Zone 3 during the spring, summer, and fall of 2003. One in the Alpine District, four in the Kamas Valley District, four in the Summit District, fifteen in the Timp-Nebo District, and three in the Wasatch District. A separate narrative report is presented for each district with maps showing the location of the sample sites. Each report covers three categories of water quality criteria: irrigation, livestock and culinary. Data are presented in four tables for each zone, grouped according to district, general parameters (temperature, pH, total dissolved solids (TDS), and chemicals for which there are no standards); irrigation, livestock and drinking water parameters.

### Alpine District

#### **General:**

The sample for the district tested moderate with 5.6 grains per gallon (gpg). Sampled water temperature was 12.5 °C. The pH was 8.21.

#### **Irrigation:**

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in  $\mu\text{mhos/cm}$ . Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750  $\mu\text{mhos/cm}$ , salt-sensitive plants begin to be affected. When EC exceeds 3,000  $\mu\text{mhos/cm}$ , most plants would be severely injured. Sample 3178 does not exceed salinity standard of 750  $\mu\text{mhos/cm}$ .

The sodium absorption ratio (SAR) measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 marks the beginning of problems and values greater than 9 indicate severe problems. Sample 3178 measured 0.4.

Bicarbonate ( $\text{HCO}_3$ ) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l and severe problems appear when it exceeds 8.5 meq/l. Sample 3178 has high bicarbonate, which is common for water in Utah.

No other elements were found in concentrations harmful to plants.

#### **Livestock:**

No water quality standards for livestock were exceeded.

#### **Culinary:**

Dissolved salts in water are measured in the field as Electrical Conductivity (EC). Culinary standards, however, are designated as Total Dissolved Solids (TDS), calculated from EC. Sample 3178 does **not** exceed the EPA aesthetic salinity standard of 500 ppm.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil, whereas *E. coli*, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of *E. coli* in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well casing, improper grouting, or lack of a casing. *E. coli* contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables.

Sample 3178 was found to be contaminated with coliform.



## Sample Site Test Data for Alpine District

### General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
3178	-0.1000	65.02	1.74	-0.1000	30.20	14.27	-0.10	8.21	12.5	349

Values of -0.1 are below detection limits of testing procedure.

### Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
3178	-0.1000	-0.10	24.28	-0.10	0.0300	0.0400	<u>4.86</u>	-0.1000	-0.1000	0.06	0.4	582

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

### Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
3178	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	22.69	-0.1000	349	-0.1000	0.06

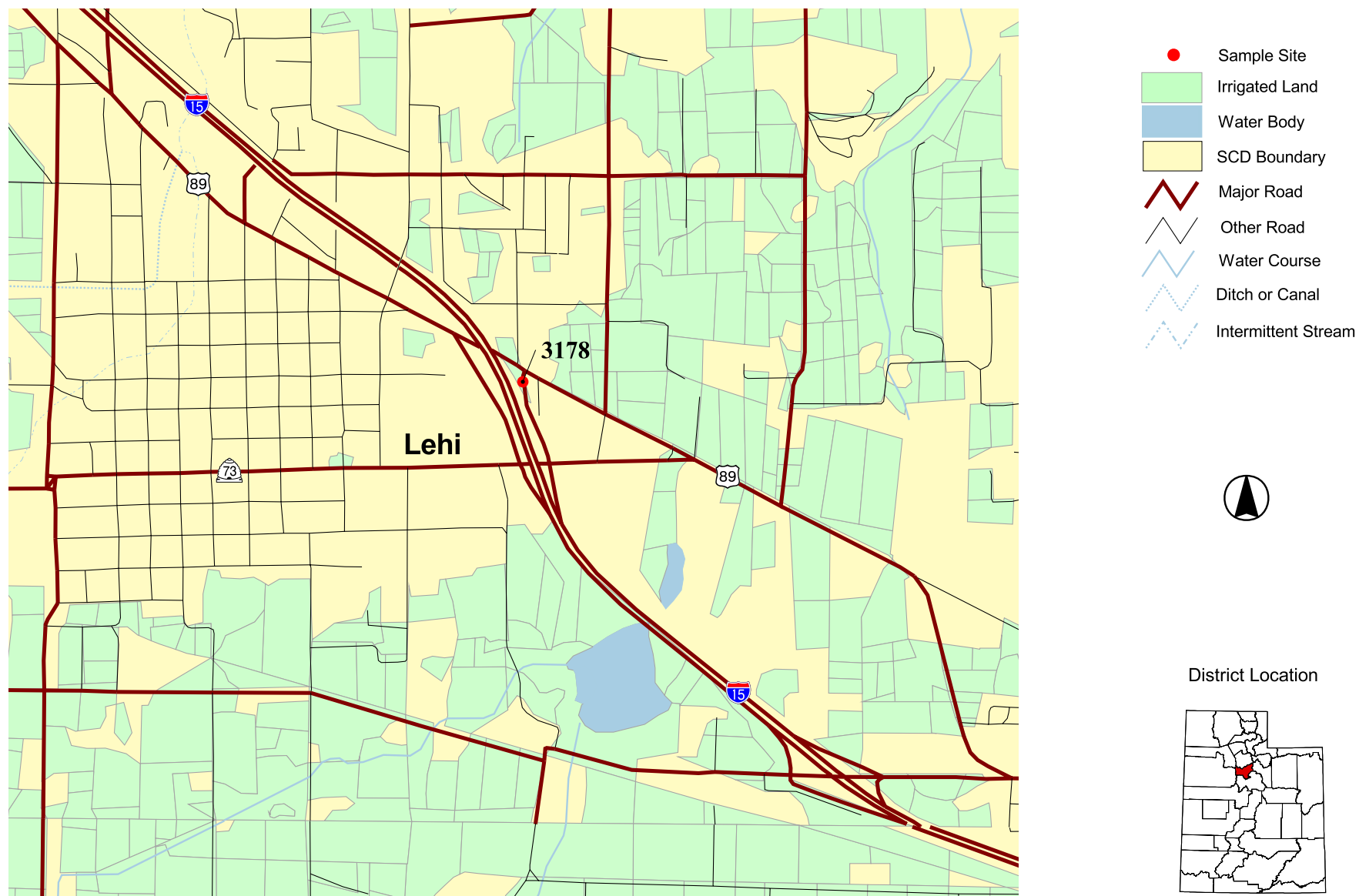
Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

### Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
3178	-0.1000	0.1300	-0.1000	-0.1000	0.0300	0.0400	-0.1000	2.6	-0.1000	22.69	-0.1000	349	0.06	8.21	<u>1</u>	0	5.6

Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.

Map 11. Alpine District



# Kamas Valley District

## **General:**

Four samples were collected in the Kamas Valley District. Water in this district tested soft, with grains per gallon (gpg) ranging from 1.7 to 2.9 with a mean of 2.5. Sampled water temperature ranges from 9.1°C to 20.4°C, with a mean of 14.44 °C. The pH for the district ranges from 6.63 to 8.59 with a mean of 7.52.

## **Irrigation:**

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in  $\mu\text{mhos/cm}$ . Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750  $\mu\text{mhos/cm}$ , salt-sensitive plants begin to be affected. When EC exceeds 3,000  $\mu\text{mhos/cm}$ , most plants would be severely injured. No samples exceeded the salinity standard of 750  $\mu\text{mhos/cm}$ .

SAR measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 marks the beginning of problems and values greater than 9 indicate severe problems. No samples exceeded the SAR standard of 3.

Bicarbonate ( $\text{HCO}_3$ ) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l and severe problems appear when it exceeds 8.5 meq/l. All of the samples **except** 3074 have high bicarbonate, which is common for water in Utah.

No elements were found in concentrations harmful to plants.

## **Livestock:**

No other water quality standards for livestock were exceeded.

## **Culinary:**

Dissolved salts in water are measured in the field as Electrical Conductivity (EC). Culinary standards, however, are designated as Total Dissolved Solids (TDS), calculated from EC. No samples exceed the EPA aesthetic standard of 500 ppm above which the water may be off-flavored, but it is not a health problem until TDS exceeds 2,000 ppm.

EPA has set an aesthetic standard of 0.05 ppm for manganese (Mn). Water with high concentrations may cause discoloration of plumbing fixtures and have poor flavor. Sample 3217 has high manganese concentration.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil, whereas *E. coli*, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of *E. coli* in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well

casing, improper grouting, or lack of a casing. E. coli contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables.

All samples are contaminated with coliform and sample 3235 is contaminated with E. coli. These wells all need to be inspected to identify how they are being contaminated.

## Sample Site Test Data for Kamas Valley District

### General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
3073	-0.1000	38.63	1.69	0.1100	8.33	22.24	-0.10	6.71	20.4	222
3074	-0.1000	24.26	5.95	0.0800	5.31	16.34	0.17	6.63	13.9	155
3217	-0.1000	36.72	1.45	0.0500	11.77	11.03	-0.10	8.13	14.4	192
3235	-0.1000	35.34	0.86	0.0500	13.72	15.07	-0.10	8.59	9.1	197

Values of -0.1 are below detection limits of testing procedure.

### Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
3073	-0.1000	-0.10	19.82	-0.10	0.0600	0.1000	<u>4.30</u>	0.0500	-0.1000	0.04	0.8	370
3074	-0.1000	-0.10	25.29	-0.10	0.0200	0.1600	1.35	-0.1000	-0.1000	-0.10	0.8	259
3217	-0.1000	-0.10	4.92	-0.10	0.0400	-0.1000	<u>2.61</u>	0.1500	-0.1000	-0.10	0.4	320
3235	0.2900	-0.10	12.09	-0.10	-0.1000	0.2000	<u>2.58</u>	-0.1000	-0.1000	-0.10	0.5	328

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

### Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
3073	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	5.99	-0.1000	222	-0.1000	0.04
3074	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	6.02	-0.1000	155	-0.1000	-0.10
3217	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	17.37	-0.1000	192	-0.1000	-0.10
3235	0.2900	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	4.31	-0.1000	197	-0.1000	-0.10

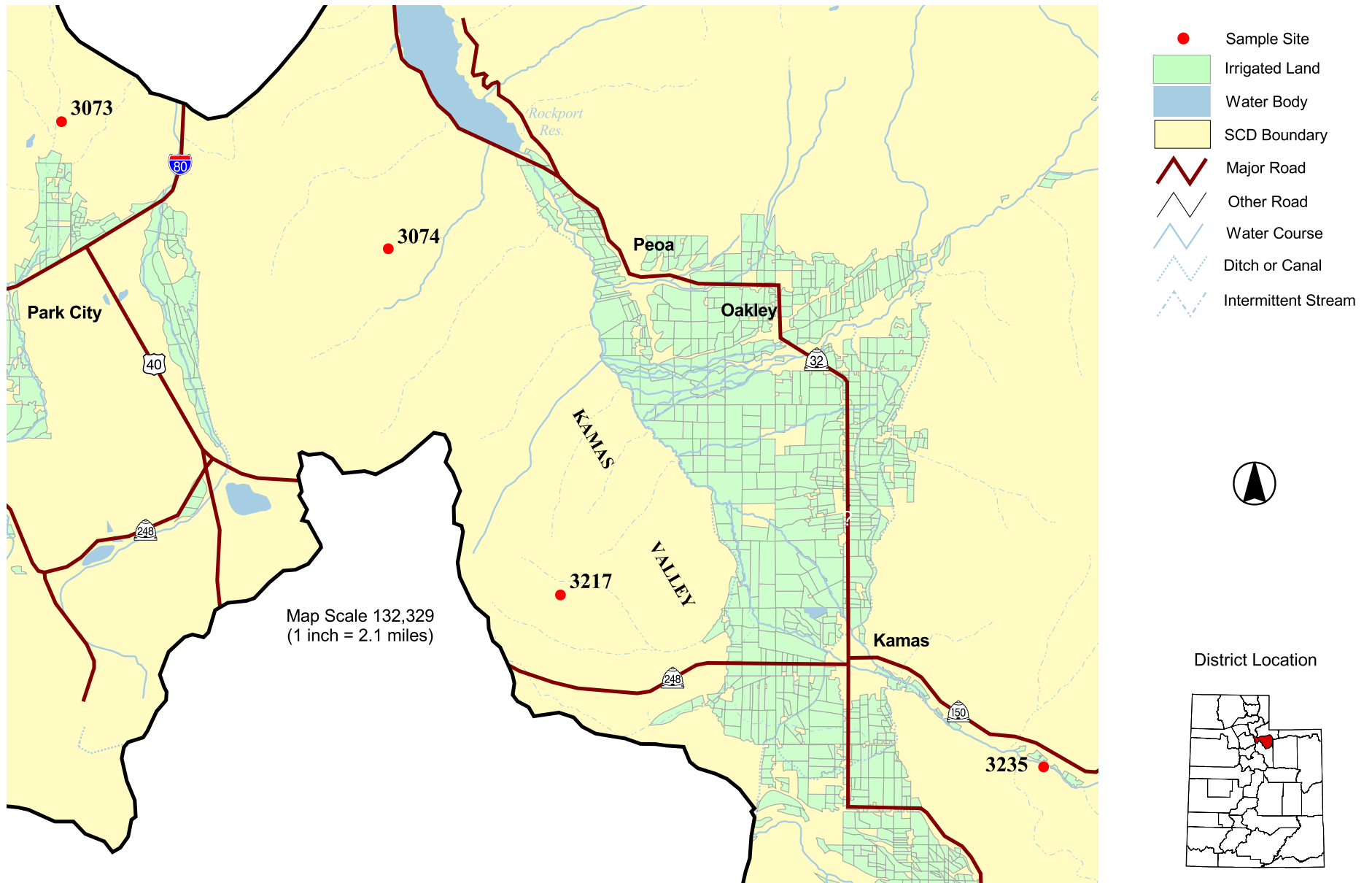
Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

### Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
3073	-0.1000	0.1100	-0.1000	-0.1000	0.0600	0.1000	0.0500	0.7	-0.1000	5.99	-0.1000	222	0.04	6.71	<u>1</u>	0	2.7
3074	-0.1000	0.1900	-0.1000	-0.1000	0.0200	0.1600	-0.1000	-0.1	-0.1000	6.02	-0.1000	155	-0.10	6.63	<u>1</u>	0	1.7
3217	-0.1000	0.0200	-0.1000	-0.1000	0.0400	-0.1000	<u>0.1500</u>	-0.1	-0.1000	17.37	-0.1000	192	-0.10	8.13	<u>1</u>	0	2.8
3235	-0.1000	0.0400	-0.1000	-0.1000	-0.1000	0.2000	-0.1000	1.0	-0.1000	4.31	-0.1000	197	-0.10	<u>8.59</u>	<u>1</u>	<u>1</u>	2.9

Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.

Map 12. Kamas Valley District



## Summit District

### General:

Four samples were collected in the Summit District. Water in this district tested soft to moderate, with grains per gallon (gpg) ranging from 1.1 to 7.9 with a mean of 6.0. Sampled water temperature ranges from 12.0°C to 13.9°C, with a mean of 13.10 °C. The pH for the district ranges from 6.80 to 7.61 with a mean of 7.25.

### Irrigation:

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in  $\mu\text{mhos/cm}$ . Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750  $\mu\text{mhos/cm}$ , salt-sensitive plants begin to be affected. When EC exceeds 3,000  $\mu\text{mhos/cm}$ , most plants would be severely injured. All but sample 3136 exceeded the salinity standard of 750  $\mu\text{mhos/cm}$ .

SAR measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 marks the beginning of problems and values greater than 9 indicate severe problems. No samples exceeded the SAR standard of 3.

Bicarbonate ( $\text{HCO}_3$ ) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l and severe problems appear when it exceeds 8.5 meq/l. All of the samples have high bicarbonate, which is common for water in Utah.

Chlorine found in the form of chloride (Cl) can damage sensitive plants at concentrations above 145 ppm and concentrations exceeding 355 ppm can cause severe damage to almost all plants. Damage increases under sprinkler irrigation and is more severe in windy conditions. Samples 3029, and 3030 have high chlorine.

Zinc (Zn) is a micro-nutrient and is required for plant growth. However, in excess of 2 ppm it can injure plants. Sample 3136 has elevated zinc

No other elements were found in concentrations harmful to plants.

### Livestock:

No water quality standards for livestock were exceeded.

### Culinary:

Dissolved salts in water are measured in the field as Electrical Conductivity (EC). Culinary standards, however, are designated as Total Dissolved Solids (TDS), calculated from EC. All samples **except** 3136 exceed the EPA aesthetic standard of 500 ppm above which the water may be off-flavored, but it is not a health problem until TDS exceeds 2,000 ppm.

EPA has set a standard of 5.0 ppm of zinc (Zn) in drinking water. Sample 3136 exceeds this standard.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful

bacteria. Coliform bacteria can occur naturally in the soil, whereas *E. coli*, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of *E. coli* in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well casing, improper grouting, or lack of a casing. *E. coli* contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables.

Sample 3135 is contaminated with coliform bacteria. This well needs to be inspected to identify how it became contaminated.



## Sample Site Test Date for Summit District

### General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
3029	-0.1000	93.98	4.07	0.4600	32.57	88.40	-0.10	7.44	13.9	607
3030	-0.1000	93.22	3.70	0.4700	35.62	63.99	-0.10	7.61	13.3	577
3135	-0.1000	102.51	1.95	0.1400	32.62	35.77	-0.10	7.15	12.0	518
3136	-0.1000	15.58	1.03	0.0900	3.40	9.55	-0.10	6.80	13.2	119

Values of -0.1 are below detection limits of testing procedure.

### Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
3029	-0.1000	0.07	<u>173.03</u>	-0.10	-0.1000	0.0300	<u>4.94</u>	0.0200	-0.1000	0.13	2.0	<u>1,012</u>
3030	-0.1000	0.09	<u>153.48</u>	-0.10	-0.1000	-0.1000	<u>5.08</u>	-0.1000	-0.1000	-0.10	1.4	<u>962</u>
3135	-0.1000	0.09	58.24	-0.10	0.0200	-0.1000	<u>5.47</u>	-0.1000	-0.1000	0.04	0.8	<u>864</u>
3136	-0.1000	-0.10	16.68	-0.10	0.0600	0.0800	<u>1.68</u>	0.0300	-0.1000	<u>10.99</u>	0.6	198

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently.

Values of -0.1 are below detection limits of testing procedure.

### Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
3029	-0.1000	-0.1000	0.07	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	14.58	-0.1000	607	-0.1000	0.13
3030	-0.1000	-0.1000	0.09	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	21.55	-0.1000	577	-0.1000	-0.10
3135	-0.1000	-0.1000	0.09	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	35.66	-0.1000	518	-0.1000	0.04
3136	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	3.35	-0.1000	119	-0.1000	10.99

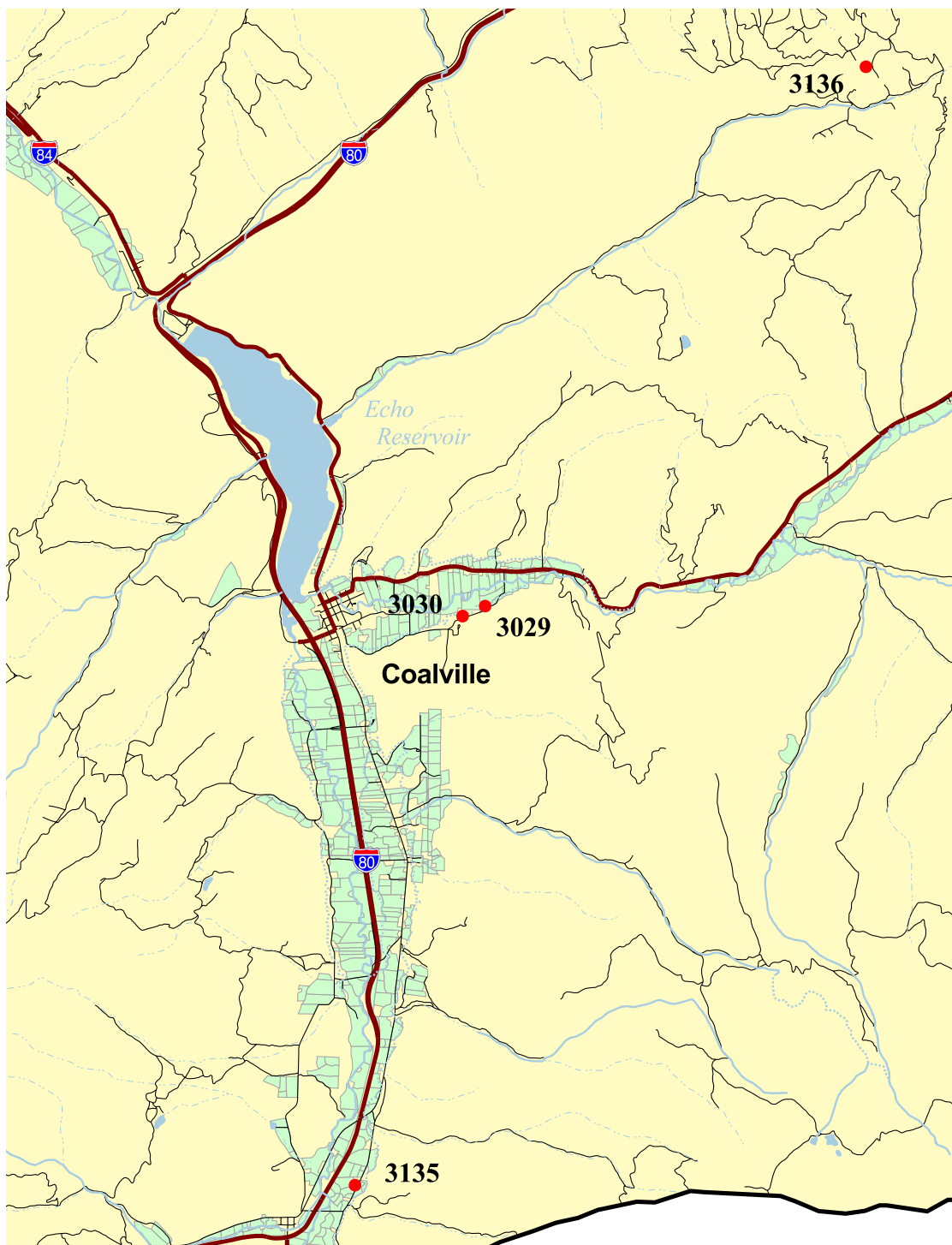
Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

### Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
3029	-0.1000	0.2000	-0.1000	-0.1000	-0.1000	0.0300	0.0200	1.0	-0.1000	14.58	-0.1000	<u>607</u>	0.13	7.44	0	0	7.4
3030	-0.1000	0.1200	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.5	-0.1000	21.55	-0.1000	<u>577</u>	-0.10	7.61	0	0	7.5
3135	-0.1000	0.0400	-0.1000	-0.1000	0.0200	-0.1000	-0.1000	2.9	-0.1000	35.66	-0.1000	<u>518</u>	0.04	7.15	1	0	7.9
3136	-0.1000	0.2600	-0.1000	-0.1000	0.0600	0.0800	0.0300	-0.1	-0.1000	3.35	-0.1000	119	<u>10.99</u>	6.80	0	0	1.1

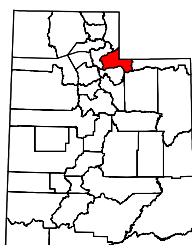
Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.










Map 13. Summit District



Map Scale 1:125,000 (1 inch = 1.9 miles)

District Location



-  Sample Site
-  Irrigated Land
-  Water Body
-  SCD Boundary
-  Major Road
-  Other Road
-  Water Course
-  Ditch or Canal
-  Intermittent Stream

## **Timp-Nebo District**

### **General:**

Fifteen samples were collected in the Timp-Nebo District. Water in this district varies from soft to very hard, with grains per gallon (gpg) ranging from 2.3 to 32.2 with a mean of 8.00. Sampled water temperature ranges from 12.2 °C to 20.6 °C, with a mean of 15.62 °C. The pH for the district ranges from 7.13 to 8.36 with a mean of 7.70.

### **Irrigation:**

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in  $\mu\text{mhos/cm}$ . Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750  $\mu\text{mhos/cm}$ , salt-sensitive plants begin to be affected. When EC exceeds 3,000  $\mu\text{mhos/cm}$ , most plants would be severely injured. Samples 3001, 3038, 3133, 3304, and 3316 exceed the salinity standard of 750  $\mu\text{mhos/cm}$ . Sample 3001 exceeds the severe-injury level of 3,000  $\mu\text{mhos/cm}$ , which would affect most plants.

SAR measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 marks the beginning of problems and values greater than 9 indicate severe problems. No samples have elevated SAR.

Bicarbonate ( $\text{HCO}_3$ ) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l and severe problems appear when it exceeds 8.5 meq/l. All of the samples have high bicarbonate, which is common for water in Utah and samples 3133 and 3316 exceed the 8.5 level.

Chlorine found in the form of chloride (Cl) can damage sensitive plants at concentrations above 145 ppm and concentrations exceeding 355 ppm can cause severe damage to almost all plants. Damage increases under sprinkler irrigation and is more severe in windy conditions. Samples 3038, 3133, and 3304 have high chlorine.

EPA has set an aesthetic standard of 0.05 ppm for manganese (Mn). Water with high concentrations of manganese may cause discoloration of plumbing fixtures and have poor flavor. Samples 3001, 3304, 3316 have a high manganese concentration.

No other elements were found in concentrations harmful to plants.

### **Livestock:**

No water quality standards for livestock were exceeded.

### **Culinary:**

Dissolved salts in water are measured in the field as Electrical Conductivity (EC). Culinary standards, however, are designated as Total Dissolved Solids (TDS), calculated from EC. Samples 3001, 3038, 3133, 3304, and 3316 exceed the EPA aesthetic standard of 500 ppm. At this level the water may be off-flavored, but it is not a health problem until TDS reaches 2,000 ppm. Sample 3001 exceeds that health standard for total dissolved solids.

Three elements iron (Fe), manganese (Mn), and sulfur (S) were found to exceed the aesthetic drinking water quality standard. Sample 3039 has high iron. This can cause discoloration of plumbing fixtures and promote the growth of iron bacteria, which stain anything they contact. Again, this is an aesthetic issue, not a health concern.

EPA has set an aesthetic standard of 0.05 ppm for manganese (Mn). Water with high concentrations may cause discoloration of plumbing fixtures and have poor flavor. Five samples, including 3001, 3039, 3077, 3304, and 3316, have high manganese concentrations.

Sulfate is a soluble form of sulfur that can cause flavor problems in drinking water if there is more than 83 ppm sulfur. Bacteria in the water metabolize sulfur and produce hydrogen sulfide gas (rotten egg gas). The bacteria that produce this compound can live in plumbing fixtures and even hot water heaters. It is not uncommon to get strong odors when the hot water is turned on in areas where there is high sulfate. Generally, people cannot tolerate the odor from this gas. Even if the gas is not present, high sulfate concentrations can cause diarrhea in people not used to drinking it. Sample 3001 has high sulfur (S).

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil, whereas *E. coli*, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of *E. coli* in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well casing, improper grouting, or lack of a casing. *E. coli* contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables.

Samples 3001, 3039, 3041, 3042, 3077, and 3316 are contaminated with coliform bacteria.

## Sample Site Test Data for Timp-Nebo District

### General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
3001	-0.1000	314.41	21.98	2.3100	236.08	283.79	-0.10	7.13	13.3	2700
3033	-0.1000	69.60	1.81	-0.1000	23.51	26.08	-0.10	7.44	15.5	350
3034	-0.1000	73.39	2.02	-0.1000	26.07	24.11	-0.10	7.57	13.9	363
3035	-0.1000	74.55	1.94	-0.1000	26.16	28.86	-0.10	7.59	14.4	367
3036	-0.1000	80.75	2.12	0.0700	30.88	22.88	-0.10	7.25	12.2	391
3037	-0.1000	65.31	2.45	0.0700	27.82	31.33	-0.10	7.30	13.9	353
3038	-0.1000	67.62	18.99	0.4700	37.18	80.04	-0.10	7.75	19.4	604
3039	-0.1000	33.12	9.06	0.3100	17.80	51.83	0.30	7.80	20.6	296
3040	-0.1000	30.54	8.55	0.2700	27.83	19.08	-0.10	7.82	18.9	251
3041	-0.1000	28.35	4.28	0.0500	11.21	25.06	-0.10	8.14	17.2	377
3042	-0.1000	74.63	3.85	0.1900	22.27	18.74	0.13	7.61	14.4	328
3077	-0.1000	57.14	2.91	0.1700	30.05	26.36	-0.10	8.02	19.7	356
3133	-0.1000	150.91	2.35	0.2900	41.23	92.90	0.13	7.53	13.8	872
3304	-0.1000	141.58	10.56	0.3200	67.05	151.03	-0.10	8.36	14.5	1129
3316	-0.1000	105.40	7.07	0.2400	51.08	54.54	-0.10	8.13	12.6	641

Values of -0.1 are below detection limits of testing procedure.

### Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
3001	-0.1000	0.22	-0.10	-0.10	-0.1000	0.1300	<u>3.88</u>	<u>1.3500</u>	-0.1000	-0.10	2.9	4.500
3033	-0.1000	-0.10	26.30	-0.10	-0.1000	-0.1000	<u>3.99</u>	-0.1000	-0.1000	-0.10	0.7	583
3034	-0.1000	-0.10	27.41	-0.10	-0.1000	-0.1000	<u>3.91</u>	-0.1000	-0.1000	-0.10	0.6	605
3035	-0.1000	-0.10	24.51	-0.10	0.0500	-0.1000	<u>4.84</u>	-0.1000	-0.1000	-0.10	0.7	611
3036	-0.1000	-0.10	31.86	-0.10	-0.1000	-0.1000	<u>5.23</u>	-0.1000	-0.1000	-0.10	0.5	652
3037	-0.1000	-0.10	29.13	-0.10	-0.1000	-0.1000	<u>5.82</u>	-0.1000	-0.1000	-0.10	0.8	588
3038	-0.1000	0.28	<u>173.80</u>	-0.10	0.0600	-0.1000	<u>4.46</u>	-0.1000	-0.1000	-0.10	1.9	<u>1.007</u>
3039	-0.1000	0.17	15.56	-0.10	-0.1000	0.5300	<u>4.84</u>	0.0700	-0.1000	1.04	1.8	493
3040	-0.1000	-0.10	10.39	-0.10	-0.1000	0.1200	<u>3.49</u>	-0.1000	-0.1000	-0.10	0.6	419
3041	-0.1000	-0.10	6.06	-0.10	0.0200	0.0600	<u>2.71</u>	-0.1000	-0.1000	-0.10	1.0	628
3042	-0.1000	-0.10	15.60	-0.10	-0.1000	-0.1000	<u>3.29</u>	-0.1000	-0.1000	-0.10	0.5	547
3077	-0.1000	-0.10	21.74	-0.10	-0.1000	0.0800	<u>4.92</u>	0.1500	-0.1000	-0.10	0.7	594
3133	-0.1000	0.12	<u>160.02</u>	-0.10	0.0200	0.0200	<u>9.87</u>	-0.1000	-0.1000	0.07	1.7	<u>1.454</u>
3304	-0.1000	0.07	<u>342.40</u>	-0.10	-0.1000	0.1000	<u>8.18</u>	<u>0.2600</u>	-0.1000	-0.10	2.6	<u>1.882</u>
3316	-0.1000	0.13	51.12	-0.10	-0.1000	0.0300	<u>9.44</u>	<u>0.4900</u>	-0.1000	0.07	1.1	<u>1.068</u>

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

## Sample Site Test Data for Timp-Nebo District

### Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
3001	-0.1000	-0.1000	0.22	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	140.08	-0.1000	2,700	-0.1000	-0.10
3033	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	23.34	-0.1000	350	-0.1000	-0.10
3034	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	24.06	-0.1000	363	-0.1000	-0.10
3035	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	21.27	-0.1000	367	-0.1000	-0.10
3036	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	19.20	-0.1000	391	-0.1000	-0.10
3037	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	11.23	-0.1000	353	-0.1000	-0.10
3038	-0.1000	-0.1000	0.28	-0.1000	-0.1000	-0.1000	0.0100	-0.1000	-0.1000	17.64	-0.1000	604	-0.1000	-0.10
3039	-0.1000	-0.1000	0.17	-0.1000	-0.1000	-0.1000	0.0100	-0.1000	-0.1000	2.76	-0.1000	296	-0.1000	1.04
3040	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	11.64	-0.1000	251	0.0100	-0.10
3041	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	7.09	-0.1000	377	-0.1000	-0.10
3042	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	19.95	-0.1000	328	-0.1000	-0.10
3077	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	22.83	-0.1000	356	-0.1000	-0.10
3133	-0.1000	-0.1000	0.12	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	30.23	-0.1000	872	-0.1000	0.07
3304	-0.1000	-0.1000	0.07	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	48.64	-0.1000	1,129	-0.1000	-0.10
3316	-0.1000	-0.1000	0.13	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	28.19	-0.1000	641	-0.1000	0.07

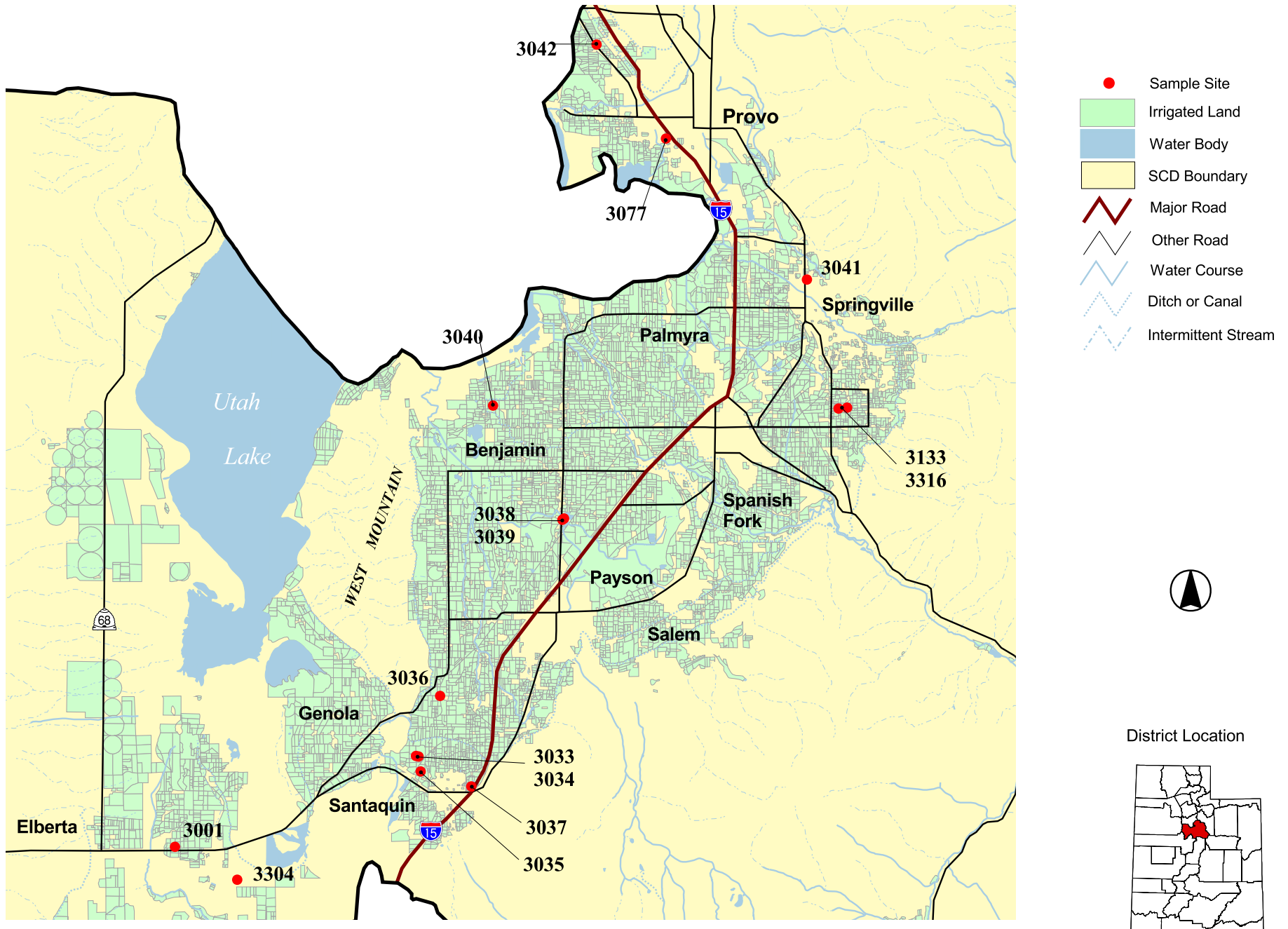
Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

### Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
3001	-0.1000	0.0400	-0.1000	-0.1000	-0.1000	0.1300	<u>1.3500</u>	-0.1	-0.1000	<u>140.08</u>	-0.1000	<u>2,700</u>	-0.10	7.13	<u>1</u>	0	32.2
3033	-0.1000	0.0900	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.3	-0.1000	23.34	-0.1000	350	-0.10	7.44	0	0	5.4
3034	-0.1000	0.0900	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.6	-0.1000	24.06	-0.1000	363	-0.10	7.57	0	0	5.8
3035	-0.1000	0.1000	-0.1000	-0.1000	0.0500	-0.1000	-0.1000	2.3	-0.1000	21.27	-0.1000	367	-0.10	7.59	0	0	5.9
3036	-0.1000	0.1100	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	4.6	-0.1000	19.20	-0.1000	391	-0.10	7.25	0	0	6.5
3037	-0.1000	0.2300	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	2.3	-0.1000	11.23	-0.1000	353	-0.10	7.30	0	0	5.4
3038	-0.1000	0.2000	-0.1000	-0.1000	0.0600	-0.1000	-0.1000	1.9	-0.1000	17.64	-0.1000	<u>604</u>	-0.10	7.75	0	0	6.1
3039	-0.1000	0.3700	-0.1000	-0.1000	-0.1000	<u>0.5300</u>	<u>0.0700</u>	0.2	-0.1000	2.76	-0.1000	296	1.04	7.80	<u>1</u>	0	3.0
3040	-0.1000	0.1200	-0.1000	-0.1000	-0.1000	0.1200	-0.1000	0.2	-0.1000	11.64	-0.1000	251	-0.10	7.82	0	0	3.4
3041	-0.1000	0.0300	-0.1000	-0.1000	0.0200	0.0600	-0.1000	-0.1	-0.1000	7.09	-0.1000	377	-0.10	8.14	<u>1</u>	0	2.3
3042	-0.1000	0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.5	-0.1000	19.95	-0.1000	328	-0.10	7.61	<u>1</u>	0	5.7
3077	-0.1000	0.1700	-0.1000	-0.1000	-0.1000	0.0800	<u>0.1500</u>	-0.1	-0.1000	22.83	-0.1000	356	-0.10	8.02	<u>1</u>	0	5.1
3133	-0.1000	0.2700	-0.1000	-0.1000	0.0200	0.0200	-0.1000	7.3	-0.1000	30.23	-0.1000	<u>872</u>	0.07	7.53	0	0	11.2
3304	-0.1000	0.4100	-0.1000	-0.1000	-0.1000	0.1000	<u>0.2600</u>	-0.1	-0.1000	48.64	-0.1000	<u>1,129</u>	-0.10	8.36	0	0	12.2
3316	-0.1000	0.1100	-0.1000	-0.1000	-0.1000	0.0300	<u>0.4900</u>	2.9	-0.1000	28.19	-0.1000	<u>641</u>	0.07	8.13	<u>1</u>	0	9.2

Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.

Map 14. Timp-Nebo District



Map Scale 1: 225,000 (1 inch = 3.6 miles)

# Wasatch District

## **General:**

Three samples were collected in the Wasatch District. Water in this district varies from soft to moderate, with grains per gallon (gpg) ranging from 2.7 to 6.3 with a mean of 4.90. Sampled water temperature ranges from 11.9 °C to 17.2 °C, with a mean of 14.33 °C. The pH for the district ranges from 7.15 to 7.34 with a mean of 7.23.

## **Irrigation:**

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in  $\mu\text{mhos/cm}$ . Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750  $\mu\text{mhos/cm}$ , salt-sensitive plants begin to be affected. When EC exceeds 3,000  $\mu\text{mhos/cm}$ , most plants would be severely injured. No Samples exceed the 750  $\mu\text{mhos/cm}$  standard.

SAR measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 marks the beginning of problems and values greater than 9 indicate severe problems. None of the water sampled in this district has elevated SAR values.

Bicarbonate ( $\text{HCO}_3$ ) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l and severe problems appear when it exceeds 8.5 meq/l. All of the samples have high bicarbonate, which is common for water in Utah.

No other elements were found in concentrations harmful to plants.

## **Livestock:**

No water quality standards for livestock were exceeded.

## **Culinary:**

Dissolved salts in water are measured in the field as Electrical Conductivity (EC). Culinary standards, however, are designated as Total Dissolved Solids (TDS), calculated from EC. No samples exceed the EPA aesthetic standard of 500 ppm. At this level the water may be off-flavored but it is not a health problem until TDS reaches 2,000 ppm.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil, whereas *E. coli*, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of *E. coli* in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well casing, improper grouting, or lack of a casing. *E. coli* contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables.



Sample 3075 is contaminated with coliform bacteria. This well should be inspected carefully to determine the source of contamination and should not be used for culinary purposes until the problem is corrected. No E. coli was found in any samples from this area.

## Sample Site Test Data for Wasatch District

### General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
3031	-0.1000	36.80	3.31	0.0600	8.86	13.04	-0.10	7.34	13.9	184
3075	-0.1000	86.74	0.96	0.1100	10.00	20.56	-0.10	7.15	17.2	342
3076	-0.1000	83.81	1.92	0.1300	24.67	17.49	-0.10	7.21	11.9	394

Values of -0.1 are below detection limits of testing procedure.

### Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
3031	-0.1000	-0.10	14.65	-0.10	-0.1000	0.0200	<u>3.39</u>	-0.1000	-0.1000	-0.10	0.5	306
3075	-0.1000	-0.10	11.59	-0.10	-0.1000	-0.1000	<u>5.23</u>	-0.1000	-0.1000	0.04	0.6	570
3076	-0.1000	-0.10	16.61	-0.10	0.0200	-0.1000	<u>5.89</u>	-0.1000	-0.1000	0.04	0.4	656

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

### Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
3031	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	3.78	-0.1000	184	-0.1000	-0.10
3075	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	9.20	-0.1000	342	-0.1000	0.04
3076	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	10.04	-0.1000	394	-0.1000	0.04

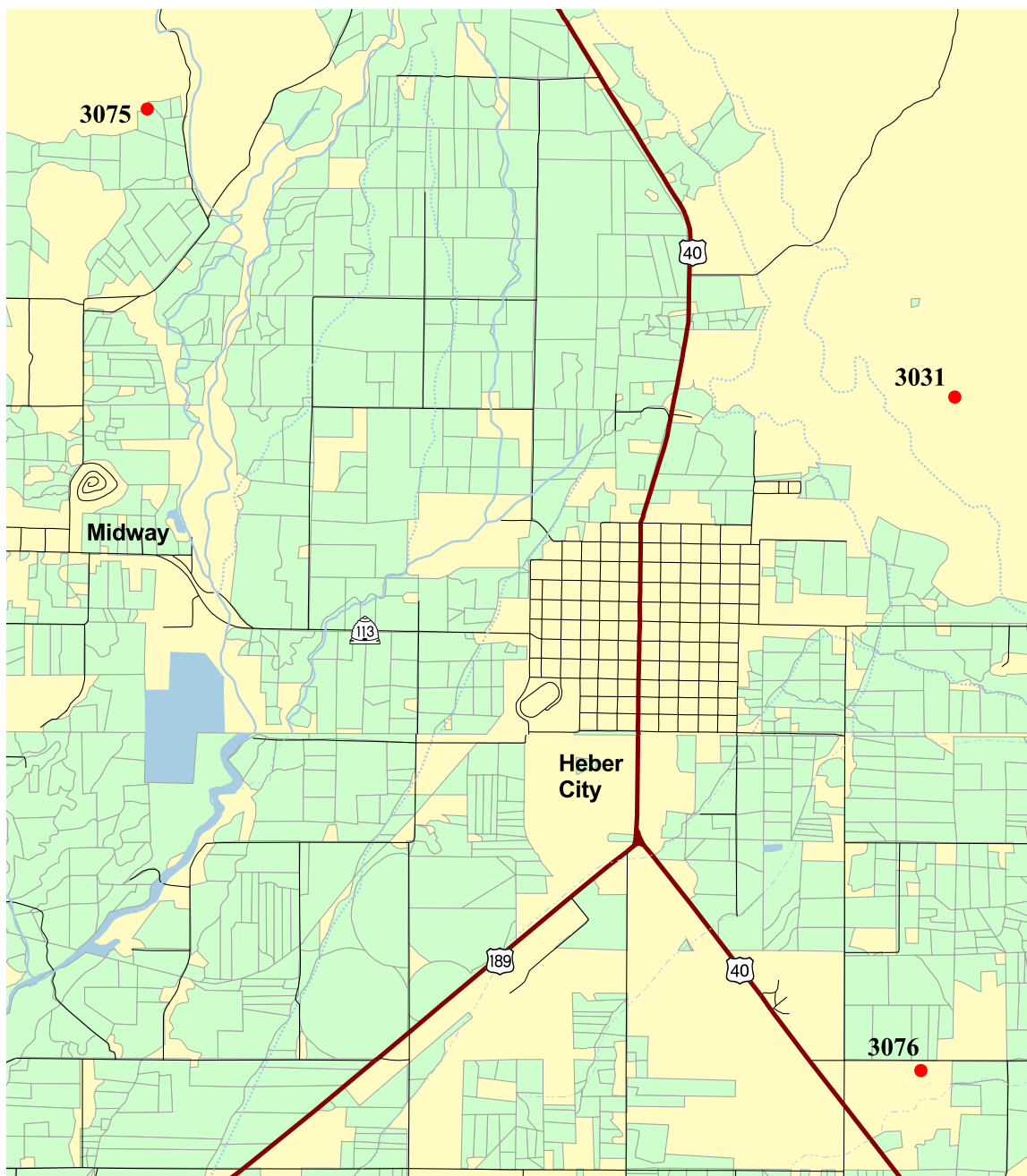
Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

### Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
3031	-0.1000	0.2400	-0.1000	-0.1000	-0.1000	0.0200	-0.1000	1.6	-0.1000	3.78	-0.1000	184	-0.10	7.34	0	0	2.7
3075	-0.1000	0.0600	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.7	-0.1000	9.20	-0.1000	342	0.04	7.15	<u>1</u>	0	5.7
3076	-0.1000	0.2000	-0.1000	-0.1000	0.0200	-0.1000	-0.1000	1.7	-0.1000	10.04	-0.1000	394	0.04	7.21	0	0	6.3

Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.

**Map 15. Wasatch District**

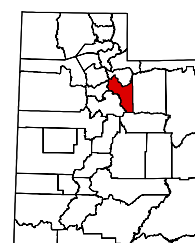


Map Scale 1:50,372 (1 inch = 0.8 miles)

- Sample Site
- Irrigated Land
- Water Body
- SCD Boundary
- Major Road
- Other Road
- Water Course
- Ditch or Canal
- ... Intermittent Stream



**District Location**



## Zone 4

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UACD Zone 4 consists of six districts in six counties including Juab, Millard, Piute, Sanpete, Sevier, and Wayne counties.

One hundred and twenty-nine sites were sampled in Zone 4 during the spring, summer, and fall of 2003. These include twenty-two in the Delta District, eleven in the Fremont River District, thirteen in the Juab County District, twenty-two in the Millard District, ten in Piute District, sixteen in the Sanpete County District, and thirty-five in Sevier County District. Many of the Millard District wells were sampled as part of an ongoing agreement with the Division of Water Rights and Utah Department of Natural Resources. A narrative report is presented for these areas together with data tables and maps showing approximate locations of sampling sites. The report covers three categories of water quality criteria—irrigation, livestock and culinary.

### Delta District

#### General:

Twenty-two samples were collected in the Delta District. Water in this district generally tested soft to moderate with grains per gallon (gpg) ranging from 0.2 to 7.5 and a mean of 1.2. Sampled water temperature ranges from 11.7 °C to 22.8 °C, with a mean of 16.3 °C. The pH for the district ranges from 8.02 to 9.65 with a mean of 8.88.

#### Irrigation:

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in  $\mu\text{mhos/cm}$ . Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750  $\mu\text{mhos/cm}$ , salt-sensitive plants begin to be affected. When EC exceeds 3,000  $\mu\text{mhos/cm}$ , most plants would be severely injured. Samples 3003, 3009, and 3311 exceed the 750  $\mu\text{mhos/cm}$  standard.

The sodium absorption ratio (SAR) measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 marks the beginning of problems and values greater than 9 indicate severe problems. Samples 3002 through 3004, 3007 through 3014, and 3309 through 3313 have elevated SAR values. Samples 3002, 3009 through 3011, 3013, 3014, and 3309 through 3311 have SAR values that exceed 9.

Bicarbonate ( $\text{HCO}_3$ ) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l and severe problems appear when it exceeds 8.5 meq/l. All of the samples have high bicarbonate, which is common for water in Utah.

Chlorine found in the form of chloride (Cl) can damage sensitive plants at concentrations above 145 ppm and concentrations exceeding 355 ppm can cause severe damage to almost all plants. Damage increases under sprinkler irrigation and is more severe in windy conditions. Samples 3003 and 3311 have high chlorine.

No other elements were found in concentrations harmful to plants.

### **Livestock:**

No water quality standards for livestock were exceeded.

### **Culinary:**

Dissolved salts in water are measured in the field as Electrical Conductivity (EC). Culinary standards, however, are designated as Total Dissolved Solids (TDS), calculated from EC. The EPA aesthetic standard for salinity is 500 ppm. At this level the water may be off-flavored, but it is not a health problem until TDS reaches 2,000 ppm  $\mu\text{mhos/cm}$ . TDS for samples 3003 and 3311 exceed the aesthetic standard of 500 ppm.

EPA has set a standard for Arsenic (As) in drinking water at 0.05 ppm. Samples 3002, 3007, 3009, 3010, 3014, and 3311 exceed this standard and should not be used for drinking water.

Sulfate is a soluble form of sulfur that can cause flavor problems in drinking water if there is more than 83 ppm sulfur. Bacteria in the water metabolize sulfur and produce hydrogen sulfide gas (rotten egg gas). The bacteria that produce this compound can live in plumbing fixtures and even hot water heaters. It is not uncommon to get strong odors when the hot water is turned on in areas where there is high sulfate. Generally, people cannot tolerate the odor from this gas. Even if the gas is not present, high sulfate concentrations can cause diarrhea in people not used to drinking it. Sample 3003 has high sulfur (S).

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil, whereas *E. coli*, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of *E. coli* in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well casing, improper grouting, or lack of a casing. *E. coli* contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables.

Samples 3002, 3013, 3311, 3312, and 3328 are contaminated with coliform (Col.).

## Sample Site Test Data for Delta District

### General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
3002	-0.1000	2.90	6.84	0.8700	1.28	157.07	0.15	8.43	15.0	417
3003	-0.1000	61.40	7.29	0.5900	67.01	216.03	-0.10	8.48	12.8	1000
3004	-0.1000	11.82	2.69	0.4800	5.90	113.64	-0.10	8.25	22.8	391
3005	-0.1000	17.44	3.89	0.3400	15.31	42.71	-0.10	8.02	16.1	236
3006	-0.1000	18.97	3.76	0.3500	17.92	36.76	-0.10	8.18	15.6	242
3007	-0.1000	7.60	3.25	0.3900	3.45	92.00	-0.10	9.35	16.1	264
3008	-0.1000	7.58	5.79	0.7600	4.68	83.59	-0.10	8.48	16.7	257
3009	-0.1000	2.76	7.65	0.6100	1.38	188.00	0.20	8.81	14.4	494
3010	-0.1000	3.68	3.98	0.4600	1.76	137.73	-0.10	8.92	11.7	344
3011	-0.1000	4.86	3.65	0.4500	2.47	100.87	-0.10	8.81	15.0	278
3012	-0.1000	5.96	2.92	0.5100	2.87	98.10	-0.10	8.67	13.9	266
3013	-0.1000	7.24	7.85	1.4000	3.20	193.94	0.40	8.69	13.3	428
3014	-0.1000	3.89	1.68	0.2400	1.65	121.05	-0.10	8.82	18.3	319
3306	-0.1000	15.65	3.87	0.2700	11.76	56.17	-0.10	9.06	17.5	257
3307	-0.1000	17.55	4.19	0.3200	13.12	53.72	-0.10	8.97	18.5	260
3308	-0.1000	16.91	3.10	0.3100	14.64	43.09	-0.10	9.11	17.1	238
3309	-0.1000	2.76	2.67	0.5200	0.99	107.58	-0.10	9.65	18.4	297
3310	-0.1000	2.60	5.71	0.5600	0.89	120.25	-0.10	9.64	16.3	337
3311	-0.1000	7.49	7.95	1.0600	4.00	207.68	-0.10	9.31	19.0	675
3312	-0.1000	6.35	4.88	0.5100	2.34	97.41	-0.10	9.27	18.3	283
3313	-0.1000	7.50	3.28	0.5400	4.64	65.99	-0.10	9.26	15.8	217
3328	-0.1000	20.69	2.85	0.3200	17.82	37.24	-0.10	9.15	15.4	238

Values of -0.1 are below detection limits of testing procedure.

## Sample Site Test Data for Delta District

### Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
3002	-0.1000	0.44	40.33	0.46	-0.1000	0.1100	<u>5.21</u>	-0.1000	-0.1000	-0.10	<u>19.31</u>	695
3003	0.1100	0.33	<u>292.02</u>	-0.10	-0.1000	0.0900	<u>4.92</u>	-0.1000	-0.1000	-0.10	<u>4.53</u>	<u>1,667</u>
3004	-0.1000	0.24	71.16	-0.10	-0.1000	-0.1000	<u>4.01</u>	-0.1000	-0.1000	-0.10	<u>6.73</u>	651
3005	-0.1000	0.10	36.82	-0.10	-0.1000	-0.1000	<u>2.83</u>	-0.1000	-0.1000	-0.10	1.79	394
3006	-0.1000	0.09	36.53	-0.10	-0.1000	-0.1000	<u>2.89</u>	-0.1000	-0.1000	-0.10	1.45	404
3007	-0.1000	0.18	35.73	-0.10	-0.1000	0.0400	<u>3.10</u>	-0.1000	-0.1000	-0.10	<u>6.94</u>	440
3008	-0.1000	0.24	25.42	-0.10	-0.1000	-0.1000	<u>3.49</u>	-0.1000	-0.1000	-0.10	<u>5.88</u>	428
3009	-0.1000	0.54	35.73	0.77	-0.1000	-0.1000	<u>6.67</u>	-0.1000	-0.1000	0.16	<u>23.04</u>	<u>823</u>
3010	0.0400	0.28	25.10	0.38	-0.1000	0.0300	<u>5.04</u>	-0.1000	-0.1000	-0.10	<u>14.77</u>	574
3011	-0.1000	0.20	31.41	-0.10	-0.1000	0.0800	<u>3.74</u>	-0.1000	-0.1000	-0.10	<u>9.28</u>	463
3012	-0.1000	0.19	30.20	0.38	-0.1000	0.1000	<u>3.10</u>	-0.1000	-0.1000	-0.10	<u>8.25</u>	444
3013	-0.1000	0.34	39.96	-0.10	0.0200	0.0400	<u>7.17</u>	-0.1000	-0.1000	1.63	<u>15.08</u>	713
3014	-0.1000	0.21	23.54	3.10	-0.1000	-0.1000	<u>4.32</u>	-0.1000	-0.1000	-0.10	<u>12.95</u>	532
3306	-0.1000	0.09	39.64	-0.10	-0.1000	-0.1000	<u>3.25</u>	-0.1000	-0.1000	-0.10	2.61	429
3307	-0.1000	0.09	40.41	-0.10	-0.1000	-0.1000	<u>4.55</u>	-0.1000	-0.1000	-0.10	2.36	434
3308	-0.1000	0.07	37.46	-0.10	-0.1000	-0.1000	<u>3.33</u>	-0.1000	-0.1000	-0.10	1.85	397
3309	-0.1000	0.15	37.70	1.55	0.0300	-0.1000	<u>4.19</u>	-0.1000	-0.1000	-0.10	<u>14.12</u>	495
3310	-0.1000	0.17	39.45	1.94	-0.1000	-0.1000	<u>5.82</u>	-0.1000	-0.1000	-0.10	<u>16.36</u>	562
3311	-0.1000	0.41	<u>157.72</u>	2.32	-0.1000	-0.1000	<u>6.51</u>	-0.1000	-0.1000	-0.10	<u>15.22</u>	<u>1,125</u>
3312	-0.1000	0.18	28.95	-0.10	-0.1000	-0.1000	<u>4.09</u>	-0.1000	-0.1000	-0.10	<u>8.38</u>	472
3313	-0.1000	0.10	26.56	-0.10	-0.1000	0.1300	<u>3.29</u>	-0.1000	-0.1000	-0.10	<u>4.66</u>	362
3328	-0.1000	0.07	35.26	-0.10	-0.1000	0.0600	<u>2.79</u>	0.0300	-0.1000	-0.10	1.44	396

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

## Sample Site Test Data for Delta District

### Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
3002	-0.1000	0.0800	0.44	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	9.35	-0.1000	417	-0.1000	-0.10
3003	0.1100	-0.1000	0.33	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	91.89	-0.1000	1,000	-0.1000	-0.10
3004	-0.1000	-0.1000	0.24	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	21.59	-0.1000	391	-0.1000	-0.10
3005	-0.1000	-0.1000	0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	13.08	-0.1000	236	0.0100	-0.10
3006	-0.1000	-0.1000	0.09	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	13.16	-0.1000	242	0.0100	-0.10
3007	-0.1000	0.0600	0.18	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	10.94	-0.1000	264	-0.1000	-0.10
3008	-0.1000	0.0400	0.24	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	6.73	-0.1000	257	-0.1000	-0.10
3009	-0.1000	0.1000	0.54	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	9.39	-0.1000	494	-0.1000	0.16
3010	0.0400	0.1000	0.28	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	6.10	-0.1000	344	-0.1000	-0.10
3011	-0.1000	0.0500	0.20	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	8.75	-0.1000	278	-0.1000	-0.10
3012	-0.1000	0.0500	0.19	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	8.14	-0.1000	266	-0.1000	-0.10
3013	-0.1000	-0.1000	0.34	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	4.39	-0.1000	428	-0.1000	1.63
3014	-0.1000	0.0600	0.21	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	5.93	-0.1000	319	-0.1000	-0.10
3306	-0.1000	-0.1000	0.09	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	12.87	-0.1000	257	0.0100	-0.10
3307	-0.1000	-0.1000	0.09	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	12.95	-0.1000	260	0.0100	-0.10
3308	-0.1000	-0.1000	0.07	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	13.23	-0.1000	238	0.0100	-0.10
3309	-0.1000	0.0400	0.15	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	11.78	-0.1000	297	-0.1000	-0.10
3310	-0.1000	0.0400	0.17	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	10.36	-0.1000	337	-0.1000	-0.10
3311	-0.1000	0.0900	0.41	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	27.29	-0.1000	675	-0.1000	-0.10
3312	-0.1000	0.0500	0.18	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	8.14	-0.1000	283	-0.1000	-0.10
3313	-0.1000	-0.1000	0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	6.68	-0.1000	217	-0.1000	-0.10
3328	-0.1000	-0.1000	0.07	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	13.22	-0.1000	238	-0.1000	-0.10

Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.



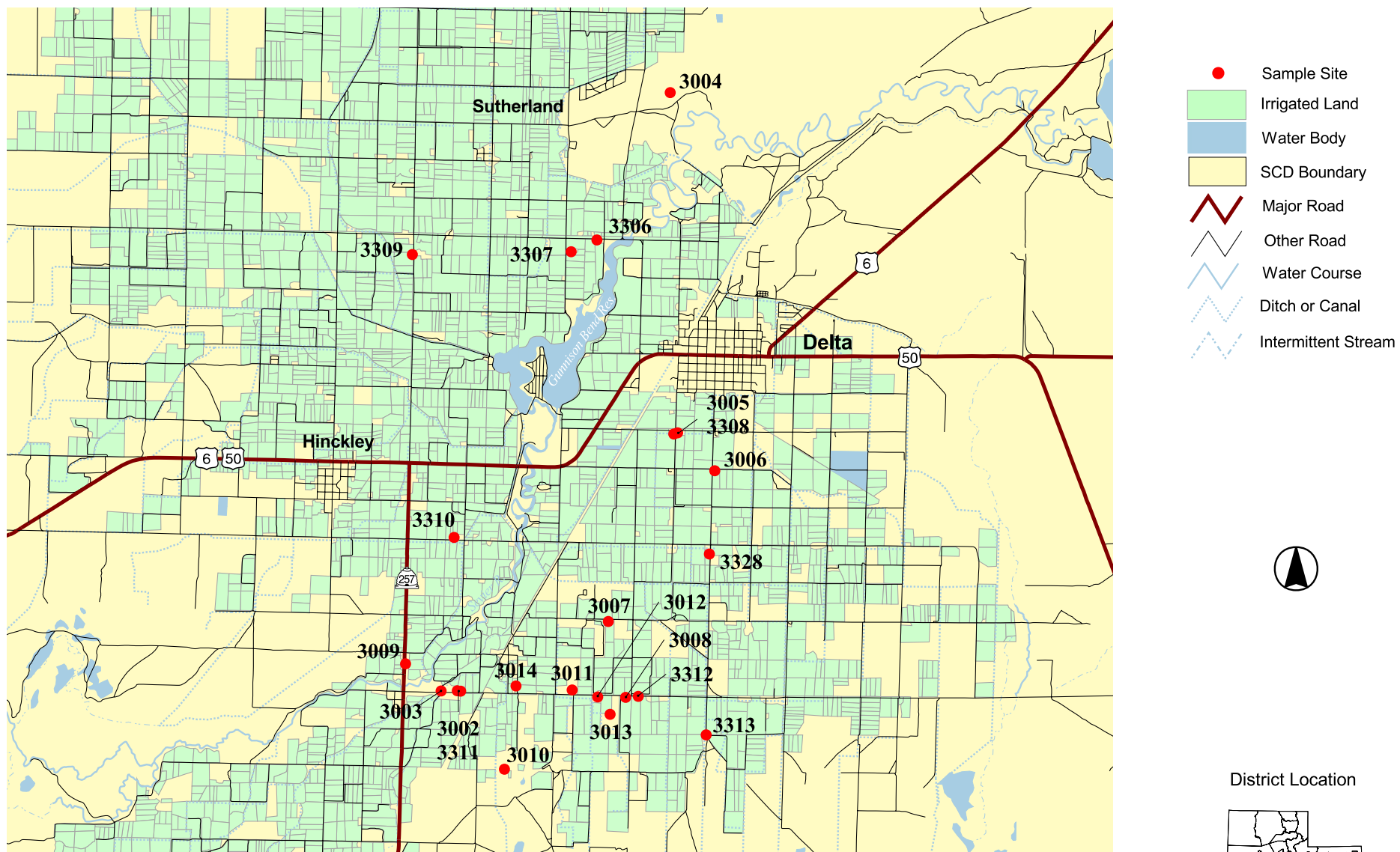
## Sample Site Test Data for Delta District

### Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
3002	<u>0.0800</u>	0.0200	-0.1000	-0.1000	-0.1000	0.1100	-0.1000	-0.1	-0.1000	9.35	-0.1000	417	-0.10	8.43	<u>1</u>	0	0.2
3003	-0.1000	0.0900	-0.1000	-0.1000	-0.1000	0.0900	-0.1000	0.0	-0.1000	<u>91.89</u>	-0.1000	<u>1,000</u>	-0.10	8.48	0	0	7.5
3004	-0.1000	0.0400	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1	-0.1000	21.59	-0.1000	391	-0.10	8.25	0	0	1.0
3005	-0.1000	0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1	-0.1000	13.08	-0.1000	236	-0.10	8.02	0	0	1.9
3006	-0.1000	0.1400	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1	-0.1000	13.16	-0.1000	242	-0.10	8.18	0	0	2.2
3007	<u>0.0600</u>	0.0300	-0.1000	-0.1000	-0.1000	0.0400	-0.1000	-0.1	-0.1000	10.94	-0.1000	264	-0.10	<u>9.35</u>	0	0	0.6
3008	0.0400	0.0700	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1	-0.1000	6.73	-0.1000	257	-0.10	8.48	0	0	0.7
3009	<u>0.1000</u>	0.0200	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.0	-0.1000	9.39	-0.1000	494	0.16	<u>8.81</u>	0	0	0.2
3010	<u>0.1000</u>	0.0200	-0.1000	-0.1000	-0.1000	0.0300	-0.1000	0.1	-0.1000	6.10	-0.1000	344	-0.10	<u>8.92</u>	0	0	0.3
3011	0.0500	0.0200	-0.1000	-0.1000	-0.1000	0.0800	-0.1000	0.0	-0.1000	8.75	-0.1000	278	-0.10	<u>8.81</u>	0	0	0.4
3012	0.0500	0.0400	-0.1000	-0.1000	-0.1000	0.1000	-0.1000	-0.1	-0.1000	8.14	-0.1000	266	-0.10	<u>8.67</u>	0	0	0.5
3013	-0.1000	0.0200	-0.1000	-0.1000	0.0200	0.0400	-0.1000	-0.1	-0.1000	4.39	-0.1000	428	1.63	<u>8.69</u>	<u>1</u>	0	0.6
3014	<u>0.0600</u>	0.0200	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1	-0.1000	5.93	-0.1000	319	-0.10	<u>8.82</u>	0	0	0.3
3306	-0.1000	0.0800	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1	-0.1000	12.87	-0.1000	257	-0.10	<u>9.06</u>	0	0	1.6
3307	-0.1000	0.1100	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1	-0.1000	12.95	-0.1000	260	-0.10	<u>8.97</u>	0	0	1.8
3308	-0.1000	0.0800	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1	-0.1000	13.23	-0.1000	238	-0.10	<u>9.11</u>	0	0	1.8
3309	0.0400	-0.1000	-0.1000	-0.1000	0.0300	-0.1000	-0.1000	-0.1	-0.1000	11.78	-0.1000	297	-0.10	<u>9.65</u>	0	0	0.2
3310	0.0400	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1	-0.1000	10.36	-0.1000	337	-0.10	<u>9.64</u>	0	0	0.2
3311	<u>0.0900</u>	0.0200	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1	-0.1000	27.29	-0.1000	<u>675</u>	-0.10	<u>9.31</u>	<u>1</u>	0	0.7
3312	0.0500	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1	-0.1000	8.14	-0.1000	283	-0.10	<u>9.27</u>	<u>1</u>	0	0.5
3313	-0.1000	0.0400	-0.1000	-0.1000	-0.1000	0.1300	-0.1000	-0.1	-0.1000	6.68	-0.1000	217	-0.10	<u>9.26</u>	0	0	0.7
3328	-0.1000	0.1200	-0.1000	-0.1000	-0.1000	0.0600	0.0300	-0.1	-0.1000	13.22	-0.1000	238	-0.10	<u>9.15</u>	<u>1</u>	0	2.3

Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.

Map 16. Delta District



# Fremont River District

## **General:**

Eleven samples were collected in the Fremont River District. Water in this district tested soft to very hard, with grains per gallon (gpg) ranging from 0.4 to 55.9 with a mean of 8.60. Sampled water temperature ranges from 8.9 °C to 18.4 °C, with a mean of 15.04 °C. The pH for the district ranges from 6.84 to 9.18 with a mean of 8.19.

## **Irrigation:**

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in  $\mu\text{mhos/cm}$ . Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750  $\mu\text{mhos/cm}$ , salt-sensitive plants begin to be affected. When EC exceeds 3,000  $\mu\text{mhos/cm}$ , most plants would be severely injured. Samples 3270, 3271, and 3275 exceed the 750  $\mu\text{mhos/cm}$  standard and sample 3275 also exceeds the 3,000 standard.

SAR measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 marks the beginning of problems and values greater than 9 indicate severe problems. Samples 3272 through 3274 have elevated SAR values.

Bicarbonate ( $\text{HCO}_3$ ) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l, and severe problems appear when it exceeds 8.5 meq/l. All samples have high bicarbonate, which is common for water in Utah.

Sample 3269 has elevated copper (Cu) and can interfere with plant metabolism.

Sample 3063 has manganese (Mn) at levels that are toxic to plants. Both these elements are needed for plant growth, but are toxic when too concentrated.

No other elements were found in concentrations harmful to plants.

## **Livestock:**

Livestock eating plants irrigated with water that has molybdenum (Mo) concentration greater than 0.01 ppm may be harmed. High concentrations of molybdenum interfere with copper nutrition in livestock. Samples 3272 and 3273 have elevated molybdenum.

Sulfur (S) in the form of sulfate can cause water to be off flavored and also diarrhea in animals not used to drinking it. Problems start when the sulfur level in water exceeds 167 ppm. Sample 3275 has elevated sulfur at concentrations which exceed the livestock standard for sulfur.

No other water quality standards for livestock were exceeded.

## **Culinary:**

Dissolved salts in water are measured in the field as Electrical Conductivity (EC). Culinary standards, however, are designated as Total Dissolved Solids (TDS), calculated from EC. The EPA aesthetic

standard for TDS is 500 ppm. At this level the water may be off-flavored but it is not a health problem until TDS reaches 2,000 ppm. Sample 3275 exceeds the aesthetic standard for salinity.

High iron (Fe) can cause discoloration of plumbing fixtures and promote the growth of iron bacteria, which stain anything they contact. This is an aesthetic issue, not a health concern. Samples 3062 and 3226 have high iron.

EPA has set an aesthetic standard of 0.05 ppm for manganese (Mn). Water with high concentrations of manganese may cause discoloration of plumbing fixtures and have poor flavor. Sample 3063 has a high manganese concentration.

Sulfate is a soluble form of sulfur that can cause flavor problems in drinking water if there is more than 83 ppm sulfur (S). Bacteria in the water metabolize sulfur and produce hydrogen sulfide gas (rotten egg gas). The bacteria that produce this compound can live in plumbing fixtures and even hot water heaters. It is not uncommon to get strong odors when the hot water is turned on in areas where there is high sulfate. Generally, people cannot tolerate the odor from this gas. Even if the gas is not present, high sulfate concentrations can cause diarrhea in people not used to drinking it. Sample 3275 has high sulfur.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil, whereas *E. coli*, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of *E. coli* in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well casing, improper grouting, or lack of a casing. *E. coli* contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables.

Coliform bacteria were detected in samples 3270 and 3271 with *E. coli* also being found in 3270.

## Sample Site Test Data for Fremont River District

### General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
3061	-0.1000	35.85	3.77	-0.1000	8.24	17.65	-0.10	7.71	15.0	194
3062	-0.1000	41.61	6.08	-0.1000	17.60	31.57	-0.10	8.26	12.2	280
3063	-0.1000	25.21	1.38	-0.1000	5.54	8.45	-0.10	7.40	8.9	119
3226	-0.1000	5.99	1.31	-0.1000	1.66	5.71	-0.10	6.84	9.8	39
3269	-0.1000	99.71	3.80	0.0500	36.62	27.17	-0.10	8.21	17.5	449
3270	-0.1000	111.08	4.40	0.0700	35.14	25.57	-0.10	8.31	16.4	463
3271	-0.1000	114.09	0.80	0.2500	45.31	23.52	-0.10	8.52	15.6	477
3272	-0.1000	22.16	2.12	0.5200	9.55	154.68	-0.10	8.85	17.2	443
3273	-0.1000	19.72	2.06	0.4700	7.90	146.24	-0.10	8.68	18.4	408
3274	-0.1000	11.43	1.79	0.5200	4.96	147.93	-0.10	9.18	17.2	373
3275	-0.1000	470.88	16.01	1.9100	485.61	75.36	-0.10	8.10	17.3	1902

Values of -0.1 are below detection limits of testing procedure.

### Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
3061	-0.1000	-0.10	13.54	-0.10	-0.1000	-0.1000	<u>3.37</u>	-0.1000	-0.1000	0.09	0.7	324
3062	-0.1000	0.10	28.22	-0.10	-0.1000	0.3400	<u>5.33</u>	0.0200	-0.1000	-0.10	1.0	467
3063	-0.1000	-0.10	7.09	-0.10	-0.1000	0.0800	<u>2.65</u>	<u>0.4400</u>	-0.1000	0.10	0.4	199
3226	1.0000	-0.10	-0.10	-0.10	-0.1000	0.4800	<u>2.42</u>	-0.1000	-0.1000	0.15	0.5	65
3269	-0.1000	0.10	22.74	-0.10	<u>0.2100</u>	-0.1000	<u>3.91</u>	-0.1000	-0.1000	0.17	0.6	749
3270	-0.1000	0.08	23.44	-0.10	-0.1000	-0.1000	<u>4.55</u>	-0.1000	-0.1000	0.08	0.5	<u>772</u>
3271	-0.1000	0.10	8.03	-0.10	0.0500	-0.1000	<u>6.78</u>	-0.1000	-0.1000	0.08	0.5	<u>795</u>
3272	-0.1000	0.17	4.24	-0.10	-0.1000	0.1600	<u>4.42</u>	-0.1000	-0.1000	-0.10	<u>6.9</u>	739
3273	-0.1000	0.17	-0.10	-0.10	-0.1000	-0.1000	<u>4.42</u>	-0.1000	-0.1000	-0.10	<u>7.0</u>	680
3274	-0.1000	0.11	-0.10	-0.10	-0.1000	-0.1000	<u>3.41</u>	-0.1000	-0.1000	-0.10	<u>9.2</u>	622
3275	-0.1000	0.32	14.87	-0.10	-0.1000	-0.1000	<u>4.20</u>	-0.1000	-0.1000	0.04	0.6	<u>3,170</u>

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently.

Values of -0.1 are below detection limits of testing procedure.

## Sample Site Test Data for Fremont River District

### Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
3061	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	6.29	-0.1000	194	-0.1000	0.09
3062	-0.1000	-0.1000	0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	3.30	-0.1000	280	-0.1000	-0.10
3063	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	3.47	-0.1000	119	-0.1000	0.10
3226	1.0000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.94	-0.1000	39	-0.1000	0.15
3269	-0.1000	-0.1000	0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	58.51	-0.1000	449	-0.1000	0.17
3270	-0.1000	-0.1000	0.08	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	58.89	-0.1000	463	-0.1000	0.08
3271	-0.1000	-0.1000	0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	34.27	-0.1000	477	-0.1000	0.08
3272	-0.1000	-0.1000	0.17	-0.1000	-0.1000	-0.1000	<u>0.0300</u>	-0.1000	-0.1000	63.40	-0.1000	443	-0.1000	-0.10
3273	-0.1000	-0.1000	0.17	-0.1000	-0.1000	-0.1000	<u>0.0300</u>	-0.1000	-0.1000	54.12	-0.1000	408	-0.1000	-0.10
3274	-0.1000	-0.1000	0.11	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	51.75	-0.1000	373	-0.1000	-0.10
3275	-0.1000	-0.1000	0.32	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1053.05	-0.1000	1,902	-0.1000	0.04

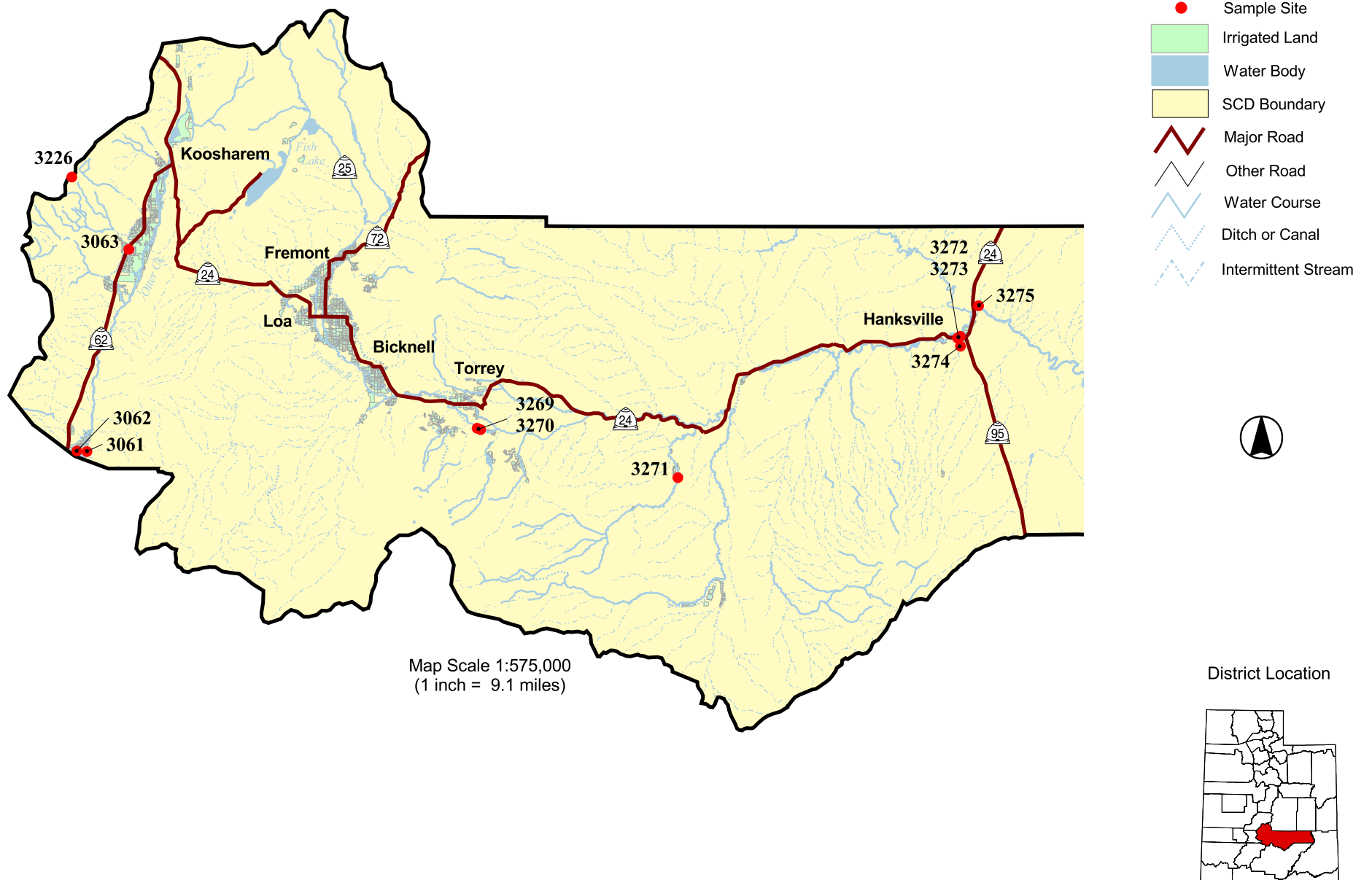
Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

### Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
3061	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.4	-0.1000	6.29	-0.1000	194	0.09	7.71	0	0	2.6
3062	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	<u>0.3400</u>	0.0200	-0.1	-0.1000	3.30	-0.1000	280	-0.10	8.26	0	0	3.5
3063	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.0800	<u>0.4400</u>	0.1	-0.1000	3.47	-0.1000	119	0.10	7.40	0	0	1.8
3226	-0.1000	0.0400	-0.1000	-0.1000	-0.1000	<u>0.4800</u>	-0.1000	-0.1	-0.1000	0.94	-0.1000	39	0.15	6.84	0	0	0.4
3269	-0.1000	0.0900	-0.1000	-0.1000	0.2100	-0.1000	-0.1000	-0.1	-0.1000	58.51	-0.1000	449	0.17	8.21	0	0	8.0
3270	-0.1000	0.0600	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.7	-0.1000	58.89	-0.1000	463	0.08	8.31	<u>1</u>	<u>1</u>	8.6
3271	-0.1000	0.0300	-0.1000	-0.1000	0.0500	-0.1000	-0.1000	-0.1	-0.1000	34.27	-0.1000	477	0.08	<u>8.52</u>	<u>1</u>	0	9.3
3272	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.1600	-0.1000	-0.1	-0.1000	63.40	-0.1000	443	-0.10	<u>8.85</u>	0	0	1.9
3273	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1	-0.1000	54.12	-0.1000	408	-0.10	<u>8.68</u>	0	0	1.6
3274	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1	-0.1000	51.75	-0.1000	373	-0.10	<u>9.18</u>	0	0	1.0
3275	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1	-0.1000	1053.05	-0.1000	<u>1,902</u>	0.04	8.10	0	0	55.9

Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.

Map 17. Fremont River District



## **Juab District**

### **General:**

Thirteen samples were collected in the Juab County District. Water in this district varies from soft to very hard, with grains per gallon (gpg) ranging from 2.2 to 18.7 with a mean of 7.6. Sampled water temperature ranges from 10.6 °C to 16.7 °C, with a mean of 12.79 °C. The pH for the district ranges from 7.30 to 8.82 with a mean of 8.31.

### **Irrigation:**

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in  $\mu\text{mhos/cm}$ . Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750  $\mu\text{mhos/cm}$ , salt-sensitive plants begin to be affected. When EC exceeds 3,000  $\mu\text{mhos/cm}$ , most plants would be severely injured. All samples have EC values greater than 750  $\mu\text{mhos/cm}$  except 3320, 3322, 3325, and 3327. No samples exceed the 3,000  $\mu\text{mhos/cm}$  severe standard.

SAR measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 marks the beginning of problems and values greater than 9 indicate severe problems. Samples 3318 and 3322 have elevated SAR values. Sample 3318 exceeds 9 and could cause severe problems.

Bicarbonate ( $\text{HCO}_3$ ) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l and severe problems appear when it exceeds 8.5 meq/l. All of the samples have high bicarbonate, common for water in Utah. Samples 3016 and 3305 exceed the 8.5 level.

Chlorine (Cl), found in the form of chloride ( $\text{Cl}^-$ ), can damage sensitive plants at concentrations above 145 ppm, and concentrations exceeding 355 ppm can cause severe damage to almost all plants. Damage increases under sprinkler irrigation and is more severe in windy conditions. Samples 3015, 3305, 3318, 3319 and 3321 have elevated Cl and 3318 may cause severe damage to plants.

Some specific elements can be toxic to plants. Manganese (Mn) is a micro-nutrient and is required for plant growth, yet in excess it can damage plants. Manganese above 0.2 ppm can injure plants and cause reduction in dry matter production. Excess manganese interferes with the plant's ability to use other nutrients such as calcium (Ca). Sample 3318 has elevated concentrations of manganese.

Zinc (Zn) is a micro-nutrient and is required for plant growth. However, in excess of 2 ppm it can injure plants. Sample 3015 has elevated zinc.

### **Livestock:**

Sulfur (S) in the form of sulfate can cause water to be off flavored and also diarrhea in animals not used to drinking it. Problems start when the sulfur level in water exceeds 167 ppm. Samples 3015 and 3016 have elevated sulfur at concentrations which exceed the livestock standard for sulfur.

No other water quality standards for livestock were exceeded.



## **Culinary:**

Dissolved salts in water are measured in the field as Electrical Conductivity (EC). Culinary standards, however, are designated as Total Dissolved Solids (TDS), calculated from EC. The EPA aesthetic standard for TDS is 500 ppm. At this level the water may be off-flavored but it is not a health problem until TDS reaches 2,000 ppm. All samples **except** for 3320, 3322, 3324, 3325, and 3327 exceed the aesthetic standard for salinity.

High iron (Fe) can cause discoloration of plumbing fixtures and promote the growth of iron bacteria, which stain anything they contact. This is an aesthetic issue, not a health concern. Sample 3015 has high iron.

EPA has set an aesthetic standard of 0.05 ppm for manganese (Mn). Water with high concentrations of manganese may cause discoloration of plumbing fixtures and have poor flavor. Samples 3015, 3318, and 3322 have a high manganese concentration.

Sulfate is a soluble form of sulfur that can cause flavor problems in drinking water if there is more than 83 ppm sulfur(S). Bacteria in the water metabolize sulfur and produce hydrogen sulfide gas (rotten egg gas). The bacteria that produce this compound can live in plumbing fixtures and even hot water heaters. It is not uncommon to get strong odors when the hot water is turned on in areas where there is high sulfate. Generally, people cannot tolerate the odor from this gas. Even if the gas is not present, high sulfate concentrations can cause diarrhea in people not used to drinking it. Samples 3015, 3016, and 3318 also have high sulfur.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil, whereas *E. coli*, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of *E. coli* in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well casing, improper grouting, or lack of a casing. *E. coli* contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables.

Samples 3015 and 3325 are contaminated with coliform.

## Sample Site Test Data for Juab County District

### General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
3015	-0.1000	215.82	4.82	0.3300	103.26	142.08	-0.10	7.30	16.7	1218
3016	-0.1000	138.55	7.96	0.7300	172.08	66.68	-0.10	7.48	10.6	1070
3305	-0.1000	123.06	3.38	0.1500	34.07	136.16	-0.10	7.96	13.6	865
3318	-0.1000	78.53	20.29	1.0900	53.11	469.46	-0.10	8.52	14.1	1524
3319	-0.1000	74.76	6.49	0.6700	47.08	109.15	-0.10	8.47	12.9	757
3320	-0.1000	38.14	4.01	0.3800	21.19	65.26	-0.10	8.55	12.5	370
3321	-0.1000	70.73	4.36	0.3700	41.68	116.92	-0.10	8.28	15.3	707
3322	-0.1000	23.95	3.10	0.2700	13.75	104.45	-0.10	8.60	11.5	411
3323	-0.1000	57.45	3.83	0.2500	36.96	72.29	-0.10	8.48	11.6	502
3324	-0.1000	57.14	3.25	0.2100	34.31	67.42	-0.10	8.55	11.0	472
3325	-0.1000	26.68	2.74	0.1800	20.82	42.53	-0.10	8.82	12.2	260
3326	-0.1000	71.66	3.02	0.1900	40.15	63.92	-0.10	8.42	12.6	532
3327	-0.1000	61.56	2.91	0.1800	31.92	57.78	-0.10	8.57	11.7	444

Values of -0.1 are below detection limits of testing procedure.

### Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
3015	-0.1000	0.13	<u>205.23</u>	-0.10	-0.1000	0.4400	<u>3.78</u>	0.1400	-0.1000	<u>3.39</u>	2.0	<u>2,030</u>
3016	-0.1000	0.18	98.95	-0.10	-0.1000	-0.1000	<u>8.92</u>	-0.1000	-0.1000	-0.10	0.9	<u>1,784</u>
3305	-0.1000	0.09	<u>197.02</u>	-0.10	-0.1000	-0.1000	<u>8.55</u>	-0.1000	-0.1000	0.28	2.8	<u>1,442</u>
3318	-0.1000	0.42	<u>622.38</u>	-0.10	0.0500	0.0200	<u>4.88</u>	<u>0.3100</u>	-0.1000	-0.10	<u>10.0</u>	<u>2,540</u>
3319	-0.1000	0.26	<u>201.70</u>	-0.10	0.0200	-0.1000	<u>4.55</u>	-0.1000	-0.1000	-0.10	2.4	<u>1,261</u>
3320	-0.1000	0.18	52.93	-0.10	-0.1000	0.0700	<u>3.91</u>	-0.1000	-0.1000	-0.10	2.1	616
3321	-0.1000	0.21	<u>229.00</u>	-0.10	0.0200	-0.1000	<u>3.31</u>	-0.1000	-0.1000	0.39	2.7	<u>1,178</u>
3322	-0.1000	0.20	66.49	-0.10	-0.1000	0.1300	<u>3.95</u>	0.0900	-0.1000	-0.10	<u>4.2</u>	685
3323	-0.1000	0.19	99.56	-0.10	-0.1000	-0.1000	<u>4.46</u>	-0.1000	-0.1000	-0.10	1.8	<u>837</u>
3324	-0.1000	0.18	89.41	-0.10	-0.1000	-0.1000	<u>4.26</u>	-0.1000	-0.1000	-0.10	1.7	<u>787</u>
3325	-0.1000	0.14	18.18	-0.10	-0.1000	-0.1000	<u>3.78</u>	-0.1000	-0.1000	-0.10	1.5	433
3326	-0.1000	0.17	117.95	-0.10	0.0600	0.1200	<u>4.88</u>	-0.1000	-0.1000	0.04	1.5	<u>887</u>
3327	-0.1000	0.16	71.70	-0.10	0.0300	0.0500	<u>4.63</u>	-0.1000	-0.1000	0.08	1.5	740

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently.

Values of -0.1 are below detection limits of testing procedure.

## Sample Site Test Data for Juab County District

### Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
3015	-0.1000	-0.1000	0.13	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	<u>262.01</u>	-0.1000	1,218	-0.1000	3.39
3016	-0.1000	-0.1000	0.18	-0.1000	-0.1000	-0.1000	0.0100	-0.1000	-0.1000	<u>235.39</u>	-0.1000	1,070	-0.1000	-0.10
3305	-0.1000	-0.1000	0.09	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	31.62	-0.1000	865	-0.1000	0.28
3318	-0.1000	-0.1000	0.42	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	127.57	-0.1000	1,524	-0.1000	-0.10
3319	-0.1000	-0.1000	0.26	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	33.15	-0.1000	757	-0.1000	-0.10
3320	-0.1000	-0.1000	0.18	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	15.66	-0.1000	370	-0.1000	-0.10
3321	-0.1000	-0.1000	0.21	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	36.89	-0.1000	707	-0.1000	0.39
3322	-0.1000	-0.1000	0.20	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	17.32	-0.1000	411	-0.1000	-0.10
3323	-0.1000	-0.1000	0.19	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	21.11	-0.1000	502	-0.1000	-0.10
3324	-0.1000	-0.1000	0.18	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	19.35	-0.1000	472	-0.1000	-0.10
3325	-0.1000	-0.1000	0.14	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	10.72	-0.1000	260	-0.1000	-0.10
3326	-0.1000	-0.1000	0.17	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	21.05	-0.1000	532	-0.1000	0.04
3327	-0.1000	-0.1000	0.16	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	18.13	-0.1000	444	-0.1000	0.08

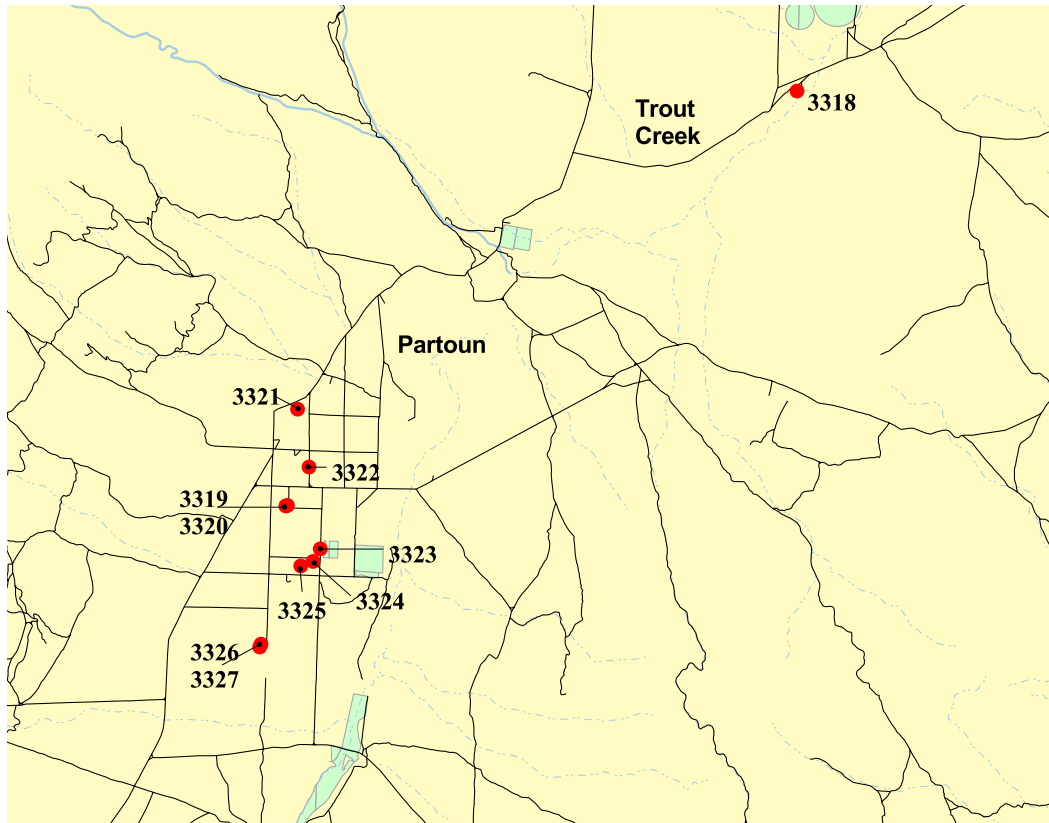
Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

### Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
3015	-0.1000	0.0300	-0.1000	-0.1000	-0.1000	<u>0.4400</u>	<u>0.1400</u>	1.3	-0.1000	<u>262.01</u>	-0.1000	<u>1,218</u>	3.39	7.30	1	0	18.7
3016	-0.1000	0.0300	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1	-0.1000	<u>235.39</u>	-0.1000	<u>1,070</u>	-0.10	7.48	0	0	18.2
3305	-0.1000	0.0500	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	3.8	-0.1000	31.62	-0.1000	<u>865</u>	0.28	7.96	0	0	9.2
3318	-0.1000	0.0200	-0.1000	-0.1000	0.0500	0.0200	<u>0.3100</u>	-0.1	-0.1000	<u>127.57</u>	-0.1000	<u>1,524</u>	-0.10	<u>8.52</u>	0	0	7.7
3319	-0.1000	0.1000	-0.1000	-0.1000	0.0200	-0.1000	-0.1000	-0.1	-0.1000	33.15	-0.1000	<u>757</u>	-0.10	8.47	0	0	7.1
3320	-0.1000	0.0500	-0.1000	-0.1000	-0.1000	0.0700	-0.1000	-0.1	-0.1000	15.66	-0.1000	370	-0.10	<u>8.55</u>	0	0	3.5
3321	-0.1000	0.0300	-0.1000	-0.1000	0.0200	-0.1000	-0.1000	-0.1	-0.1000	36.89	-0.1000	<u>707</u>	0.39	8.28	0	0	6.6
3322	-0.1000	0.0500	-0.1000	-0.1000	-0.1000	0.1300	<u>0.0900</u>	-0.1	-0.1000	17.32	-0.1000	411	-0.10	<u>8.60</u>	0	0	2.2
3323	-0.1000	0.0600	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1	-0.1000	21.11	-0.1000	<u>502</u>	-0.10	8.48	0	0	5.5
3324	-0.1000	0.0600	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1	-0.1000	19.35	-0.1000	472	-0.10	<u>8.55</u>	0	0	5.3
3325	-0.1000	0.0600	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1	-0.1000	10.72	-0.1000	260	-0.10	<u>8.82</u>	1	0	2.8
3326	-0.1000	0.1000	-0.1000	-0.1000	0.0600	0.1200	-0.1000	-0.1	-0.1000	21.05	-0.1000	<u>532</u>	0.04	8.42	0	0	6.5
3327	-0.1000	0.1000	-0.1000	-0.1000	0.0300	0.0500	-0.1000	-0.1	-0.1000	18.13	-0.1000	444	0.08	<u>8.57</u>	0	0	5.5

Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.

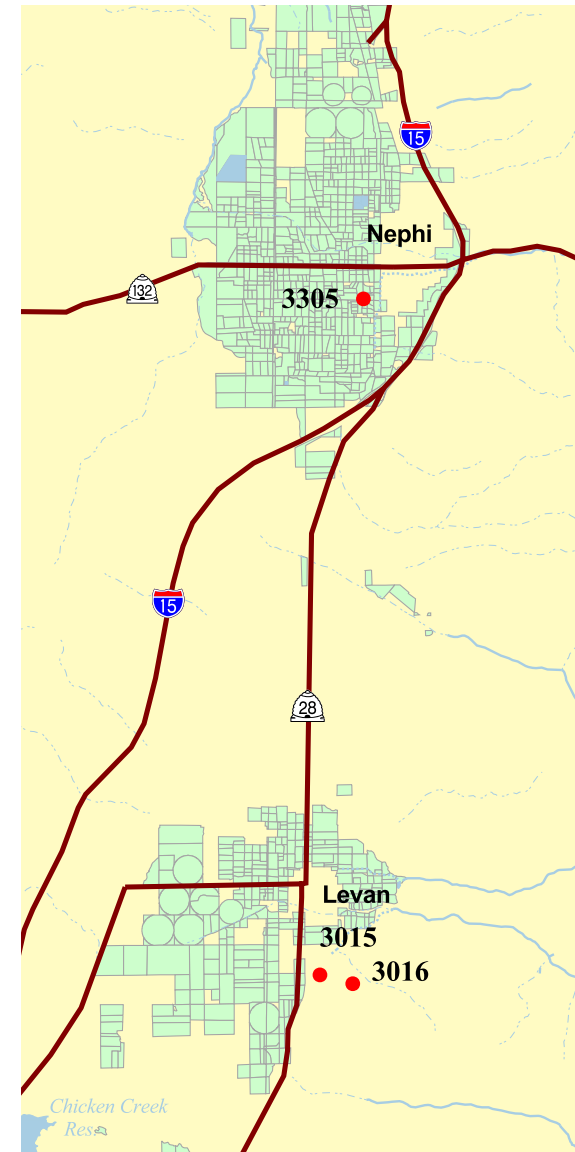
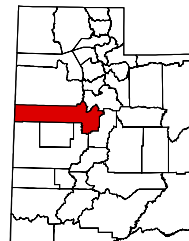
## Map 18. Juab County District



Map Scale 1:106,387  
(1 inch = 1.7 miles)

- Sample Site
- Irrigated Land
- Water Body
- SCD Boundary
- Major Road
- Other Road
- Water Course
- Ditch or Canal
- Intermittent Stream

District Location



Map Scale 1:205,000  
(1 inch = 3.24 miles)

## Millard District

### General:

Twenty-two samples were collected in the Millard District. Water in this district varies from moderate-hard to very hard, with grains per gallon (gpg) ranging from 4.0 to 40.1 with a mean of 9.1. Sampled water temperature ranges from 12.9 °C to 24.8 °C, with a mean of 17.17 °C. The pH for the district ranges from 7.05 to 8.68 with a mean of 7.73.

### Irrigation:

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in  $\mu\text{mhos/cm}$ . Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750  $\mu\text{mhos/cm}$ , salt-sensitive plants begin to be affected. When EC exceeds 3,000  $\mu\text{mhos/cm}$ , most plants would be severely injured. Only six of the 22 samples have EC values **less** than 750  $\mu\text{mhos/cm}$  —3162, 3166, 3171, 3172, 3314, and 3315. Samples 3174, 3175, and 3177 exceed the severe-injury level of 3,000  $\mu\text{mhos/cm}$ .

SAR measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 marks the beginning of problems and values greater than 9 indicate severe problems. Samples 3174, 3175, and 3177 have elevated SAR values. Samples 3174 and 3175 exceed 9 and can indicate severe problems.

Bicarbonate ( $\text{HCO}_3$ ) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l and severe problems appear when it exceeds 8.5 meq/l. All of the samples have high bicarbonate, which is common for water in Utah. Sample 3174 exceeds the 8.5 level.

Boron (B) is toxic to sensitive plants when concentration exceeds 0.7 ppm. It will cause severe injury at 10.0 ppm. However, boron in trace amounts is required for proper plant growth. It is important to monitor this element because the margin separating safe health from toxicity is small. Samples 3174, 3175, and 3177 have elevated boron.

Chlorine (Cl), found in the form of chloride ( $\text{Cl}^-$ ), can damage sensitive plants at concentrations above 145 ppm, and concentrations exceeding 355 ppm can cause severe damage to almost all plants. Damage increases under sprinkler irrigation and is more severe in windy conditions. Samples 3159, 3160, 3163, 3165, 3167 through 3169 and 3173 have elevated Cl.

The standard for Selenium (Se) in irrigation water is 0.02 ppm. Sample 3177 exceeds the irrigation water standard for selenium. This water should not be used for irrigation without special treatment.

No other elements were found in concentrations harmful to plants.

### Livestock:

Sulfur (S) in the form of sulfate can cause water to be off flavored and may cause diarrhea in animals not used to drinking it. Problems start when the sulfur level in water exceeds 167 ppm. Samples 3167 and 3177 have sulfur exceeding the livestock standard for sulfur. Sample 3177 has extremely high sulfur and should not be used for livestock.

No other water quality standards for livestock were exceeded.

## **Culinary:**

Dissolved salts in water are measured in the field as Electrical Conductivity (EC). Culinary standards, however, are designated as Total Dissolved Solids (TDS), calculated from EC. TDS for 15 samples exceed the EPA aesthetic standard of 500 ppm. At this level the water may be off-flavored but it is not a health problem until TDS reaches 2,000 ppm. All samples exceed the aesthetic standard for TDS **except** – 3162, 3164, 3166, 3171, 3172, 3314, and 3315. Samples 3174, 3175, and 3177 exceed the health standard and should not be used for drinking.

EPA has set an aesthetic standard of 0.05 ppm for manganese (Mn). Water with high concentrations may cause discoloration of plumbing fixtures and have poor flavor. Samples 3174 and 3175 have high manganese) concentration.

Sulfate is a soluble form of sulfur that can cause flavor problems in drinking water if there is more than 83 ppm sulfur (S). Bacteria in the water metabolize sulfur and produce hydrogen sulfide gas (rotten egg gas). The bacteria that produce this compound can live in plumbing fixtures and even hot water heaters. It is not uncommon to get strong odors when the hot water is turned on in areas where there is high sulfate. Generally, people cannot tolerate the odor from this gas. Even if the gas is not present, high sulfate concentrations can cause diarrhea in people not used to drinking it. Samples 3167, 3175, and 3177 also have high sulfur.

EPA has set a drinking water standard for selenium (Se) at 0.01 ppm. Sample 3177 exceeds the EPA primary drinking water standard for selenium. This water should not be used for drinking without special treatment.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil, whereas *E. coli*, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of *E. coli* in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well casing, improper grouting, or lack of a casing. *E. coli* contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables.

Samples 3158, 3159, 3167, 3168, 3169, 3172, 3174 through 3177, and 3315 are contaminated with coliform bacteria. Samples 3174 and 3177 are contaminated with *E. coli* bacteria. Wells these samples were taken from should be inspected carefully to determine the source of contamination and should not be used for culinary purposes until the problem is corrected.

## Sample Site Test Data for Millard District

### General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
3158	-0.1000	113.81	3.16	0.3300	41.15	54.25	-0.10	7.21	15.1	677
3159	-0.1000	156.63	3.94	0.4400	51.28	53.26	-0.10	7.28	15.5	844
3160	-0.1000	140.33	2.59	0.1700	72.65	60.86	-0.10	7.05	14.9	965
3161	-0.1000	88.05	1.48	0.1100	44.79	31.92	-0.10	7.21	15.5	586
3162	-0.1000	36.93	2.15	0.3800	30.78	34.23	-0.10	7.78	17.0	362
3163	-0.1000	90.28	1.80	0.1900	37.93	45.28	-0.10	7.61	19.4	602
3164	-0.1000	65.20	1.34	0.1400	45.47	32.33	-0.10	7.61	18.0	474
3165	-0.1000	74.86	1.74	0.2100	33.87	33.58	-0.10	7.71	18.5	526
3166	-0.1000	50.07	1.35	0.1200	30.12	19.95	-0.10	7.75	18.3	335
3167	-0.1000	154.30	4.64	0.8000	112.07	66.87	-0.10	7.40	19.1	1121
3168	-0.1000	81.28	11.52	2.0900	60.05	81.89	-0.10	7.84	19.3	781
3169	-0.1000	89.57	13.36	2.3700	30.38	100.11	-0.10	7.69	15.6	775
3170	-0.1000	108.51	5.06	0.5000	32.18	58.10	-0.10	7.96	16.7	641
3171	-0.1000	74.01	1.88	0.1200	24.16	27.82	-0.10	8.36	15.9	416
3172	-0.1000	82.89	2.05	0.1300	29.57	22.23	-0.10	7.73	15.1	438
3173	-0.1000	85.93	3.76	0.4700	34.81	76.71	-0.10	7.42	14.8	666
3174	-0.1000	40.04	70.68	13.9300	78.51	784.32	-0.10	7.94	17.8	2988
3175	-0.1000	51.76	102.81	23.5200	60.47	879.76	-0.10	8.68	24.8	2700
3176	-0.1000	78.39	7.24	0.9800	36.08	52.15	-0.10	7.80	16.4	556
3177	-0.1000	450.38	49.64	9.7400	235.10	665.52	-0.10	7.55	23.6	3546
3314	-0.1000	75.55	0.92	0.1100	19.41	22.34	-0.10	8.13	12.9	340
3315	-0.1000	62.57	1.97	0.1000	25.65	20.21	-0.10	8.39	13.7	360

Values of -0.1 are below detection limits of testing procedure.

## Sample Site Test Data for Millard District

### Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
3158	-0.1000	0.09	130.90	-0.10	0.0200	-0.1000	<u>7.17</u>	-0.1000	-0.1000	-0.10	1.1	<u>1,129</u>
3159	-0.1000	0.11	<u>185.60</u>	-0.10	0.0200	-0.1000	<u>6.49</u>	-0.1000	-0.1000	-0.10	0.9	<u>1,407</u>
3160	-0.1000	0.07	<u>311.10</u>	-0.10	0.0300	-0.1000	<u>6.30</u>	-0.1000	-0.1000	0.04	1.0	<u>1,608</u>
3161	-0.1000	-0.10	140.33	-0.10	0.0400	-0.1000	<u>6.24</u>	-0.1000	-0.1000	-0.10	0.7	<u>977</u>
3162	-0.1000	0.07	80.59	-0.10	0.0300	-0.1000	<u>3.99</u>	-0.1000	-0.1000	-0.10	1.0	603
3163	-0.1000	0.07	<u>188.06</u>	-0.10	-0.1000	-0.1000	<u>4.46</u>	-0.1000	-0.1000	-0.10	1.0	<u>1,003</u>
3164	-0.1000	0.08	69.11	-0.10	-0.1000	-0.1000	<u>6.98</u>	-0.1000	-0.1000	-0.10	0.8	<u>790</u>
3165	-0.1000	-0.10	<u>188.62</u>	-0.10	-0.1000	-0.1000	<u>4.07</u>	-0.1000	-0.1000	-0.10	0.8	<u>876</u>
3166	-0.1000	-0.10	38.66	-0.10	-0.1000	-0.1000	<u>5.35</u>	-0.1000	-0.1000	-0.10	0.5	558
3167	-0.1000	0.18	<u>231.17</u>	-0.10	0.0200	-0.1000	<u>5.33</u>	-0.1000	-0.1000	-0.10	1.0	<u>1,868</u>
3168	-0.1000	0.23	<u>178.70</u>	-0.10	0.0300	0.0200	<u>8.07</u>	-0.1000	-0.1000	-0.10	1.7	<u>1,302</u>
3169	-0.1000	0.49	<u>230.37</u>	-0.10	0.0300	0.0900	<u>5.54</u>	-0.1000	-0.1000	-0.10	2.3	<u>1,291</u>
3170	-0.1000	0.19	121.16	-0.10	0.0200	-0.1000	<u>6.65</u>	-0.1000	-0.1000	-0.10	1.3	<u>1,069</u>
3171	-0.1000	0.09	49.77	-0.10	-0.1000	-0.1000	<u>6.42</u>	-0.1000	-0.1000	-0.10	0.7	694
3172	-0.1000	0.08	35.53	-0.10	-0.1000	-0.1000	<u>7.54</u>	-0.1000	-0.1000	-0.10	0.5	730
3173	-0.1000	0.27	<u>167.23</u>	-0.10	-0.1000	0.0300	<u>4.67</u>	-0.1000	-0.1000	-0.10	1.8	<u>1,110</u>
3174	-0.1000	<u>2.20</u>	-0.10	-0.10	-0.1000	0.0900	<u>10.61</u>	0.1300	-0.1000	-0.10	<u>16.6</u>	<u>4,980</u>
3175	-0.1000	<u>2.42</u>	-0.10	-0.10	-0.1000	0.0300	<u>1.68</u>	0.0700	-0.1000	-0.10	<u>19.7</u>	<u>4,500</u>
3176	-0.1000	0.23	132.23	-0.10	-0.1000	-0.1000	<u>5.47</u>	-0.1000	-0.1000	-0.10	1.2	<u>926</u>
3177	-0.1000	<u>1.76</u>	-0.10	-0.10	-0.1000	-0.1000	<u>4.90</u>	-0.1000	<u>0.0300</u>	-0.10	<u>6.3</u>	<u>5,910</u>
3314	-0.1000	-0.10	18.95	-0.10	-0.1000	-0.1000	<u>4.32</u>	-0.1000	-0.1000	-0.10	0.6	566
3315	-0.1000	-0.10	60.60	-0.10	-0.1000	-0.1000	<u>5.23</u>	-0.1000	-0.1000	-0.10	0.5	600

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently.  
Values of -0.1 are below detection limits of testing procedure.



## Sample Site Test Data for Millard District

### Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
3158	-0.1000	-0.1000	0.09	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	32.47	-0.1000	677	-0.1000	-0.10
3159	-0.1000	-0.1000	0.11	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	71.74	-0.1000	844	-0.1000	-0.10
3160	-0.1000	-0.1000	0.07	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	49.49	-0.1000	965	-0.1000	0.04
3161	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	11.93	-0.1000	586	-0.1000	-0.10
3162	-0.1000	-0.1000	0.07	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	7.50	-0.1000	362	0.0100	-0.10
3163	-0.1000	-0.1000	0.07	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	23.23	-0.1000	602	-0.1000	-0.10
3164	-0.1000	-0.1000	0.08	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	14.01	-0.1000	474	-0.1000	-0.10
3165	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	11.73	-0.1000	526	-0.1000	-0.10
3166	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	5.19	-0.1000	335	-0.1000	-0.10
3167	-0.1000	-0.1000	0.18	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	<u>184.66</u>	-0.1000	1,121	-0.1000	-0.10
3168	-0.1000	-0.1000	0.23	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	79.44	-0.1000	781	0.0100	-0.10
3169	-0.1000	-0.1000	0.49	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	34.44	-0.1000	775	-0.1000	-0.10
3170	-0.1000	-0.1000	0.19	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	42.10	-0.1000	641	-0.1000	-0.10
3171	-0.1000	-0.1000	0.09	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	14.52	-0.1000	416	-0.1000	-0.10
3172	-0.1000	-0.1000	0.08	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	13.14	-0.1000	438	-0.1000	-0.10
3173	-0.1000	-0.1000	0.27	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	24.38	-0.1000	666	-0.1000	-0.10
3174	-0.1000	-0.1000	2.20	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.66	-0.1000	2,988	-0.1000	-0.10
3175	-0.1000	-0.1000	2.42	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	87.53	-0.1000	2,700	-0.1000	-0.10
3176	-0.1000	-0.1000	0.23	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	22.22	-0.1000	556	-0.1000	-0.10
3177	-0.1000	-0.1000	1.76	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	<u>448.36</u>	0.0300	3,546	-0.1000	-0.10
3314	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	6.04	-0.1000	340	-0.1000	-0.10
3315	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	9.55	-0.1000	360	-0.1000	-0.10

Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

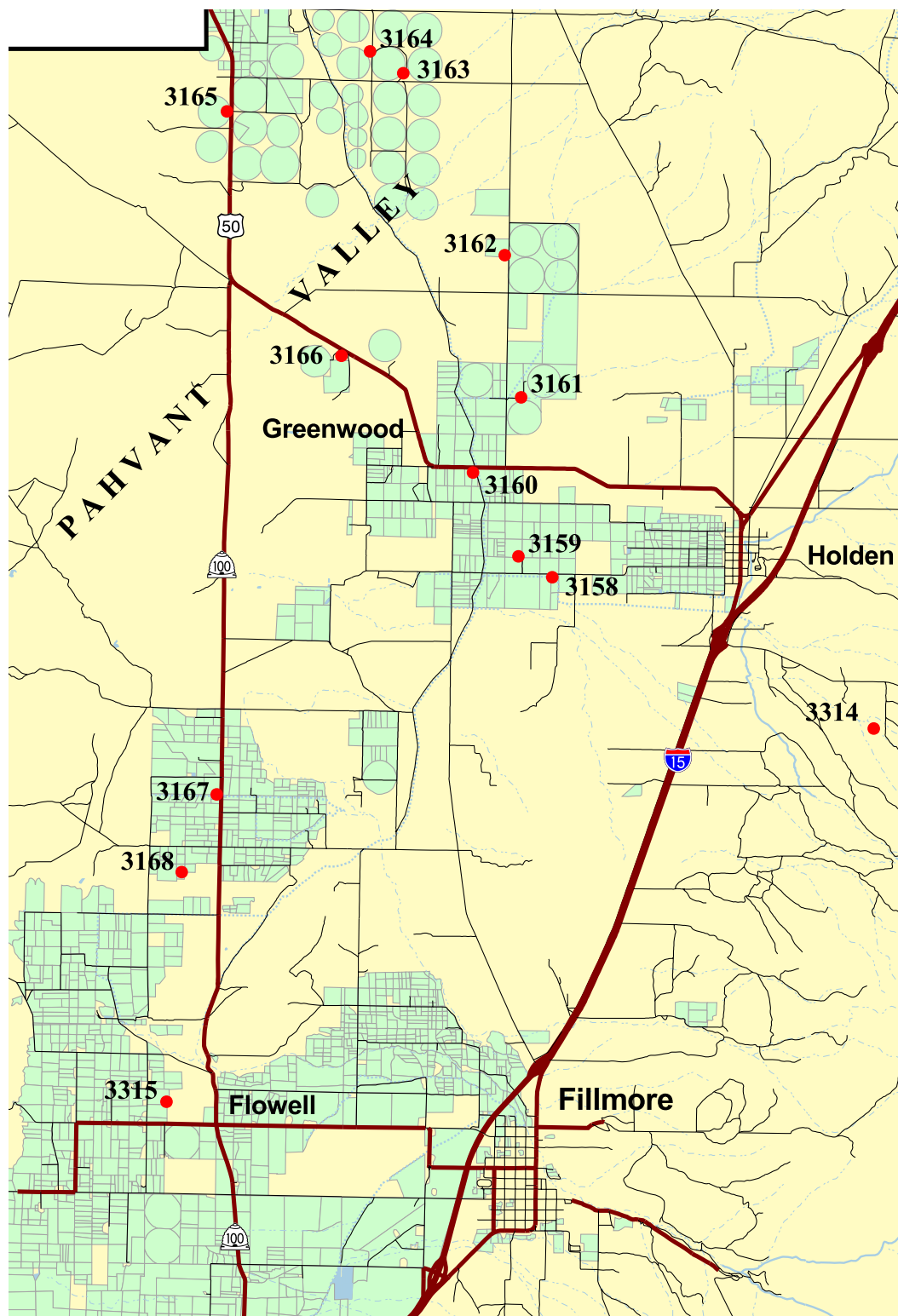
## Sample Site Test Data for Millard District

### Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
3158	-0.1000	0.0300	-0.1000	-0.1000	0.0200	-0.1000	-0.1000	9.2	-0.1000	32.47	-0.1000	<u>677</u>	-0.10	7.21	<u>1</u>	0	9.1
3159	-0.1000	0.0300	-0.1000	-0.1000	0.0200	-0.1000	-0.1000	8.9	-0.1000	71.74	-0.1000	<u>844</u>	-0.10	7.28	<u>1</u>	0	12.2
3160	-0.1000	0.0800	-0.1000	-0.1000	0.0300	-0.1000	-0.1000	7.1	-0.1000	49.49	-0.1000	<u>965</u>	0.04	7.05	0	0	12.5
3161	-0.1000	0.1600	-0.1000	-0.1000	0.0400	-0.1000	-0.1000	9.2	-0.1000	11.93	-0.1000	<u>586</u>	-0.10	7.21	0	0	7.8
3162	-0.1000	0.2400	-0.1000	-0.1000	0.0300	-0.1000	-0.1000	1.9	-0.1000	7.50	-0.1000	362	-0.10	7.78	0	0	4.0
3163	-0.1000	0.2400	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	3.1	-0.1000	23.23	-0.1000	<u>602</u>	-0.10	7.61	0	0	7.5
3164	-0.1000	0.1700	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.0	-0.1000	14.01	-0.1000	474	-0.10	7.61	0	0	6.5
3165	-0.1000	0.1700	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.8	-0.1000	11.73	-0.1000	<u>526</u>	-0.10	7.71	0	0	6.4
3166	-0.1000	0.1400	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.9	-0.1000	5.19	-0.1000	335	-0.10	7.75	0	0	4.7
3167	-0.1000	0.0200	-0.1000	-0.1000	0.0200	-0.1000	-0.1000	2.1	-0.1000	<u>184.66</u>	-0.1000	<u>1,121</u>	-0.10	7.40	<u>1</u>	0	15.6
3168	-0.1000	0.0400	-0.1000	-0.1000	0.0300	0.0200	-0.1000	0.8	-0.1000	79.44	-0.1000	<u>781</u>	-0.10	7.84	<u>1</u>	0	8.3
3169	-0.1000	0.0700	-0.1000	-0.1000	0.0300	0.0900	-0.1000	2.5	-0.1000	34.44	-0.1000	<u>775</u>	-0.10	7.69	<u>1</u>	0	7.0
3170	-0.1000	0.0700	-0.1000	-0.1000	0.0200	-0.1000	-0.1000	2.6	-0.1000	42.10	-0.1000	<u>641</u>	-0.10	7.96	0	0	8.2
3171	-0.1000	0.1900	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.4	-0.1000	14.52	-0.1000	416	-0.10	8.36	0	0	5.7
3172	-0.1000	0.2000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	2.6	-0.1000	13.14	-0.1000	438	-0.10	7.73	<u>1</u>	0	6.6
3173	-0.1000	0.0800	-0.1000	-0.1000	-0.1000	0.0300	-0.1000	2.5	-0.1000	24.38	-0.1000	<u>666</u>	-0.10	7.42	0	0	7.1
3174	-0.1000	0.0900	-0.1000	-0.1000	-0.1000	0.0900	<u>0.1300</u>	-0.1	-0.1000	1.66	-0.1000	<u>2,988</u>	-0.10	7.94	<u>1</u>	<u>1</u>	6.9
3175	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.0300	<u>0.0700</u>	-0.1	-0.1000	<u>87.53</u>	-0.1000	<u>2,700</u>	-0.10	<u>8.68</u>	<u>1</u>	0	6.6
3176	-0.1000	0.1100	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	3.1	-0.1000	22.22	-0.1000	<u>556</u>	-0.10	7.80	<u>1</u>	0	6.7
3177	-0.1000	0.0400	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	2.6	-0.1000	<u>448.36</u>	<u>0.0300</u>	<u>3,546</u>	-0.10	7.55	<u>1</u>	<u>1</u>	40.1
3314	-0.1000	0.1200	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1	-0.1000	6.04	-0.1000	340	-0.10	8.13	0	0	5.6
3315	-0.1000	0.1200	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.4	-0.1000	9.55	-0.1000	360	-0.10	8.39	<u>1</u>	0	5.2

Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.

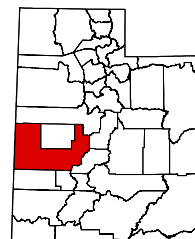
Map 19. Millard District, Northern Section



- Sample Site
- Irrigated Land
- Water Body
- SCD Boundary
- Major Road
- Other Road
- Water Course
- Ditch or Canal
- Intermittent Stream

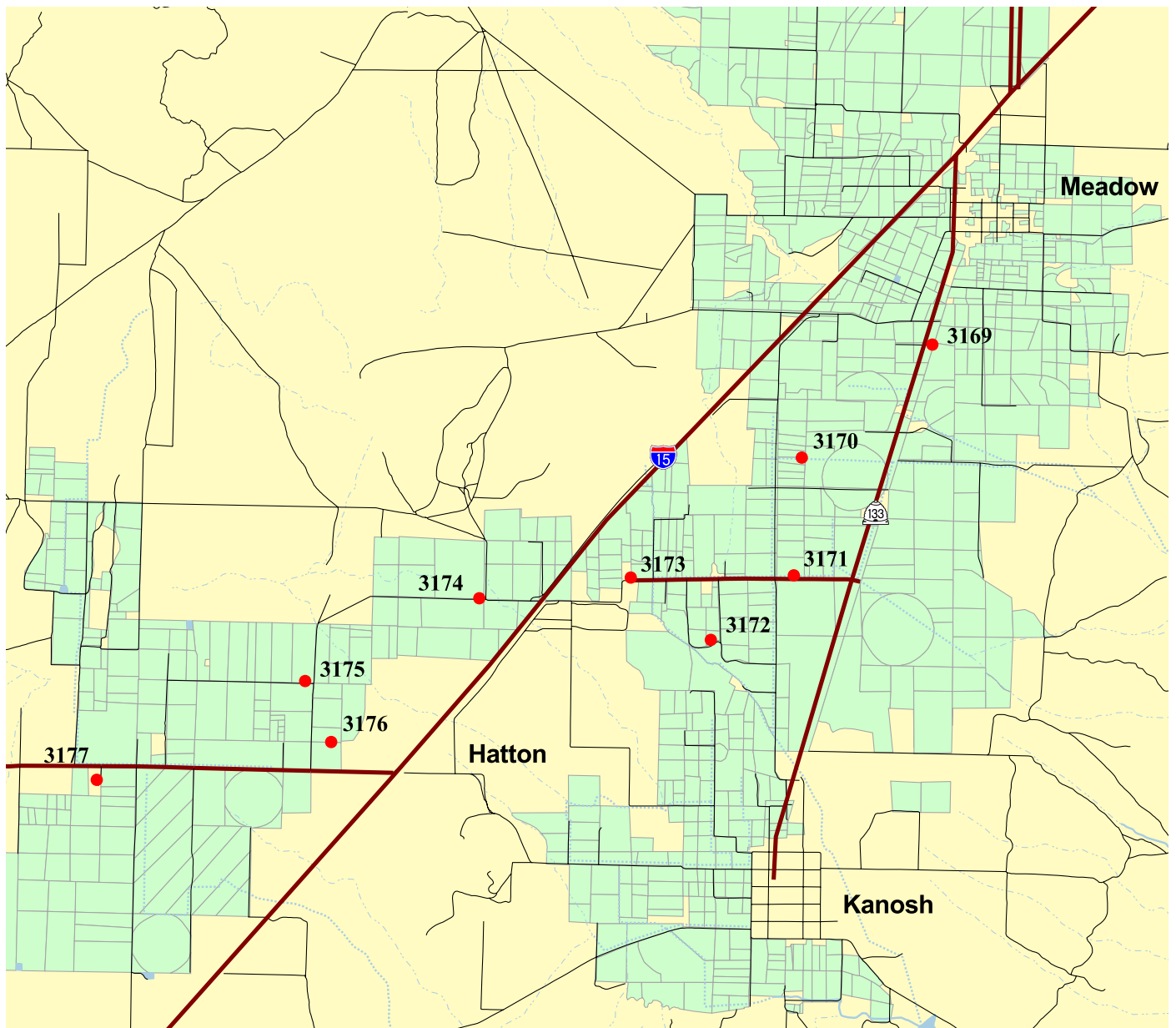


District Location



Map Scale 1:150,000 (1 inch = 2.4 miles)

**Map 20. Millard District, Southern Section**

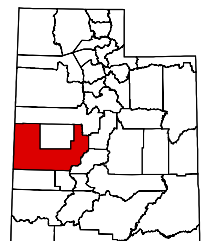


Map Scale 1:88,000 (1 inch = 1.4 miles)

- Sample Site
- Irrigated Land
- Water Body
- SCD Boundary
- Major Road
- Other Road
- Water Course
- Ditch or Canal
- Intermittent Stream



District Location



## **Piute County District**

### **General:**

Ten samples were collected in the Piute County District. Water in this district varies from soft to hard, with grains per gallon (gpg) ranging from 1.0 to 4.7 with a mean of 2.4. Sampled water temperature ranges from 8.3 °C to 16.8 °C, with a mean of 13.6 °C. The pH for the district ranges from 7.82 to 9.18 with a mean of 8.43.

### **Irrigation:**

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in  $\mu\text{mhos/cm}$ . Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750  $\mu\text{mhos/cm}$ , salt-sensitive plants begin to be affected. When EC exceeds 3,000  $\mu\text{mhos/cm}$ , most plants would be severely injured. No samples have EC values greater than 750  $\mu\text{mhos/cm}$ .

SAR measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 marks the beginning of problems and values greater than 9 indicate severe problems. None of the water sampled in this district have elevated SAR values.

Bicarbonate ( $\text{HCO}_3$ ) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l and severe problems appear when it exceeds 8.5 meq/l. All samples have high bicarbonate, which is common for water in Utah.

Boron (B) is toxic to sensitive plants when concentration exceeds 0.7 ppm and causes severe injury at 10.0 ppm. However, boron in trace amounts is required for proper plant growth. It is important to monitor this element because the margin separating safe health from toxicity is small. Sample 3262 has elevated boron concentrations.

No other elements were found in concentrations harmful to plants.

### **Livestock:**

No water quality standards for livestock were exceeded.

### **Culinary:**

Dissolved salts in water are measured in the field as Electrical Conductivity (EC). Culinary standards, however, are designated as Total Dissolved Solids (TDS), calculated from EC. TDS for eight samples exceed the EPA aesthetic standard of 500 ppm. At this level the water may be off-flavored but it is not a health problem until TDS reaches 2,000 ppm. No samples exceed the aesthetic standard for TDS.

EPA has set an aesthetic standard of 0.05 ppm for manganese (Mn). Water with high concentrations may cause discoloration of plumbing fixtures and have poor flavor. Sample 3254 has high manganese concentration.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful

bacteria. Coliform bacteria can occur naturally in the soil, whereas *E. coli*, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of *E. coli* in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well casing, improper grouting, or lack of a casing. *E. coli* contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables.

Sample 3260 is contaminated with *E. coli* bacteria, which is a type of coliform and should not be used for drinking until source of contamination is identified and corrected.

## Sample Site Test Data for Piute County District

### General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
3251	-0.1000	47.43	1.45	0.0600	11.96	20.07	-0.10	8.15	15.3	251
3252	-0.1000	11.20	1.51	0.0600	6.08	21.52	-0.10	9.14	14.0	130
3253	-0.1000	56.91	3.65	0.1400	23.89	23.36	-0.10	8.01	16.6	346
3254	-0.1000	16.78	0.73	-0.1000	2.44	17.16	-0.10	9.18	12.4	120
3255	-0.1000	39.70	1.87	-0.1000	6.31	26.99	-0.10	8.50	15.2	227
3259	-0.1000	43.91	0.32	-0.1000	4.89	10.15	-0.10	7.82	16.8	187
3260	-0.1000	29.66	-0.10	-0.1000	4.43	4.81	-0.10	8.47	8.3	134
3261	-0.1000	29.72	-0.10	-0.1000	5.57	5.15	-0.10	7.82	9.0	143
3262	-0.1000	39.50	0.25	0.0500	7.68	65.98	-0.10	8.15	16.7	355
3263	-0.1000	20.54	0.41	0.0900	5.77	48.35	-0.10	9.07	11.7	265

Values of -0.1 are below detection limits of testing procedure.

### Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
3251	-0.1000	-0.10	11.73	-0.10	-0.1000	-0.1000	<u>3.27</u>	-0.1000	-0.1000	0.08	0.7	418
3252	-0.1000	-0.10	17.44	-0.10	-0.1000	0.0600	<u>2.87</u>	0.0200	-0.1000	-0.10	1.3	216
3253	-0.1000	0.10	16.42	-0.10	0.0800	-0.1000	<u>4.65</u>	-0.1000	-0.1000	-0.10	0.7	577
3254	-0.1000	-0.10	14.96	-0.10	-0.1000	0.0200	<u>1.76</u>	0.0600	-0.1000	-0.10	1.0	200
3255	-0.1000	0.07	14.14	-0.10	-0.1000	-0.1000	<u>3.22</u>	-0.1000	-0.1000	-0.10	1.0	379
3259	-0.1000	-0.10	-0.10	-0.10	-0.1000	-0.1000	<u>3.00</u>	-0.1000	-0.1000	-0.10	0.4	311
3260	-0.1000	-0.10	-0.10	-0.10	-0.1000	-0.1000	<u>1.62</u>	-0.1000	-0.1000	-0.10	0.2	223
3261	-0.1000	-0.10	-0.10	-0.10	-0.1000	-0.1000	<u>1.57</u>	-0.1000	-0.1000	-0.10	0.2	239
3262	-0.1000	<u>0.93</u>	11.15	-0.10	-0.1000	-0.1000	<u>4.20</u>	-0.1000	-0.1000	-0.10	2.5	592
3263	-0.1000	0.40	25.42	-0.10	-0.1000	-0.1000	<u>1.78</u>	0.0400	-0.1000	-0.10	2.4	442

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently.

Values of -0.1 are below detection limits of testing procedure.

## Sample Site Test Data for Piute County District

### Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
3251	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	8.46	-0.1000	251	-0.1000	0.08
3252	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.08	-0.1000	130	-0.1000	-0.10
3253	-0.1000	-0.1000	0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	11.25	-0.1000	346	-0.1000	-0.10
3254	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	3.51	-0.1000	120	-0.1000	-0.10
3255	-0.1000	-0.1000	0.07	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	6.29	-0.1000	227	-0.1000	-0.10
3259	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	7.92	-0.1000	187	-0.1000	-0.10
3260	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	13.15	-0.1000	134	-0.1000	-0.10
3261	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	15.14	-0.1000	143	-0.1000	-0.10
3262	-0.1000	-0.1000	0.93	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	34.21	-0.1000	355	-0.1000	-0.10
3263	-0.1000	-0.1000	0.40	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	34.49	-0.1000	265	-0.1000	-0.10

Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

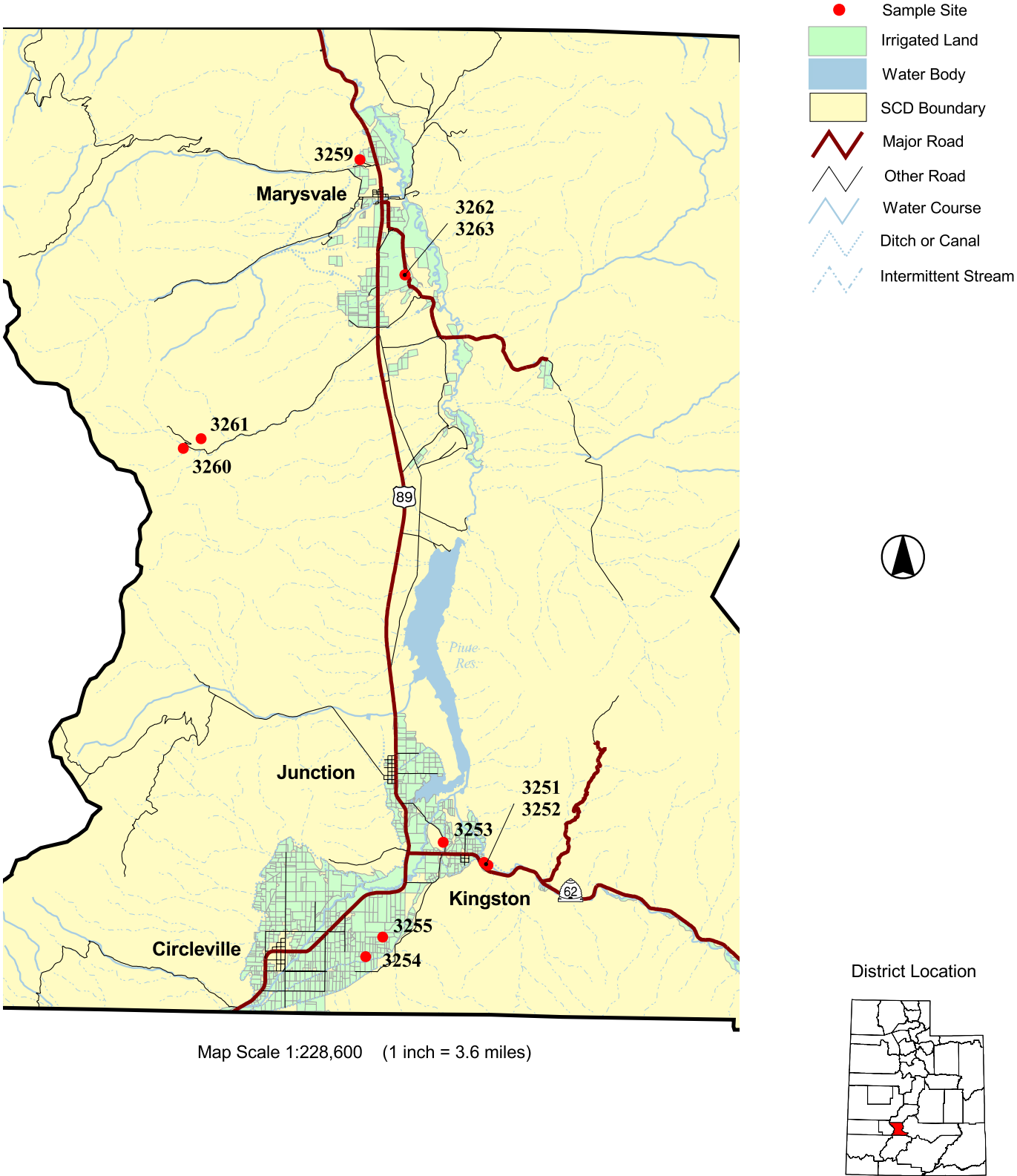
### Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
3251	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.6	-0.1000	8.46	-0.1000	251	0.08	8.15	0	0	3.5
3252	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.0600	0.0200	-0.1	-0.1000	1.08	-0.1000	130	-0.10	9.14	0	0	1.0
3253	-0.1000	0.0300	-0.1000	-0.1000	0.0800	-0.1000	-0.1000	1.4	-0.1000	11.25	-0.1000	346	-0.10	8.01	0	0	4.7
3254	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.0200	0.0600	-0.1	-0.1000	3.51	-0.1000	120	-0.10	9.18	0	0	1.1
3255	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.0	-0.1000	6.29	-0.1000	227	-0.10	8.50	0	0	2.7
3259	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.9	-0.1000	7.92	-0.1000	187	-0.10	7.82	0	0	2.9
3260	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1	-0.1000	13.15	-0.1000	134	-0.10	8.47	1	1	2.0
3261	-0.1000	0.0300	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1	-0.1000	15.14	-0.1000	143	-0.10	7.82	0	0	2.1
3262	-0.1000	0.0200	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1	-0.1000	34.21	-0.1000	355	-0.10	8.15	0	0	2.8
3263	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.0400	-0.1	-0.1000	34.49	-0.1000	265	-0.10	9.07	0	0	1.5

Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.



Map 21. Piute County District



# Sanpete County District

## **General:**

Sixteen samples were collected in the Sanpete County District. Water in this district varies from soft to hard, with grains per gallon (gpg) ranging from 0.1 to 8.0 with a mean of 5.0. Sampled water temperature ranges from 13.1 °C to 19.0 °C, with a mean of 15.61 °C. The pH for the district ranges from 7.28 to 9.06 with a mean of 8.14.

## **Irrigation:**

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in  $\mu\text{mhos/cm}$ . Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750  $\mu\text{mhos/cm}$ , salt-sensitive plants begin to be affected. When EC exceeds 3,000  $\mu\text{mhos/cm}$ , most plants would be severely injured. Samples 3120, 3121, 3123, 3125, 3231, 3233, 3290, 3291, and 3293 have EC values greater than 750  $\mu\text{mhos/cm}$ .

SAR measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 marks the beginning of problems and values greater than 9 indicate severe problems. Samples 3120, 3125, 3231, 3233, and 3291 have SAR values greater than 3 creating a risk to use these waters for irrigation. Samples 3120, 3231, and 3291 exceed the 9 standard creating severe risks if used for irrigation.

Bicarbonate ( $\text{HCO}_3$ ) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l and severe problems appear when it exceeds 8.5 meq/l. All samples have high bicarbonate, which is common for water in Utah. Samples 3121 and 3233 have very high bicarbonate and present serious risks.

Boron (B) is toxic to sensitive plants when concentration exceeds 0.7 ppm. It will cause severe injury at 10.0 ppm. However, boron in trace amounts is required for proper plant growth. It is important to monitor this element because the margin separating safe health from toxicity is small. Sample 3231 has elevated boron.

Chlorine (Cl), found in the form of chloride ( $\text{Cl}^-$ ), can damage sensitive plants at concentrations above 145 ppm, and concentrations exceeding 355 ppm can cause severe damage to almost all plants. Damage increases under sprinkler irrigation and is more severe in windy conditions. 3120 has elevated Cl.

No other elements were found in concentrations harmful to plants.

## **Livestock:**

No water quality standards for livestock were exceeded.

## **Culinary:**

Dissolved salts in water are measured in the field as Electrical Conductivity (EC). Culinary standards, however, are designated as Total Dissolved Solids (TDS), calculated from EC. TDS for eight samples exceed the EPA aesthetic standard of 500 ppm. At this level the water may be off-flavored but it is not a

health problem until TDS reaches 2,000 ppm. Samples 3120, 3121, 3125, 3231, 3233, 3290, and 3291 exceed the aesthetic standard for TDS.

Sulfate is a soluble form of sulfur that can cause flavor problems in drinking water if there is more than 83 ppm sulfur (S). Bacteria in the water metabolize sulfur and produce hydrogen sulfide gas (rotten egg gas). The bacteria that produce this compound can live in plumbing fixtures and even hot water heaters. It is not uncommon to get strong odors when the hot water is turned on in areas where there is high sulfate. Generally, people cannot tolerate the odor from this gas. Even if the gas is not present, high sulfate concentrations can cause diarrhea in people not used to drinking it. Sample 3125 also has high sulfur.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil, whereas *E. coli*, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of *E. coli* in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well casing, improper grouting, or lack of a casing. *E. coli* contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables.

Samples 3121, 3123, 3291, 3292, 3297, and 3298 are contaminated with coliform (Col.) bacteria. Sample 3121 is contaminated with *E. coli* bacteria, and should not be used for drinking until the source of contamination is identified and corrected.

## Sample Site Test Data for Sanpete County District

### General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
3120	-0.1000	4.46	0.54	0.5200	2.54	216.82	-0.10	8.85	18.2	674
3121	-0.1000	72.68	1.49	0.1100	30.83	73.37	-0.10	7.28	14.4	524
3122	-0.1000	85.79	2.64	0.0700	26.94	14.82	-0.10	7.34	15.9	395
3123	-0.1000	84.85	2.15	0.1000	36.34	23.45	-0.10	7.67	14.3	452
3124	-0.1000	55.65	1.17	0.1000	40.04	19.10	-0.10	7.55	16.4	370
3125	-0.1000	63.39	4.41	0.9000	73.81	149.55	-0.10	7.78	19.0	881
3231	-0.1000	3.13	6.21	0.4400	0.88	275.04	-0.10	9.06	18.4	824
3232	-0.1000	46.88	1.27	0.3900	42.41	17.43	-0.10	8.18	16.9	353
3233	-0.1000	47.71	3.49	0.9300	52.00	126.96	-0.10	7.94	14.6	712
3290	-0.1000	86.44	2.96	0.0800	21.36	23.33	-0.10	8.34	14.4	1290
3291	-0.1000	0.82	0.33	-0.1000	0.09	110.92	-0.10	8.07	13.5	571
3292	-0.1000	106.40	3.59	0.1200	24.31	32.24	-0.10	8.64	15.9	375
3293	-0.1000	49.16	2.20	0.3800	49.54	53.98	-0.10	8.38	15.1	481
3294	-0.1000	68.11	4.45	0.2200	33.09	89.22	-0.10	8.50	13.8	407
3297	-0.1000	42.22	1.81	0.3400	32.80	57.87	-0.10	8.23	13.1	350
3298	-0.1000	72.85	2.79	0.1000	17.37	51.41	1.13	8.46	16.0	347

Values of -0.1 are below detection limits of testing procedure.

### Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
3120	-0.1000	0.36	<u>148.63</u>	-0.10	-0.1000	0.0500	<u>7.50</u>	-0.1000	-0.1000	-0.10	<u>20.3</u>	<u>1,124</u>
3121	-0.1000	0.09	53.33	-0.10	-0.1000	0.0300	<u>14.00</u>	0.0300	-0.1000	-0.10	1.8	<u>874</u>
3122	-0.1000	-0.10	21.34	-0.10	-0.1000	-0.1000	<u>6.73</u>	-0.1000	-0.1000	0.05	0.4	659
3123	-0.1000	-0.10	40.27	-0.10	-0.1000	-0.1000	<u>7.21</u>	-0.1000	-0.1000	-0.10	0.5	<u>753</u>
3124	-0.1000	-0.10	7.84	-0.10	0.0200	-0.1000	<u>7.62</u>	-0.1000	-0.1000	-0.10	0.5	616
3125	-0.1000	0.61	110.65	-0.10	-0.1000	0.0400	<u>7.66</u>	-0.1000	-0.1000	0.60	<u>3.0</u>	<u>1,468</u>
3231	-0.1000	<u>1.60</u>	115.31	-0.10	0.0500	0.0600	<u>7.60</u>	-0.1000	-0.1000	-0.10	<u>35.3</u>	<u>1,374</u>
3232	-0.1000	-0.10	13.76	-0.10	0.0700	-0.1000	<u>6.82</u>	-0.1000	-0.1000	0.28	0.4	589
3233	-0.1000	0.27	107.03	-0.10	0.0300	-0.1000	<u>8.53</u>	-0.1000	-0.1000	-0.10	<u>3.0</u>	<u>1,187</u>
3290	-0.1000	0.13	24.18	-0.10	-0.1000	-0.1000	<u>5.85</u>	-0.1000	-0.1000	-0.10	0.6	<u>2,150</u>
3291	-0.1000	-0.10	33.15	-0.10	0.0600	0.0500	<u>3.70</u>	-0.1000	-0.1000	0.05	<u>30.8</u>	<u>951</u>
3292	-0.1000	0.18	41.15	-0.10	0.0300	-0.1000	<u>6.44</u>	-0.1000	-0.1000	-0.10	0.7	625
3293	-0.1000	0.10	54.50	-0.10	-0.1000	-0.1000	<u>6.07</u>	-0.1000	-0.1000	-0.10	1.3	<u>802</u>
3294	-0.1000	0.27	62.44	-0.10	-0.1000	-0.1000	<u>5.76</u>	-0.1000	-0.1000	0.68	2.2	679
3297	-0.1000	0.09	12.69	-0.10	0.0200	0.0500	<u>4.07</u>	-0.1000	-0.1000	0.13	1.6	584
3298	-0.1000	0.13	-0.10	-0.10	0.0200	-0.1000	<u>6.34</u>	-0.1000	-0.1000	-0.10	1.4	578

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently.

Values of -0.1 are below detection limits of testing procedure.

## Sample Site Test Data for Sanpete County District

### Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
3120	-0.1000	-0.1000	0.36	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	27.48	-0.1000	674	-0.1000	-0.10
3121	-0.1000	-0.1000	0.09	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	28.76	-0.1000	524	-0.1000	-0.10
3122	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	8.97	-0.1000	395	-0.1000	0.05
3123	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	8.27	-0.1000	452	-0.1000	-0.10
3124	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	5.33	-0.1000	370	-0.1000	-0.10
3125	-0.1000	-0.1000	0.61	-0.1000	-0.1000	-0.1000	0.0100	-0.1000	-0.1000	112.69	-0.1000	881	-0.1000	0.60
3231	-0.1000	-0.1000	1.60	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	67.69	-0.1000	824	-0.1000	-0.10
3232	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	13.47	-0.1000	353	-0.1000	0.28
3233	-0.1000	-0.1000	0.27	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	36.76	-0.1000	712	-0.1000	-0.10
3290	-0.1000	-0.1000	0.13	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	14.77	-0.1000	1,290	-0.1000	-0.10
3291	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	0.0500	-0.1000	19.33	-0.1000	571	-0.1000	0.05
3292	-0.1000	-0.1000	0.18	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	21.60	-0.1000	375	-0.1000	-0.10
3293	-0.1000	-0.1000	0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	36.99	-0.1000	481	-0.1000	-0.10
3294	-0.1000	-0.1000	0.27	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	34.29	-0.1000	407	-0.1000	0.68
3297	-0.1000	-0.1000	0.09	-0.1000	-0.1000	-0.1000	0.0100	-0.1000	-0.1000	19.88	-0.1000	350	-0.1000	0.13
3298	-0.1000	-0.1000	0.13	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	15.18	-0.1000	347	-0.1000	-0.10

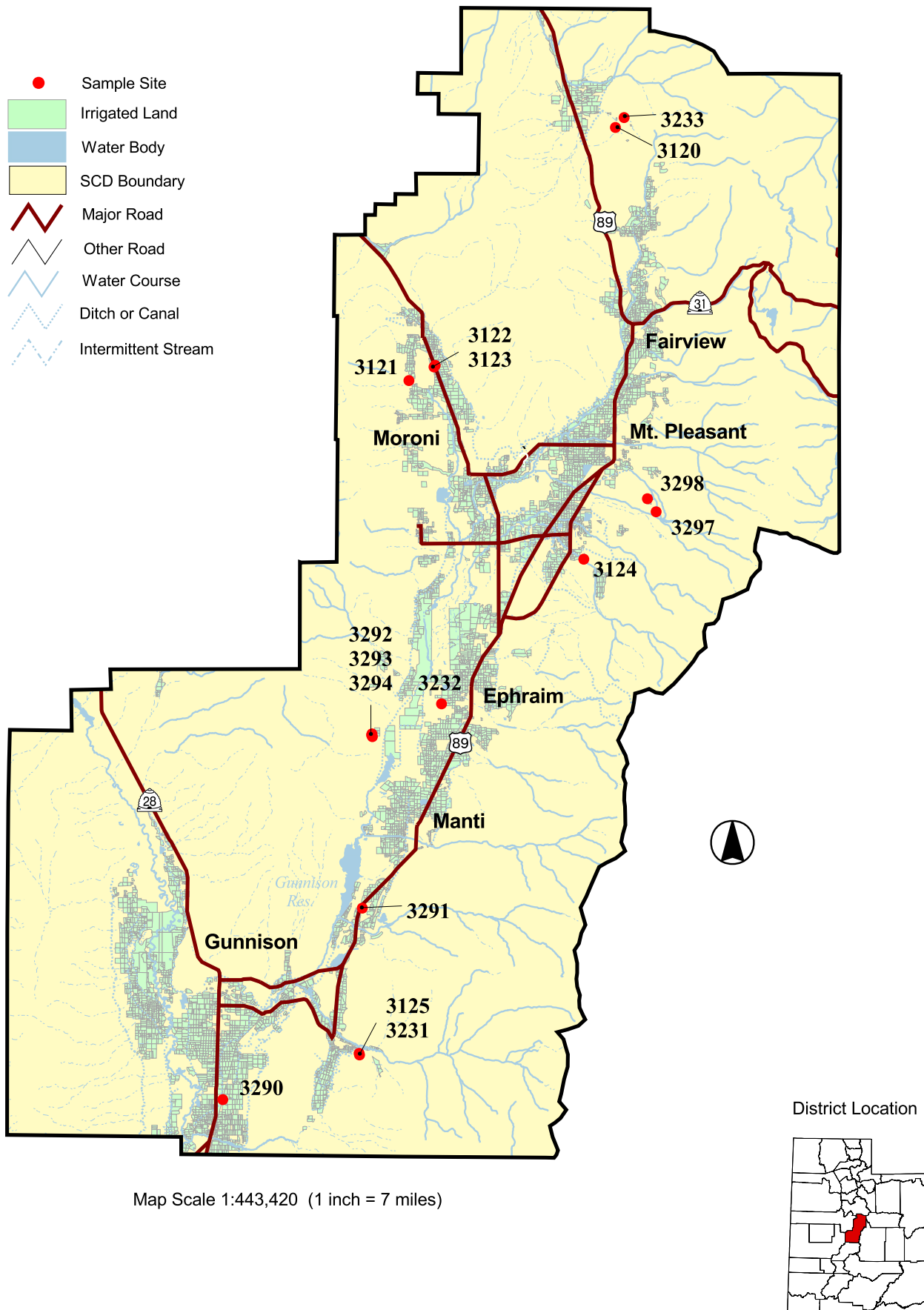
Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

### Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
3120	-0.1000	0.0600	-0.1000	-0.1000	-0.1000	0.0500	-0.1000	0.7	-0.1000	27.48	-0.1000	<u>674</u>	-0.10	8.85	0	0	0.4
3121	-0.1000	0.0400	-0.1000	-0.1000	-0.1000	0.0300	0.0300	1.3	-0.1000	28.76	-0.1000	<u>524</u>	-0.10	7.28	1	1	6.1
3122	-0.1000	0.1500	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	2.4	-0.1000	8.97	-0.1000	395	0.05	7.34	0	0	6.6
3123	-0.1000	0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	2.5	-0.1000	8.27	-0.1000	452	-0.10	7.67	1	0	7.1
3124	-0.1000	0.1900	-0.1000	-0.1000	0.0200	-0.1000	-0.1000	1.2	-0.1000	5.33	-0.1000	370	-0.10	7.55	0	0	5.6
3125	-0.1000	0.0200	-0.1000	-0.1000	-0.1000	0.0400	-0.1000	1.1	-0.1000	<u>112.69</u>	-0.1000	<u>881</u>	0.60	7.78	0	0	8.0
3231	-0.1000	0.0300	-0.1000	-0.1000	0.0500	0.0600	-0.1000	-0.1	-0.1000	67.69	-0.1000	<u>824</u>	-0.10	9.06	0	0	0.2
3232	-0.1000	0.0800	-0.1000	-0.1000	0.0700	-0.1000	-0.1000	1.5	-0.1000	13.47	-0.1000	353	0.28	8.18	0	0	5.2
3233	-0.1000	0.3200	-0.1000	-0.1000	0.0300	-0.1000	-0.1000	-0.1	-0.1000	36.76	-0.1000	<u>712</u>	-0.10	7.94	0	0	5.8
3290	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	5.7	-0.1000	14.77	-0.1000	<u>1,290</u>	-0.10	8.34	0	0	6.3
3291	-0.1000	-0.1000	-0.1000	-0.1000	0.0600	0.0500	-0.1000	8.2	-0.1000	19.33	-0.1000	<u>571</u>	0.05	8.07	1	0	0.1
3292	-0.1000	0.0800	-0.1000	-0.1000	0.0300	-0.1000	-0.1000	-0.1	-0.1000	21.60	-0.1000	375	-0.10	8.64	1	0	7.6
3293	-0.1000	0.0300	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.2	-0.1000	36.99	-0.1000	481	-0.10	8.38	0	0	5.8
3294	-0.1000	0.0400	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.5	-0.1000	34.29	-0.1000	407	0.68	8.50	0	0	5.9
3297	-0.1000	0.0500	-0.1000	-0.1000	0.0200	0.0500	-0.1000	1.7	-0.1000	19.88	-0.1000	350	0.13	8.23	1	0	4.4
3298	-0.1000	0.0700	-0.1000	-0.1000	0.0200	-0.1000	-0.1000	1.7	-0.1000	15.18	-0.1000	347	-0.10	8.46	1	0	5.3

Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.

**Map 22. Sanpete County District**



## Sevier County District

### **General:**

Thirty-five samples were collected in the Sevier County District. Water in this district varies from soft to very hard, with grains per gallon (gpg) ranging from 0.1 to 13.2 with a mean of 6.2. Sampled water temperature ranges from 10.4 °C to 19.7 °C, with a mean of 15.12 °C. The pH for the district ranges from 7.67 to 8.64 with a mean of 8.04.

### **Irrigation:**

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in  $\mu\text{mhos/cm}$ . Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750  $\mu\text{mhos/cm}$ , salt-sensitive plants begin to be affected. When EC exceeds 3,000  $\mu\text{mhos/cm}$ , most plants would be severely injured.

Samples 3126 through 3128, 3182, 3185 through 3188, 3191 through 3193, 3195, 3198, 3199, 3228, 3230, and 3264 have EC values greater than 750  $\mu\text{mhos/cm}$ .

SAR measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 marks the beginning of problems and values greater than 9 indicate severe problems. Samples 3264, 3284, and 3285 have elevated SAR values. Sample 3285 exceeds 9 and can indicate severe problems.

Bicarbonate ( $\text{HCO}_3$ ) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l and severe problems appear when it exceeds 8.5 meq/l. All of the samples have high bicarbonate, which is common for water in Utah. Samples 3126, 3186, 3187, 3193, 3199, 3228, and 3284 exceed the 8.5 level.

Boron (B) is toxic to sensitive plants when concentration exceeds 0.7 ppm. It will cause severe injury at 10.0 ppm. However, boron in trace amounts is required for proper plant growth. It is important to monitor this element because the margin separating safe health from toxicity is small. Sample 3284 has elevated boron.

Chlorine (Cl), found in the form of chloride ( $\text{Cl}^-$ ), can damage sensitive plants at concentrations above 145 ppm, and concentrations exceeding 355 ppm can cause severe damage to almost all plants. Damage increases under sprinkler irrigation and is more severe in windy conditions. Samples 3230 and 3284 have elevated Cl.

Manganese (Mn) above 0.2 ppm can injure plants and cause reduction in dry matter production. Excess manganese interferes with the plant's ability to use other nutrients such as calcium (Ca). Sample 3230 has elevated concentrations of manganese.

No other elements were found in concentrations harmful to plants.

### **Livestock:**

Livestock eating plants irrigated with water that has molybdenum (Mo) concentration greater than 0.01 ppm may be harmed. High concentrations of molybdenum interfere with copper nutrition in livestock. Samples 3195 and 3228 have elevated molybdenum.

No other water quality standards for livestock were exceeded.

### **Culinary:**

Dissolved salts in water are measured in the field as Electrical Conductivity (EC). Culinary standards, however, are designated as Total Dissolved Solids (TDS), calculated from EC. TDS for twelve samples exceed the EPA aesthetic standard of 500 ppm – 3128, 3185 through 3188, 3191 through 3193, 3195, 3198, 3228, and 3230. At this level the water may be off-flavored but it is not a health problem until TDS reaches 2,000 ppm.

Iron (Fe), manganese (Mn), and Sulfur (S) were found to exceed the aesthetic drinking water quality standard in some samples. This can cause discoloration of plumbing fixtures and promote the growth of iron bacteria, which stain anything they contact. Again, this is an aesthetic issue, not a health concern. Sample 3230 has high iron.

EPA has set an aesthetic standard of 0.05 ppm for manganese (Mn). Water with high concentrations may cause discoloration of plumbing fixtures and have poor flavor. Samples 3193, 3195, and 3230 have high manganese concentration.

Sulfate is a soluble form of sulfur that can cause flavor problems in drinking water if there is more than 83 ppm sulfur (S). Bacteria in the water metabolize sulfur and produce hydrogen sulfide gas (rotten egg gas). The bacteria that produce this compound can live in plumbing fixtures and even hot water heaters. It is not uncommon to get strong odors when the hot water is turned on in areas where there is high sulfate. Generally, people cannot tolerate the odor from this gas. Even if the gas is not present, high sulfate concentrations can cause diarrhea in people not used to drinking it. Samples 3228 and 3284 also have high sulfur.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil, whereas *E. coli*, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of *E. coli* in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well casing, improper grouting, or lack of a casing. *E. coli* contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables.

Samples 3183, 3184, 3186, and 3193 are contaminated with coliform bacteria. Sample 3186 is contaminated with *E. coli* bacteria. Wells these samples were taken from should be inspected carefully to determine the source of contamination and should not be used for culinary purposes until the problem is corrected.



## Sample Site Test Data for Sevier County District

### General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
3126	-0.1000	39.94	4.70	0.2500	45.13	54.90	-0.10	7.96	15.0	453
3127	-0.1000	35.02	2.51	0.3300	44.98	75.77	-0.10	7.92	15.4	481
3128	-0.1000	42.61	1.74	0.6100	77.16	78.17	-0.10	7.84	16.0	652
3180	-0.1000	58.77	3.13	0.1000	21.94	16.14	-0.10	8.18	12.4	320
3181	-0.1000	60.31	2.06	0.2000	39.08	22.34	-0.10	7.71	15.6	398
3182	-0.1000	71.65	1.81	0.2000	45.40	23.95	-0.10	7.71	14.9	458
3183	-0.1000	69.13	1.20	0.1600	38.64	20.22	-0.10	7.73	15.0	416
3184	-0.1000	54.54	2.25	0.1900	36.16	17.21	-0.10	7.94	15.9	356
3185	-0.1000	80.29	2.35	0.2600	54.13	33.10	-0.10	7.67	14.9	552
3186	-0.1000	72.98	2.10	0.5100	76.86	55.26	-0.10	7.76	14.8	678
3187	-0.1000	74.88	2.63	0.3600	60.67	98.43	-0.10	7.73	14.5	724
3188	-0.1000	74.91	1.91	0.2300	63.94	49.01	-0.10	7.88	13.9	628
3189	-0.1000	45.63	2.44	0.2000	32.48	15.35	-0.10	8.11	18.5	325
3190	-0.1000	35.78	1.85	0.1600	28.28	20.96	-0.10	8.06	18.5	291
3191	-0.1000	68.61	2.12	0.3100	52.29	52.75	-0.10	7.86	15.2	535
3192	-0.1000	76.00	2.46	0.2500	51.39	31.55	-0.10	7.78	14.7	518
3193	-0.1000	57.07	0.63	0.4300	71.09	51.80	-0.10	7.88	13.8	592
3194	-0.1000	39.14	2.44	0.1900	31.66	18.95	-0.10	8.26	16.9	301
3195	-0.1000	75.92	1.07	0.7600	100.01	147.71	-0.10	7.88	15.9	961
3196	-0.1000	75.53	4.32	0.2100	41.31	21.05	-0.10	8.23	18.3	446
3197	-0.1000	49.35	2.06	0.2100	48.28	32.97	-0.10	8.06	14.0	413
3198	-0.1000	46.66	5.09	0.3300	56.83	63.63	-0.10	8.15	13.9	541
3199	-0.1000	37.18	6.35	0.2700	38.10	75.70	-0.10	8.27	14.4	473
3227	-0.1000	87.08	3.55	0.1400	32.26	22.01	-0.10	7.98	13.9	437
3228	-0.1000	85.10	8.52	7.2800	140.27	77.73	-0.10	8.02	12.4	1033
3229	-0.1000	55.04	1.72	0.0700	15.15	5.41	-0.10	8.14	10.4	235
3230	-0.1000	40.81	4.15	0.3600	63.63	102.51	-0.10	7.96	12.4	765
3264	-0.1000	42.09	2.75	0.7800	8.98	92.70	-0.10	8.22	16.9	477
3265	-0.1000	70.93	3.08	0.3500	19.80	54.18	-0.10	8.06	14.2	420
3266	-0.1000	64.47	3.28	0.1200	19.74	29.30	-0.10	8.06	14.1	337
3284	-0.1000	52.78	3.96	3.3600	170.00	245.65	-0.10	8.64	19.5	383
3285	-0.1000	1.21	0.32	-0.1000	0.17	111.76	-0.10	8.60	19.7	241
3286	-0.1000	59.16	4.20	0.3000	35.22	76.06	-0.10	8.55	15.6	373
3288	-0.1000	40.61	1.95	0.3400	40.45	51.45	-0.10	8.27	13.5	444
3289	-0.1000	77.77	2.26	0.1000	15.93	44.36	-0.10	8.43	14.4	383

Values of -0.1 are below detection limits of testing procedure.

## Sample Site Test Data for Sevier County District

### Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
3126	-0.1000	0.25	47.00	-0.10	-0.1000	-0.1000	<u>8.59</u>	-0.1000	-0.1000	-0.10	1.4	<u>755</u>
3127	-0.1000	0.37	25.07	-0.10	-0.1000	-0.1000	<u>7.76</u>	-0.1000	-0.1000	-0.10	2.0	<u>802</u>
3128	-0.1000	0.33	51.53	-0.10	-0.1000	-0.1000	<u>6.24</u>	-0.1000	-0.1000	0.25	1.7	<u>1,087</u>
3180	-0.1000	-0.10	27.69	-0.10	0.0300	0.0200	<u>3.33</u>	-0.1000	-0.1000	-0.10	0.5	533
3181	-0.1000	0.07	17.65	-0.10	0.0200	-0.1000	<u>6.16</u>	-0.1000	-0.1000	-0.10	0.6	663
3182	-0.1000	0.08	12.59	-0.10	0.0300	-0.1000	<u>7.23</u>	-0.1000	-0.1000	0.05	0.5	<u>763</u>
3183	-0.1000	0.07	12.37	-0.10	0.0400	-0.1000	<u>6.34</u>	-0.1000	-0.1000	-0.10	0.5	693
3184	-0.1000	-0.10	12.83	-0.10	0.0400	-0.1000	<u>5.43</u>	-0.1000	-0.1000	-0.10	0.4	593
3185	-0.1000	0.13	21.75	-0.10	0.0200	-0.1000	<u>7.99</u>	0.0200	-0.1000	-0.10	0.7	<u>920</u>
3186	-0.1000	0.26	27.81	-0.10	0.0400	-0.1000	<u>10.53</u>	0.0300	-0.1000	-0.10	1.1	<u>1,130</u>
3187	-0.1000	0.58	24.95	-0.10	0.0500	0.1200	<u>10.72</u>	0.0300	-0.1000	-0.10	2.0	<u>1,207</u>
3188	-0.1000	0.15	76.25	-0.10	0.0400	0.0400	<u>6.98</u>	-0.1000	-0.1000	-0.10	1.0	<u>1,046</u>
3189	0.0800	-0.10	20.29	-0.10	0.0200	0.1100	<u>4.40</u>	0.0300	-0.1000	-0.10	0.4	541
3190	-0.1000	0.07	20.39	-0.10	0.0300	0.1600	<u>3.91</u>	0.0200	-0.1000	-0.10	0.6	485
3191	-0.1000	0.21	30.53	-0.10	0.0400	-0.1000	<u>7.81</u>	-0.1000	-0.1000	-0.10	1.2	<u>891</u>
3192	-0.1000	0.13	23.44	-0.10	0.0300	-0.1000	<u>7.99</u>	-0.1000	-0.1000	-0.10	0.7	<u>863</u>
3193	-0.1000	0.23	36.11	-0.10	0.0300	-0.1000	<u>8.98</u>	0.0800	-0.1000	-0.10	1.1	<u>987</u>
3194	-0.1000	-0.10	21.50	-0.10	0.0300	-0.1000	<u>5.19</u>	-0.1000	-0.1000	-0.10	0.5	501
3195	-0.1000	0.67	78.84	-0.10	0.0500	-0.1000	<u>6.73</u>	0.0800	-0.1000	-0.10	2.6	<u>1,602</u>
3196	-0.1000	0.07	29.46	-0.10	0.0600	0.0300	<u>7.08</u>	-0.1000	-0.1000	0.06	0.5	744
3197	-0.1000	0.15	16.05	-0.10	0.0300	0.0400	<u>5.64</u>	-0.1000	-0.1000	-0.10	0.8	688
3198	-0.1000	0.24	49.21	-0.10	0.0500	-0.1000	<u>4.71</u>	-0.1000	-0.1000	-0.10	1.5	<u>902</u>
3199	-0.1000	0.27	47.51	-0.10	0.0300	0.0400	<u>12.80</u>	-0.1000	-0.1000	-0.10	2.1	<u>788</u>
3227	-0.1000	0.18	39.17	-0.10	0.0300	-0.1000	<u>6.32</u>	-0.1000	-0.1000	-0.10	0.5	728
3228	-0.1000	0.29	69.25	-0.10	0.0300	0.0900	<u>9.81</u>	-0.1000	-0.1000	-0.10	1.2	<u>1,721</u>
3229	-0.1000	-0.10	-0.10	-0.10	0.0300	-0.1000	<u>4.32</u>	-0.1000	-0.1000	-0.10	0.2	391
3230	-0.1000	0.10	<u>216.13</u>	-0.10	0.0300	0.3600	<u>5.43</u>	<u>0.5800</u>	-0.1000	-0.10	2.3	<u>1,275</u>
3264	-0.1000	0.37	59.70	-0.10	-0.1000	0.0700	<u>3.99</u>	-0.1000	-0.1000	0.05	<u>3.4</u>	<u>795</u>
3265	-0.1000	0.20	36.97	-0.10	-0.1000	-0.1000	<u>4.69</u>	-0.1000	-0.1000	-0.10	1.5	700
3266	-0.1000	0.10	24.36	-0.10	-0.1000	-0.1000	<u>4.59</u>	-0.1000	-0.1000	-0.10	0.8	561
3284	-0.1000	<u>0.85</u>	<u>314.22</u>	-0.10	-0.1000	-0.1000	<u>9.91</u>	-0.1000	-0.1000	-0.10	<u>3.7</u>	638
3285	0.0400	-0.10	33.11	-0.10	0.1000	-0.1000	<u>3.70</u>	-0.1000	-0.1000	-0.10	<u>25.1</u>	401
3286	-0.1000	0.28	92.87	-0.10	-0.1000	0.0400	<u>4.24</u>	-0.1000	-0.1000	0.04	1.9	621
3288	-0.1000	0.09	46.36	-0.10	0.0200	-0.1000	<u>5.62</u>	-0.1000	-0.1000	-0.10	1.4	740
3289	-0.1000	0.12	16.08	-0.10	0.0400	-0.1000	<u>5.66</u>	-0.1000	-0.1000	0.04	1.2	638

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently.

Values of -0.1 are below detection limits of testing procedure.

## Sample Site Test Data for Sevier County District

### Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
3126	-0.1000	-0.1000	0.25	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	19.50	-0.1000	453	-0.1000	-0.10
3127	-0.1000	-0.1000	0.37	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	19.38	-0.1000	481	-0.1000	-0.10
3128	-0.1000	-0.1000	0.33	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	45.73	-0.1000	652	0.0100	0.25
3180	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	17.94	-0.1000	320	-0.1000	-0.10
3181	-0.1000	-0.1000	0.07	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	11.09	-0.1000	398	-0.1000	-0.10
3182	-0.1000	-0.1000	0.08	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	10.55	-0.1000	458	-0.1000	0.05
3183	-0.1000	-0.1000	0.07	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	10.05	-0.1000	416	-0.1000	-0.10
3184	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	8.15	-0.1000	356	-0.1000	-0.10
3185	-0.1000	-0.1000	0.13	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	18.03	-0.1000	552	-0.1000	-0.10
3186	-0.1000	-0.1000	0.26	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	24.03	-0.1000	678	-0.1000	-0.10
3187	-0.1000	-0.1000	0.58	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	23.10	-0.1000	724	-0.1000	-0.10
3188	-0.1000	-0.1000	0.15	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	35.64	-0.1000	628	-0.1000	-0.10
3189	0.0800	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	10.17	-0.1000	325	-0.1000	-0.10
3190	-0.1000	-0.1000	0.07	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	9.10	-0.1000	291	-0.1000	-0.10
3191	-0.1000	-0.1000	0.21	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	21.65	-0.1000	535	-0.1000	-0.10
3192	-0.1000	-0.1000	0.13	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	18.37	-0.1000	518	-0.1000	-0.10
3193	-0.1000	-0.1000	0.23	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	23.19	-0.1000	592	-0.1000	-0.10
3194	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	10.33	-0.1000	301	-0.1000	-0.10
3195	-0.1000	-0.1000	0.67	-0.1000	-0.1000	-0.1000	<u>0.0300</u>	-0.1000	-0.1000	62.23	-0.1000	961	0.0100	-0.10
3196	-0.1000	-0.1000	0.07	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	53.73	-0.1000	446	-0.1000	0.06
3197	-0.1000	-0.1000	0.15	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	13.84	-0.1000	413	-0.1000	-0.10
3198	-0.1000	-0.1000	0.24	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	26.39	-0.1000	541	-0.1000	-0.10
3199	-0.1000	-0.1000	0.27	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	28.16	-0.1000	473	-0.1000	-0.10
3227	-0.1000	-0.1000	0.18	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	20.70	-0.1000	437	-0.1000	-0.10
3228	-0.1000	-0.1000	0.29	-0.1000	-0.1000	-0.1000	<u>0.0300</u>	-0.1000	-0.1000	154.40	-0.1000	1,033	-0.1000	-0.10
3229	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	2.79	-0.1000	235	-0.1000	-0.10
3230	-0.1000	-0.1000	0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	29.45	-0.1000	765	-0.1000	-0.10
3264	-0.1000	-0.1000	0.37	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	41.19	-0.1000	477	-0.1000	0.05
3265	-0.1000	-0.1000	0.20	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	26.28	-0.1000	420	-0.1000	-0.10
3266	-0.1000	-0.1000	0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	12.33	-0.1000	337	-0.1000	-0.10
3284	-0.1000	-0.1000	0.85	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	139.69	-0.1000	383	0.0400	-0.10
3285	0.0400	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	18.68	-0.1000	241	-0.1000	-0.10
3286	-0.1000	-0.1000	0.28	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	48.14	-0.1000	373	-0.1000	0.04
3288	-0.1000	-0.1000	0.09	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	28.35	-0.1000	444	-0.1000	-0.10
3289	-0.1000	-0.1000	0.12	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	14.55	-0.1000	383	-0.1000	0.04

Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

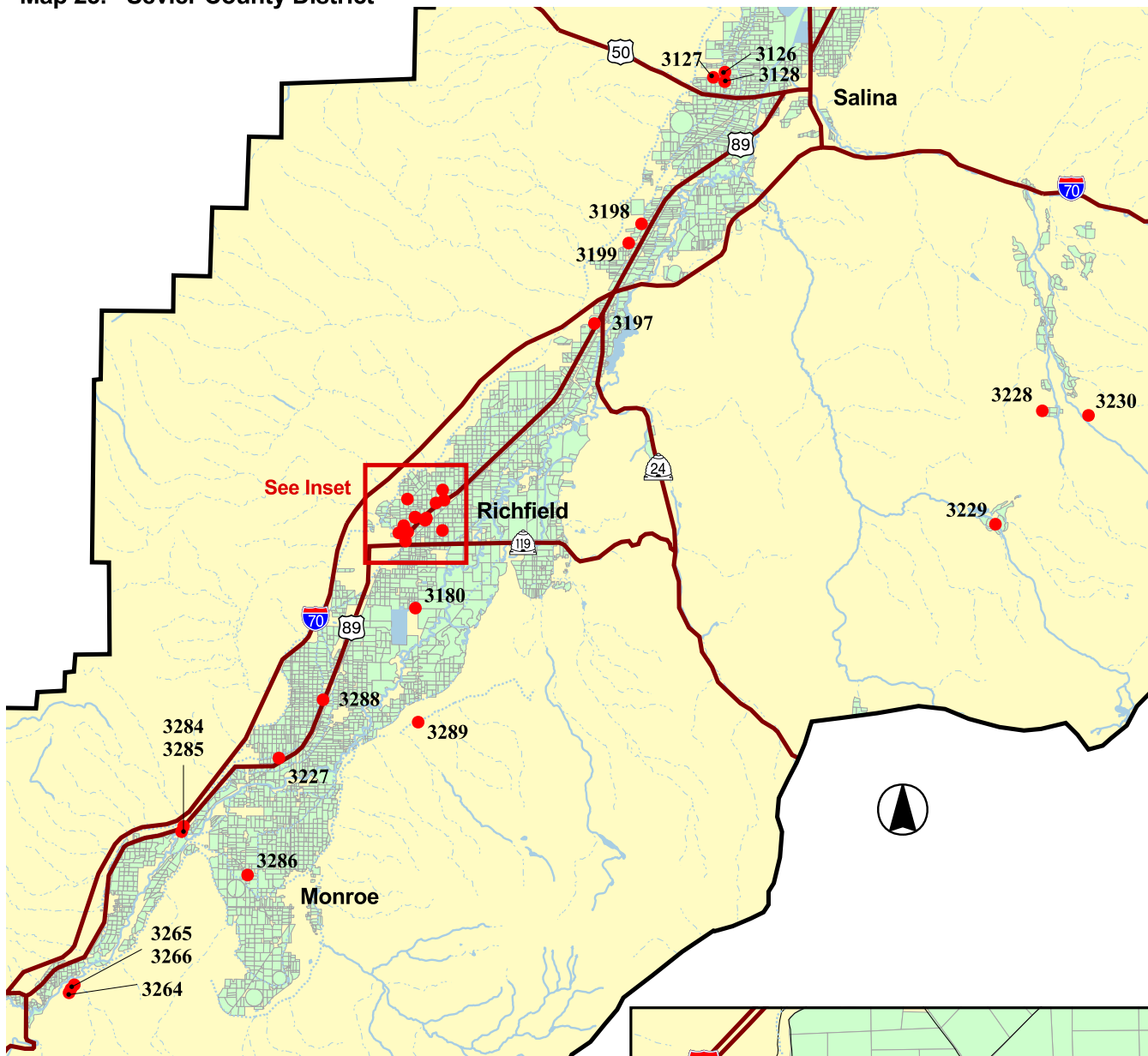
## Sample Site Test Data for Sevier County District

### Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
3126	-0.1000	0.1200	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	2.7	-0.1000	19.50	-0.1000	453	-0.10	7.96	0	0	5.0
3127	-0.1000	0.0500	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	2.5	-0.1000	19.38	-0.1000	481	-0.10	7.92	0	0	4.7
3128	-0.1000	0.0300	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	4.7	-0.1000	45.73	-0.1000	<u>652</u>	0.25	7.84	0	0	7.0
3180	-0.1000	0.0200	-0.1000	-0.1000	0.0300	0.0200	-0.1000	1.9	-0.1000	17.94	-0.1000	320	-0.10	8.18	0	0	4.7
3181	-0.1000	0.2500	-0.1000	-0.1000	0.0200	-0.1000	-0.1000	1.9	-0.1000	11.09	-0.1000	398	-0.10	7.71	0	0	5.8
3182	-0.1000	0.2900	-0.1000	-0.1000	0.0300	-0.1000	-0.1000	1.0	-0.1000	10.55	-0.1000	458	0.05	7.71	0	0	6.8
3183	-0.1000	0.2500	-0.1000	-0.1000	0.0400	-0.1000	-0.1000	2.8	-0.1000	10.05	-0.1000	416	-0.10	7.73	<u>1</u>	0	6.3
3184	-0.1000	0.2300	-0.1000	-0.1000	0.0400	-0.1000	-0.1000	0.5	-0.1000	8.15	-0.1000	356	-0.10	7.94	<u>1</u>	0	5.3
3185	-0.1000	0.1900	-0.1000	-0.1000	0.0200	-0.1000	0.0200	-0.1	-0.1000	18.03	-0.1000	<u>552</u>	-0.10	7.67	0	0	7.9
3186	-0.1000	0.0900	-0.1000	-0.1000	0.0400	-0.1000	0.0300	-0.1	-0.1000	24.03	-0.1000	<u>678</u>	-0.10	7.76	<u>1</u>	<u>1</u>	8.8
3187	-0.1000	0.1000	-0.1000	-0.1000	0.0500	0.1200	0.0300	-0.1	-0.1000	23.10	-0.1000	<u>724</u>	-0.10	7.73	0	0	7.9
3188	-0.1000	0.0700	-0.1000	-0.1000	0.0400	0.0400	-0.1000	2.0	-0.1000	35.64	-0.1000	<u>628</u>	-0.10	7.88	0	0	8.1
3189	-0.1000	0.1300	-0.1000	-0.1000	0.0200	0.1100	0.0300	-0.1	-0.1000	10.17	-0.1000	325	-0.10	8.11	0	0	4.6
3190	-0.1000	0.2200	-0.1000	-0.1000	0.0300	0.1600	0.0200	-0.1	-0.1000	9.10	-0.1000	291	-0.10	8.06	0	0	3.7
3191	-0.1000	0.1100	-0.1000	-0.1000	0.0400	-0.1000	-0.1000	-0.1	-0.1000	21.65	-0.1000	<u>535</u>	-0.10	7.86	0	0	7.1
3192	-0.1000	0.1400	-0.1000	-0.1000	0.0300	-0.1000	-0.1000	3.6	-0.1000	18.37	-0.1000	<u>518</u>	-0.10	7.78	0	0	7.5
3193	-0.1000	0.0700	-0.1000	-0.1000	0.0300	-0.1000	<u>0.0800</u>	-0.1	-0.1000	23.19	-0.1000	<u>592</u>	-0.10	7.88	<u>1</u>	0	7.5
3194	-0.1000	0.1700	-0.1000	-0.1000	0.0300	-0.1000	-0.1000	-0.1	-0.1000	10.33	-0.1000	301	-0.10	8.26	0	0	4.1
3195	-0.1000	0.0500	-0.1000	-0.1000	0.0500	-0.1000	<u>0.0800</u>	-0.1	-0.1000	62.23	-0.1000	<u>961</u>	-0.10	7.88	0	0	10.3
3196	-0.1000	0.0700	-0.1000	-0.1000	0.0600	0.0300	-0.1000	-0.1	-0.1000	53.73	-0.1000	446	0.06	8.23	0	0	6.8
3197	-0.1000	0.0700	-0.1000	-0.1000	0.0300	0.0400	-0.1000	-0.1	-0.1000	13.84	-0.1000	413	-0.10	8.06	0	0	5.7
3198	-0.1000	0.0700	-0.1000	-0.1000	0.0500	-0.1000	-0.1000	4.3	-0.1000	26.39	-0.1000	<u>541</u>	-0.10	8.15	0	0	6.1
3199	-0.1000	0.0500	-0.1000	-0.1000	0.0300	0.0400	-0.1000	-0.1	-0.1000	28.16	-0.1000	473	-0.10	8.27	0	0	4.4
3227	-0.1000	0.1300	-0.1000	-0.1000	0.0300	-0.1000	-0.1000	2.3	-0.1000	20.70	-0.1000	437	-0.10	7.98	0	0	7.0
3228	-0.1000	-0.1000	-0.1000	-0.1000	0.0300	0.0900	-0.1000	0.9	-0.1000	<u>154.40</u>	-0.1000	<u>1,033</u>	-0.10	8.02	0	0	13.2
3229	-0.1000	0.2000	-0.1000	-0.1000	0.0300	-0.1000	-0.1000	-0.1	-0.1000	2.79	-0.1000	235	-0.10	8.14	0	0	4.1
3230	-0.1000	0.0300	-0.1000	-0.1000	0.0300	<u>0.3600</u>	<u>0.5800</u>	-0.1	-0.1000	29.45	-0.1000	<u>765</u>	-0.10	7.96	0	0	6.1
3264	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.0700	-0.1000	1.0	-0.1000	41.19	-0.1000	477	0.05	8.22	0	0	3.0
3265	-0.1000	0.0200	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.5	-0.1000	26.28	-0.1000	420	-0.10	8.06	0	0	5.3
3266	-0.1000	0.0500	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1	-0.1000	12.33	-0.1000	337	-0.10	8.06	0	0	4.9
3284	-0.1000	0.0200	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.5	-0.1000	<u>139.69</u>	-0.1000	383	-0.10	<u>8.64</u>	0	0	13.0
3285	-0.1000	-0.1000	-0.1000	-0.1000	0.1000	-0.1000	-0.1000	0.5	-0.1000	18.68	-0.1000	241	-0.10	<u>8.60</u>	0	0	0.1
3286	-0.1000	0.0300	-0.1000	-0.1000	-0.1000	0.0400	-0.1000	1.7	-0.1000	48.14	-0.1000	373	0.04	<u>8.55</u>	0	0	5.5
3288	-0.1000	0.0300	-0.1000	-0.1000	0.0200	-0.1000	-0.1000	2.6	-0.1000	28.35	-0.1000	444	-0.10	8.27	0	0	4.7
3289	-0.1000	0.0900	-0.1000	-0.1000	0.0400	-0.1000	-0.1000	3.1	-0.1000	14.55	-0.1000	383	0.04	8.43	0	0	5.5

Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.

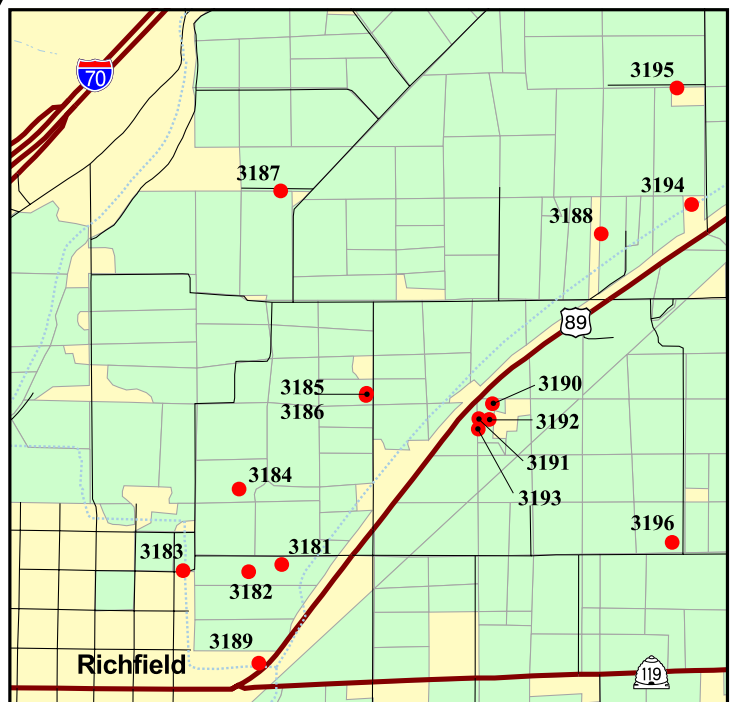
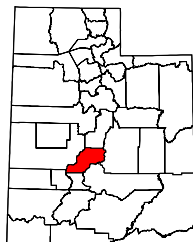
Map 23. Sevier County District



Map Scale 1:289,400 (1 inch = 4.6 miles)

- Sample Site
- Irrigated Land
- Water Body
- SCD Boundary
- Major Road
- Other Road
- Water Course
- Ditch or Canal
- ~ Intermittent Stream

District Location



## Zone 5

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UACD Zone 5 consists of seven districts in five counties, including Beaver, Iron, Garfield, Kane, and Washington counties.

Twenty-two sites were sampled in seven districts of Zone 5 during the spring, summer, and fall of 2003. Three wells were sampled in the Beaver District, ten in Canyonlands District, two in the Twin M District, and seven in the Upper Sevier District. A separate narrative report is presented for each district. These reports include data tables and maps showing locations of sample sites. Each report covers three categories of water quality criteria—irrigation, livestock and culinary. Since water use may overlap among these categories for a single well, analytical results are compared to all three sets of criteria.

### Beaver District

#### **General:**

Three samples were collected in the Beaver District. Water in this district tested soft with grains per gallon (gpg) ranging from 0.4 to 0.5 with a mean of 0.43. Sampled water temperature ranges from 11.9 °C to 14.2 °C, with a mean of 12.66 °C. The pH for the district ranges from 7.51 to 7.82 with a mean of 7.61.

#### **Irrigation:**

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in  $\mu\text{mhos/cm}$ . Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750  $\mu\text{mhos/cm}$ , salt-sensitive plants begin to be affected. When EC exceeds 3,000  $\mu\text{mhos/cm}$ , most plants would be severely injured. No samples exceeded the 750  $\mu\text{mhos/cm}$  standard.

The sodium absorption ratio (SAR) measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 marks the beginning of problems and values greater than 9 indicate severe problems. No samples have elevated SAR.

Bicarbonate ( $\text{HCO}_3$ ) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l and severe problems appear when it exceeds 8.5 meq/l. Sample 3258 has high bicarbonate.

No other elements were found in concentrations harmful to plants.

#### **Livestock:**

No water quality standards for livestock were exceeded.

#### **Culinary:**

No drinking water standards were exceeded.

## Sample Site Test Data for Beaver District

### General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
3256	-0.1000	6.03	0.51	-0.1000	1.09	4.93	-0.10	7.51	11.9	41
3257	-0.1000	7.17	0.20	-0.1000	1.09	5.08	-0.10	7.82	14.2	47
3258	-0.1000	6.26	0.40	-0.1000	1.08	4.62	-0.10	7.51	11.9	42

Values of -0.1 are below detection limits of testing procedure.

### Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
3256	0.1700	-0.10	-0.10	-0.10	-0.1000	0.0800	0.62	-0.1000	-0.1000	-0.10	0.5	69
3257	0.2800	-0.10	-0.10	-0.10	-0.1000	0.1300	1.29	-0.1000	-0.1000	-0.10	0.5	78
3258	0.1400	-0.10	-0.10	-0.10	-0.1000	0.0700	<u>1.74</u>	-0.1000	-0.1000	-0.10	0.4	70

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

### Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
3256	0.1700	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.54	-0.1000	41	-0.1000	-0.10
3257	0.2800	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.51	-0.1000	47	-0.1000	-0.10
3258	0.1400	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.52	-0.1000	42	-0.1000	-0.10

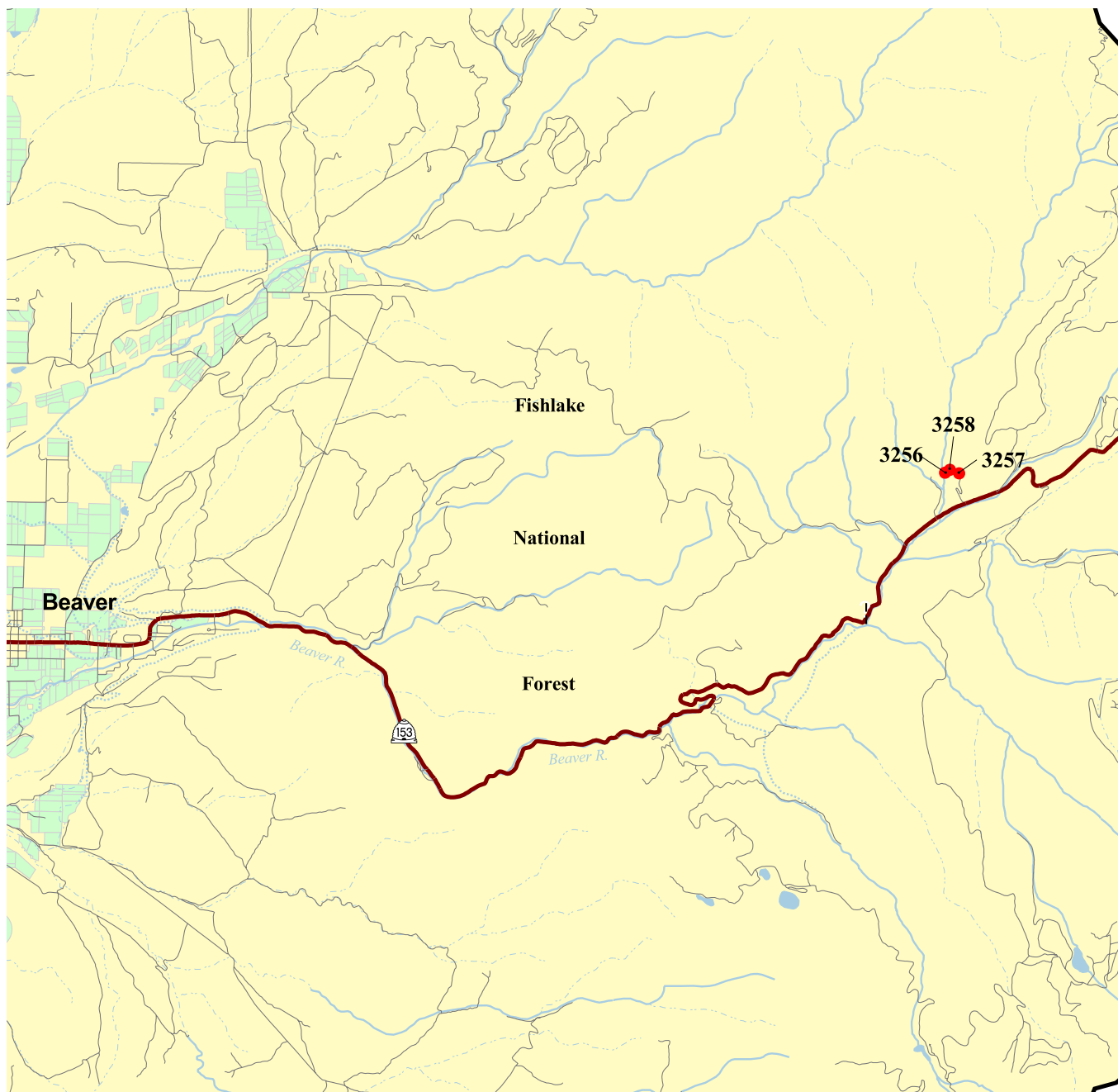
Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

### Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
3256	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.0800	-0.1000	-0.1	-0.1000	1.54	-0.1000	41	-0.10	7.51	0	0	0.4
3257	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.1300	-0.1000	-0.1	-0.1000	1.51	-0.1000	47	-0.10	7.82	0	0	0.5
3258	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.0700	-0.1000	-0.1	-0.1000	1.52	-0.1000	42	-0.10	7.51	0	0	0.4

Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.

**Map 24. Beaver District**

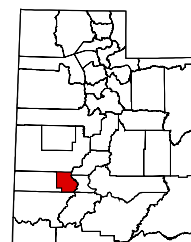


Map Scale 1:91,210 (1 inch = 1.44 miles)

- Sample Site
- Irrigated Land
- Water Body
- SCD Boundary
- Major Road
- Other Road
- Water Course
- Ditch or Canal
- Intermittent Stream



**District Location**





# Canyonlands District

## **General:**

Ten samples were collected in the Canyonlands District. Water in this district varies from soft to moderate with grains per gallon (gpg) ranging from 2.3 to 6.3 with a mean of 4.90. Sampled water temperature ranges from 11.7 °C to 24.4 °C, with a mean of 15.10 °C. The pH for the district ranges from 7.05 to 8.67 with a mean of 7.81.

## **Irrigation:**

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in  $\mu\text{mhos/cm}$ . Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750  $\mu\text{mhos/cm}$ , salt-sensitive plants begin to be affected. When EC exceeds 3,000  $\mu\text{mhos/cm}$ , most plants would be severely injured. Samples 3052, 3053, and 3055 have EC values greater than 750  $\mu\text{mhos/cm}$ .

The sodium absorption ratio (SAR) measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 marks the beginning of problems and values greater than 9 indicate severe problems.

Bicarbonate ( $\text{HCO}_3$ ) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l and severe problems appear when it exceeds 8.5 meq/l. All samples have high bicarbonate.

No other elements were found in concentrations harmful to plants.

## **Livestock:**

No water quality standards for livestock were exceeded.

## **Culinary:**

Dissolved salts in water are measured in the field as Electrical Conductivity (EC). Culinary standards, however, are designated as Total Dissolved Solids (TDS), calculated from EC. TDS for eight samples exceed the EPA aesthetic standard of 500 ppm. At this level the water may be off-flavored but it is not a health problem until TDS reaches 2,000 ppm. Sample 3052 exceeds the aesthetic standard for TDS.

EPA has set an aesthetic standard of 0.05 ppm for manganese (Mn). Water with high concentrations may cause discoloration of plumbing fixtures and have poor flavor. Samples 3054 through 3056 have high manganese concentration.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil, whereas *E. coli*, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of *E. coli* in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well

casing, improper grouting, or lack of a casing. E. coli contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables.

Samples 3053 and 3056 are contaminated with coliform bacteria. Sample 3053 is contaminated with E. coli bacteria. The source of this contamination needs to be found and corrected before using this water for drinking.

## Sample Site Test Data for Canyonlands District

### General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
3052	-0.1000	48.45	2.67	0.0900	34.78	9.54	-0.10	7.05	11.7	1099
3053	-0.1000	45.55	2.29	0.2900	41.01	82.69	-0.10	8.67	16.1	494
3054	-0.1000	34.87	2.90	0.3400	39.17	69.07	-0.10	8.46	11.7	416
3055	-0.1000	50.91	7.88	0.2500	40.78	46.56	-0.10	7.98	24.4	456
3056	-0.1000	61.19	7.82	0.2300	38.44	32.20	-0.10	7.55	18.3	441
3057	-0.1000	70.24	6.87	-0.1000	22.47	28.08	-0.10	7.80	15.0	372
3058	-0.1000	59.96	1.44	-0.1000	12.41	10.85	-0.10	7.36	13.9	241
3059	-0.1000	79.69	3.10	0.0500	28.51	16.36	-0.10	7.46	13.9	403
3060	-0.1000	77.48	1.86	0.0500	21.26	16.38	-0.10	7.46	13.9	351
3268	-0.1000	26.58	1.81	-0.1000	12.10	8.04	-0.10	8.26	12.2	145

Values of -0.1 are below detection limits of testing procedure.

### Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
3052	-0.1000	-0.10	11.79	-0.10	-0.1000	-0.1000	<u>5.43</u>	-0.1000	-0.1000	0.14	0.3	<u>1,832</u>
3053	-0.1000	0.09	13.76	-0.10	-0.1000	0.0600	<u>6.84</u>	-0.1000	-0.1000	-0.10	2.1	<u>824</u>
3054	-0.1000	0.08	12.98	-0.10	-0.1000	0.1800	<u>6.55</u>	0.1300	-0.1000	-0.10	1.9	694
3055	-0.1000	-0.10	75.42	-0.10	-0.1000	0.0200	<u>3.66</u>	0.0800	-0.1000	0.07	1.2	<u>760</u>
3056	-0.1000	-0.10	40.61	-0.10	-0.1000	0.0400	<u>4.59</u>	0.1100	-0.1000	-0.10	0.8	735
3057	-0.1000	-0.10	24.91	-0.10	-0.1000	-0.1000	<u>4.77</u>	-0.1000	-0.1000	0.05	0.7	620
3058	-0.1000	-0.10	11.84	-0.10	-0.1000	-0.1000	<u>4.19</u>	-0.1000	-0.1000	-0.10	0.3	402
3059	-0.1000	-0.10	41.14	-0.10	-0.1000	-0.1000	<u>5.33</u>	-0.1000	-0.1000	-0.10	0.4	671
3060	-0.1000	-0.10	15.59	-0.10	-0.1000	-0.1000	<u>5.19</u>	-0.1000	-0.1000	0.14	0.4	585
3268	-0.1000	-0.10	4.89	-0.10	-0.1000	-0.1000	<u>2.21</u>	-0.1000	-0.1000	0.13	0.3	242

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

## Sample Site Test Data for Canyonlands District

### Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
3052	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	4.62	-0.1000	1,099	0.0100	0.14
3053	-0.1000	-0.1000	0.09	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	38.26	-0.1000	494	-0.1000	-0.10
3054	-0.1000	-0.1000	0.08	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	20.86	-0.1000	416	-0.1000	-0.10
3055	-0.1000	-0.1000	-0.10	0.0100	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	54.56	-0.1000	456	-0.1000	0.07
3056	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	44.35	-0.1000	441	-0.1000	-0.10
3057	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	34.34	-0.1000	372	-0.1000	0.05
3058	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	6.71	-0.1000	241	-0.1000	-0.10
3059	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	28.11	-0.1000	403	-0.1000	-0.10
3060	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	25.91	-0.1000	351	-0.1000	0.14
3268	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	3.29	-0.1000	145	-0.1000	0.13

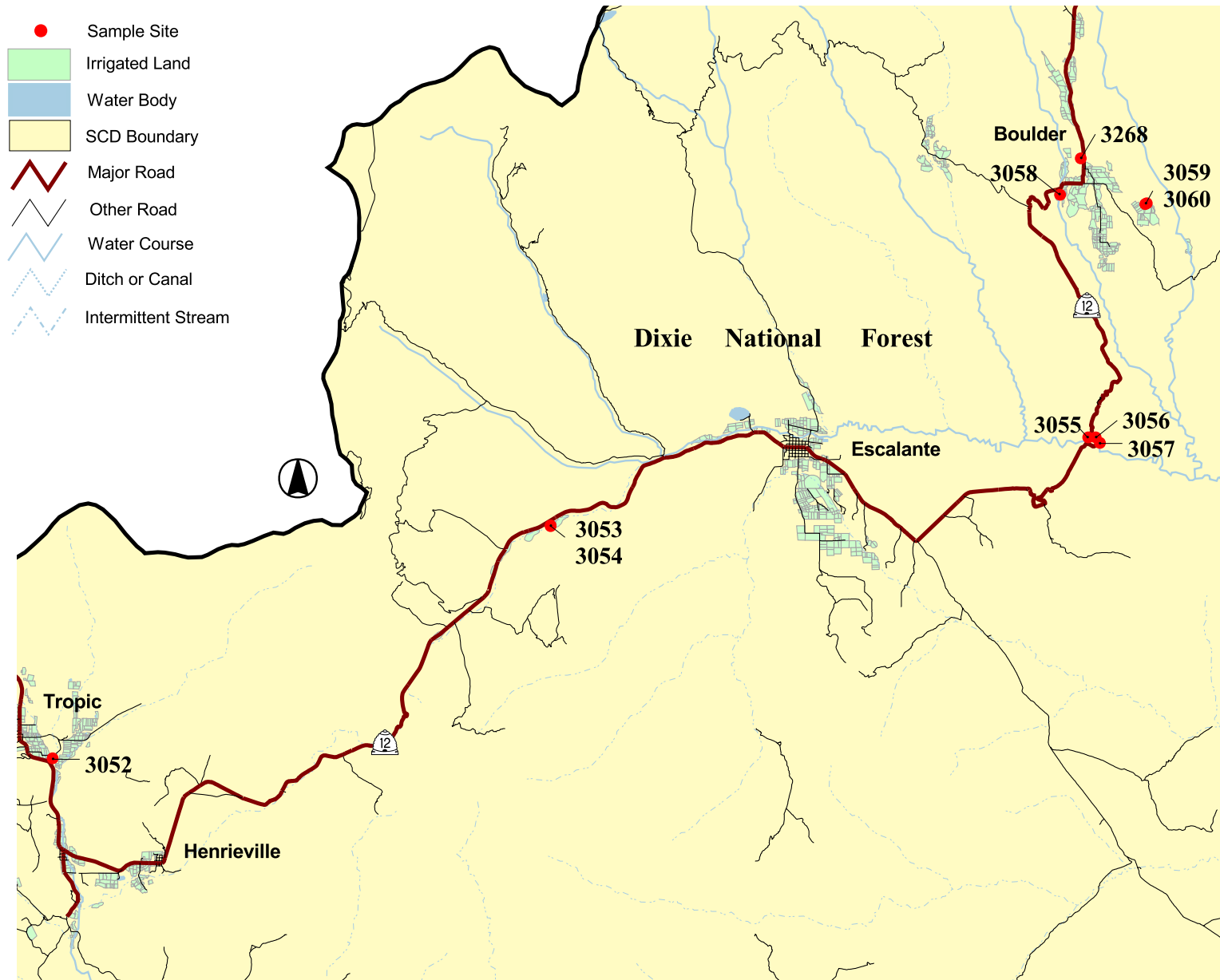
Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

### Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
3052	-0.1000	0.1300	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.9	-0.1000	4.62	-0.1000	<u>1,099</u>	0.14	7.05	0	0	4.9
3053	-0.1000	0.1100	-0.1000	-0.1000	-0.1000	0.0600	-0.1000	-0.1	-0.1000	38.26	-0.1000	494	-0.10	<u>8.67</u>	<u>1</u>	<u>1</u>	5.1
3054	-0.1000	0.0200	-0.1000	-0.1000	-0.1000	0.1800	<u>0.1300</u>	-0.1	-0.1000	20.86	-0.1000	416	-0.10	8.46	0	0	4.3
3055	-0.1000	0.0200	0.0100	-0.1000	-0.1000	0.0200	<u>0.0800</u>	-0.1	-0.1000	54.56	-0.1000	456	0.07	7.98	0	0	5.4
3056	-0.1000	0.0300	-0.1000	-0.1000	-0.1000	0.0400	<u>0.1100</u>	0.1	-0.1000	44.35	-0.1000	441	-0.10	7.55	<u>1</u>	0	5.8
3057	-0.1000	0.0200	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1	-0.1000	34.34	-0.1000	372	0.05	7.80	0	0	5.4
3058	-0.1000	0.6100	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	3.1	-0.1000	6.71	-0.1000	241	-0.10	7.36	0	0	4.2
3059	-0.1000	0.2000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	3.5	-0.1000	28.11	-0.1000	403	-0.10	7.46	0	0	6.3
3060	-0.1000	0.1500	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	2.2	-0.1000	25.91	-0.1000	351	0.14	7.46	0	0	5.8
3268	-0.1000	0.0400	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1	-0.1000	3.29	-0.1000	145	0.13	8.26	0	0	2.3

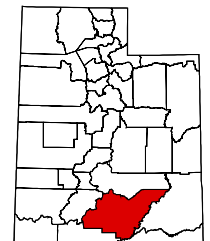
Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.

## Map 25. Canyonlands District



Map Scale 1:286,150 (1 inch = 4.5 miles)

District Location



## **Twin M District**

### **General:**

Two samples were collected in the Twin M District. Water in this district tested moderate with grains per gallon (gpg) ranging from 5.8 to 6.9 with a mean of 6.30. Sampled water temperature ranges from 14.2 °C to 17.3 °C, with a mean of 15.74 °C. The pH for the district ranges from 8.13 to 8.26 with a mean of 8.20.

### **Irrigation:**

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in  $\mu\text{mhos/cm}$ . Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750  $\mu\text{mhos/cm}$ , salt-sensitive plants begin to be affected. When EC exceeds 3,000  $\mu\text{mhos/cm}$ , most plants would be severely injured. Both samples in this district exceed the 750  $\mu\text{mhos/cm}$  standard.

SAR measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 marks the beginning of problems and values greater than 9 indicate severe problems. Neither sample in this district has elevated SAR values.

Bicarbonate ( $\text{HCO}_3$ ) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l and severe problems appear when it exceeds 8.5 meq/l. Both samples have high bicarbonate, which is common for water in Utah.

No other elements were found in concentrations harmful to plants.

### **Livestock:**

No water quality standards for livestock were exceeded.

### **Culinary:**

Dissolved salts in water are measured in the field as Electrical Conductivity (EC). Culinary standards, however, are designated as Total Dissolved Solids (TDS), calculated from EC. TDS for eight samples exceeds the EPA aesthetic standard of 500 ppm. At this level the water may be off-flavored but it is not a health problem until TDS reaches 2,000 ppm. Both Samples exceed the aesthetic standard for TDS.

No other drinking water standards were exceeded.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil, whereas *E. coli*, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of *E. coli* in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well

casing, improper grouting, or lack of a casing. E. coli contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables.

Neither of the two samples collected were contaminated with coliform or E.coli bacteria.

## Sample Site Test Data for Twin M District

### General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
3281	-0.1000	54.22	1.95	0.6200	63.47	64.55	-0.10	8.13	14.2	555
3283	-0.1000	58.11	1.39	0.1400	40.81	10.12	-0.10	8.26	17.3	528

Values of -0.1 are below detection limits of testing procedure.

### Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
3281	-0.1000	0.20	45.98	-0.10	-0.1000	0.0300	<u>7.77</u>	-0.1000	-0.1000	-0.10	1.4	<u>925</u>
3283	-0.1000	-0.10	13.62	-0.10	0.0200	-0.1000	<u>6.11</u>	-0.1000	-0.1000	-0.10	0.2	<u>880</u>

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently.

Values of -0.1 are below detection limits of testing procedure.

### Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
3281	-0.1000	-0.1000	0.20	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	26.53	-0.1000	555	-0.1000	-0.10
3283	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	6.13	-0.1000	528	-0.1000	-0.10

Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

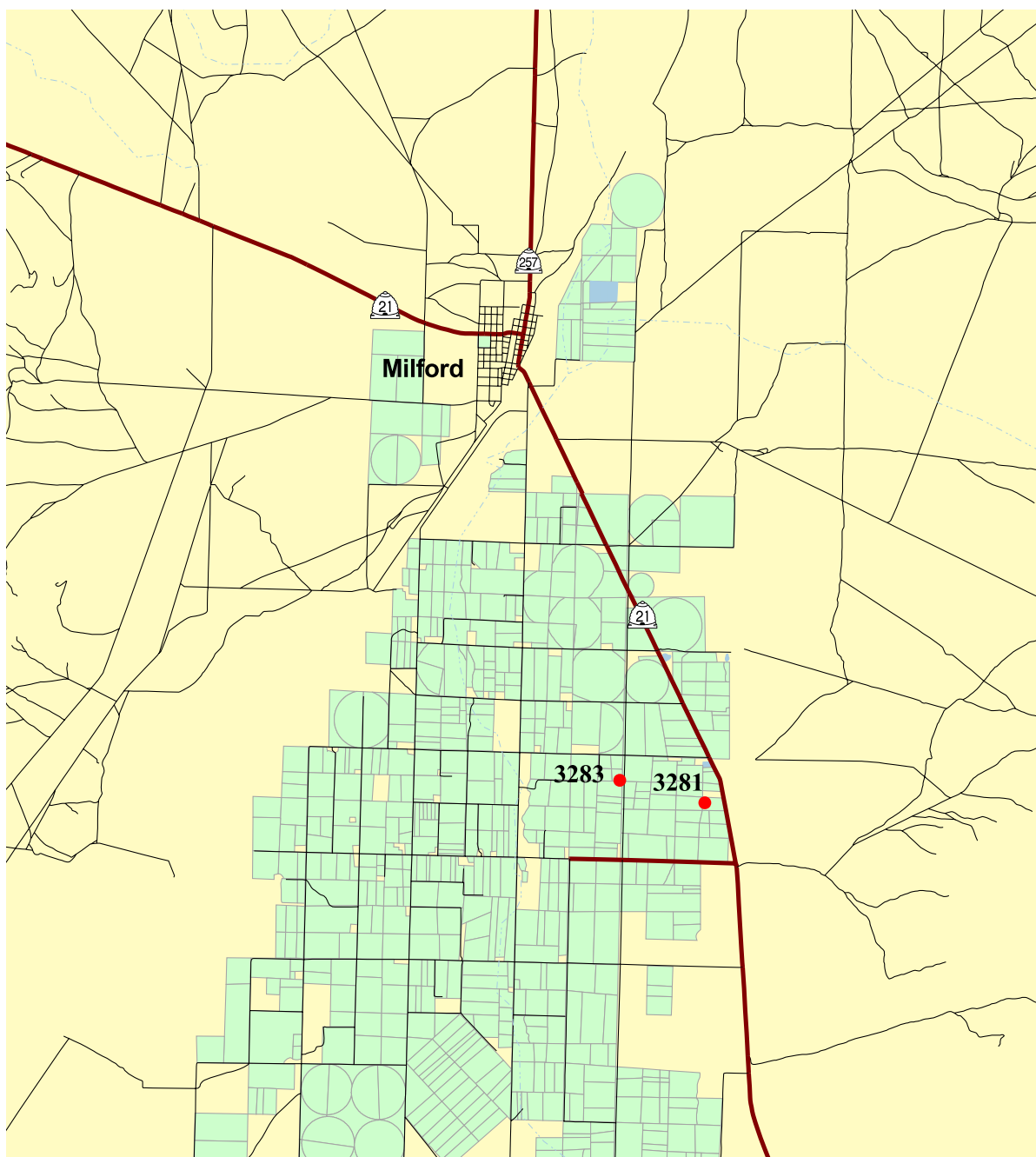
### Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
3281	-0.1000	0.0500	-0.1000	-0.1000	-0.1000	0.0300	-0.1000	2.2	-0.1000	26.53	-0.1000	<u>555</u>	-0.10	8.13	0	0	6.9
3283	-0.1000	0.1500	-0.1000	-0.1000	0.0200	-0.1000	-0.1000	1.7	-0.1000	6.13	-0.1000	<u>528</u>	-0.10	8.26	0	0	5.8

Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.



**Map 26. Twin M District**

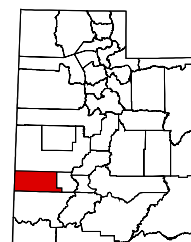


Map Scale 1:176,443 (1 inch = 2.8 miles)

- Sample Site
- Irrigated Land
- Water Body
- SCD Boundary
- Major Road
- Other Road
- Water Course
- Ditch or Canal
- Intermittent Stream



**District Location**



## Upper Sevier District

### **General:**

Seven samples were collected in the Upper Sevier District. Water in this district varies from soft to very-hard with grains per gallon (gpg) ranging from 3.3 to 17.4 with a mean of 7.3. Sampled water temperature ranges from 9.8 °C to 11.1 °C, with a mean of 10.34 °C. The pH for the district ranges from 7.19 to 8.50 with a mean of 7.82.

### **Irrigation:**

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in  $\mu\text{mhos/cm}$ . Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750  $\mu\text{mhos/cm}$ , salt-sensitive plants begin to be affected. When EC exceeds 3,000  $\mu\text{mhos/cm}$ , most plants would be severely injured. No samples in this district exceed the 750  $\mu\text{mhos/cm}$  standard.

SAR measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 marks the beginning of problems and values greater than 9 indicate severe problems. No samples in this district have an elevated SAR values.

Bicarbonate ( $\text{HCO}_3$ ) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive concentrations, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l and severe problems appear when it exceeds 8.5 meq/l. All samples have high bicarbonate, which is common for water in Utah. Sample 3051 exceeds the 8.5 meq/l standard.

No other elements were found in concentrations harmful to plants.

### **Livestock:**

Sulfate ( $\text{SO}_4$ ) is shown on chemical analyses for sulfur (S). Sulfur as sulfate can cause water to be off flavored and produces diarrhea in animals not used to drinking it. Problems start when the sulfur level in water exceeds 167 ppm. Sample 3051 has high sulfur.

No other water quality standards for livestock were exceeded.

### **Culinary:**

EPA has set an aesthetic standard of 0.05 ppm for manganese (Mn). Water with high concentrations may cause discoloration of plumbing fixtures and have poor flavor. Sample 3049 has high manganese concentration.

Sulfate is a soluble form of sulfur (S) that can cause flavor problems in drinking water at concentrations greater than 83 ppm sulfur. Bacteria in the water metabolize sulfur and produce hydrogen sulfide gas (rotten egg gas). The bacteria that produce this compound can live in plumbing fixtures and even hot water heaters. It is not uncommon to get strong odors when the hot water is turned on in areas where there is high sulfate. Generally people cannot tolerate the odor from this gas. Even if the gas is not present, high sulfate concentrations can cause diarrhea in people not used to drinking it. Sample 3051 has high sulfur that exceeds the EPA aesthetic standard of 83 ppm content.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil, whereas *E. coli*, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of *E. coli* in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well casing, improper grouting, or lack of a casing. *E. coli* contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables.

None of the samples collected in this district were contaminated with coliform or *E. coli* bacteria.

## Sample Site Test Data for Upper Sevier District

### General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
3048	-0.1000	60.55	1.35	0.2000	55.17	14.59	-0.10	7.19	10.6	419
3049	-0.1000	63.35	0.67	0.1500	38.27	8.56	-0.10	7.61	10.0	343
3050	-0.1000	75.27	2.93	0.2500	50.99	10.03	-0.10	7.40	11.1	430
3051	-0.1000	200.39	7.36	0.8200	96.51	102.23	-0.10	7.67	10.0	309
3248	-0.1000	51.09	3.06	0.0700	22.29	7.85	-0.10	8.31	10.4	287
3249	-0.1000	63.46	3.47	0.4800	43.44	9.60	-0.10	8.06	10.6	415
3250	-0.1000	28.86	1.07	0.1300	27.18	4.78	-0.10	8.50	9.8	218

Values of -0.1 are below detection limits of testing procedure.

### Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC mhos/cm
3048	-0.1000	-0.10	-0.10	-0.10	-0.1000	-0.1000	<u>7.89</u>	-0.1000	-0.1000	0.06	0.3	699
3049	-0.1000	-0.10	4.26	-0.10	-0.1000	0.0300	<u>7.02</u>	0.2000	-0.1000	0.18	0.2	572
3050	-0.1000	-0.10	10.78	-0.10	-0.1000	-0.1000	<u>6.96</u>	-0.1000	-0.1000	-0.10	0.2	717
3051	-0.1000	0.20	38.82	-0.10	-0.1000	-0.1000	<u>9.05</u>	-0.1000	-0.1000	-0.10	1.5	515
3248	-0.1000	-0.10	12.57	-0.10	-0.1000	-0.1000	<u>4.07</u>	-0.1000	-0.1000	-0.10	0.2	479
3249	-0.1000	-0.10	10.27	-0.10	-0.1000	0.0400	<u>5.99</u>	-0.1000	-0.1000	0.04	0.2	692
3250	-0.1000	-0.10	-0.10	-0.10	-0.1000	-0.1000	<u>3.76</u>	-0.1000	-0.1000	-0.10	0.2	364

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

## Sample Site Test Data for Upper Sevier District

### Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
3048	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	2.86	-0.1000	419	-0.1000	0.06
3049	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	2.50	-0.1000	343	-0.1000	0.18
3050	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	30.56	-0.1000	430	-0.1000	-0.10
3051	-0.1000	-0.1000	0.20	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	<u>261.08</u>	-0.1000	309	-0.1000	-0.10
3248	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	5.18	-0.1000	287	-0.1000	-0.10
3249	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	25.77	-0.1000	415	-0.1000	0.04
3250	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	2.97	-0.1000	218	-0.1000	-0.10

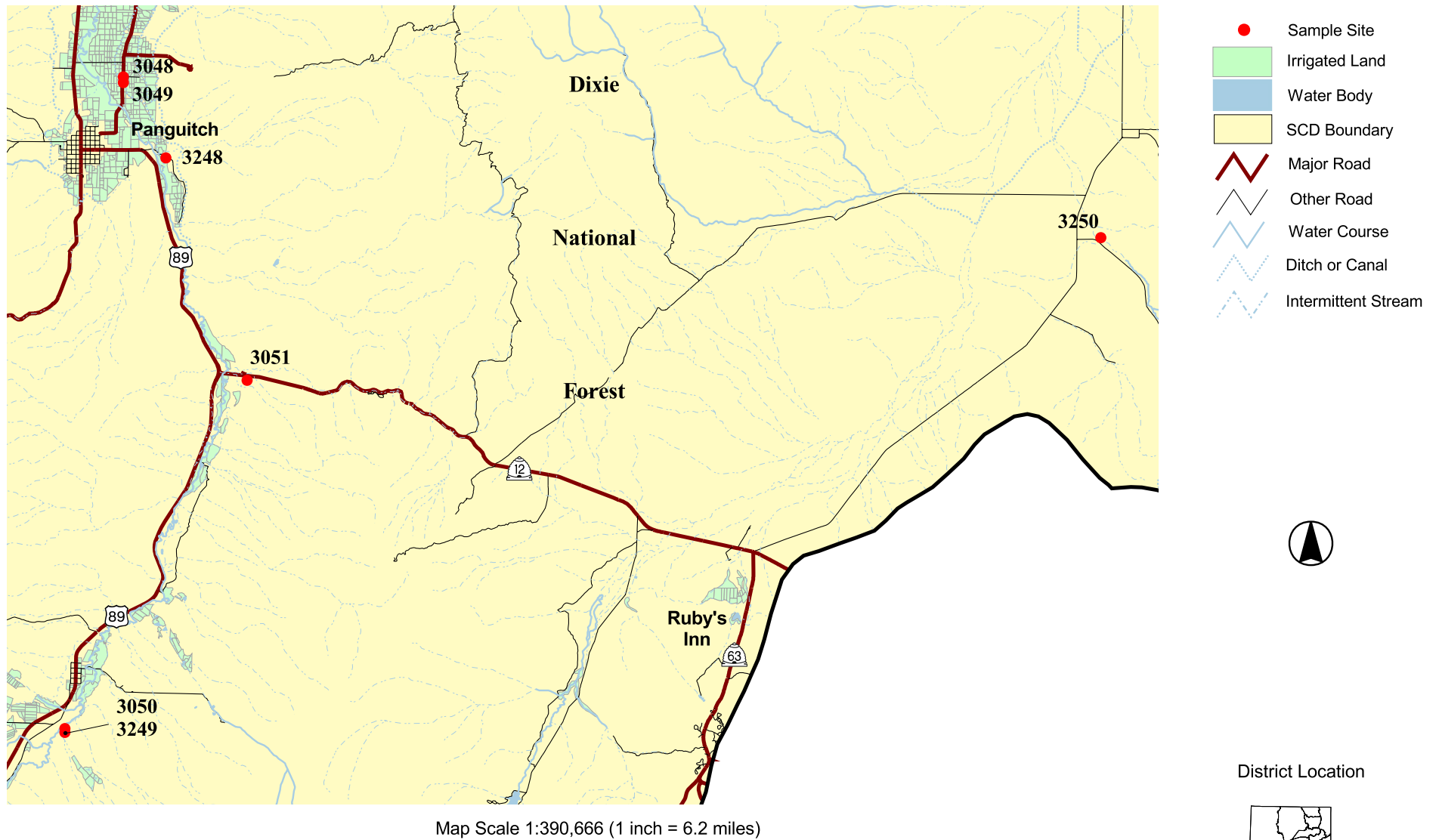
Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

### Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
3048	-0.1000	0.1300	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.0	-0.1000	2.86	-0.1000	419	0.06	7.19	0	0	6.8
3049	-0.1000	0.0900	-0.1000	-0.1000	-0.1000	0.0300	<u>0.2000</u>	-0.1	-0.1000	2.50	-0.1000	343	0.18	7.61	0	0	5.9
3050	-0.1000	0.0300	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.4	-0.1000	30.56	-0.1000	430	-0.10	7.40	0	0	7.4
3051	-0.1000	0.0200	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.1	-0.1000	<u>261.08</u>	-0.1000	309	-0.10	7.67	0	0	17.4
3248	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.7	-0.1000	5.18	-0.1000	287	-0.10	8.31	0	0	4.3
3249	-0.1000	0.0300	-0.1000	-0.1000	-0.1000	0.0400	-0.1000	-0.1	-0.1000	25.77	-0.1000	415	0.04	8.06	0	0	6.3
3250	-0.1000	0.3100	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1	-0.1000	2.97	-0.1000	218	-0.10	8.50	0	0	3.3

Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.

Map 27. Upper Sevier District



## Zone 6

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UACD Zone 6 consists of three districts in four counties including Daggett, Duchesne, Summit, and Uintah counties.

Thirty-four sample sites were sampled Zone 6 during the spring, summer, and fall of 2003, thirty-one in Duchesne District and three in Uintah District. A narrative report is presented for each district. In addition to a narrative report, tables listing measured results and maps showing locations of sample sites are included. Each report covers three categories of water quality criteria—irrigation, livestock and culinary. Since water use may overlap among these categories for a single well, analytical results are compared to all three sets of criteria.

### Duchesne County District

#### General:

Thirty-one samples were collected in the Duchesne County District. Water in this district varies from soft to very-hard with grains per gallon (gpg) ranging from 0.1 to 12.5, with a mean of 4.90. Sampled water temperature ranges from 9.5 °C to 20.2 °C, with a mean of 14.42 °C. The pH for the district ranges from 7.46 to 9.73 with a mean of 8.22.

#### Irrigation:

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in  $\mu\text{mhos/cm}$ . Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750  $\mu\text{mhos/cm}$ , salt-sensitive plants begin to be affected. When EC exceeds 3,000  $\mu\text{mhos/cm}$ , most plants would be severely injured. Samples 3080 through 3082, 3201, 3203 through 3205, 3213, 3236, and 3238 have EC values greater than 750  $\mu\text{mhos/cm}$ .

The sodium absorption ratio (SAR) measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 marks the beginning of problems and values greater than 9 indicate severe problems. Samples 3081, 3082, 3086, 3203, 3204, 3208, 3209, 3216, and 3247 have elevated SAR values. Samples 3086 and 3247 exceed 9 and are a serious problem to irrigation.

Bicarbonate ( $\text{HCO}_3$ ) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l and severe problems appear when it exceeds 8.5 meq/l. All of the samples collected in this area have high bicarbonate, which is common for water in Utah. Samples 3081, 3082, 3203, and 3204 exceed the 8.5 meq/l standard.

Boron (B) is toxic to sensitive plants when concentration exceeds 0.7 ppm. It will cause severe injury at 10.0 ppm. However, boron in trace amounts is required for proper plant growth. It is important to monitor this element because the margin separating safe health from toxicity is small. Samples 3081, 3082, 3203 and 3204 have elevated boron.

Manganese (Mn) above 0.2 ppm can injure plants and cause reduction in dry matter production. Excess manganese interferes with the plant's ability to use other nutrients such as calcium (Ca). Sample 3239 has elevated concentrations of manganese.

No other elements were found in concentrations harmful to plants.

### **Livestock:**

Boron (B) Samples 3081 and 3082 exceed the boron standard for livestock.

Livestock eating plants irrigated with water that has molybdenum (Mo) concentration greater than 0.01 ppm may be harmed. High concentrations of molybdenum interfere with copper nutrition in livestock. Samples 3081 and 3082 have elevated molybdenum.

Sulfate ( $\text{SO}_4$ ) is shown on chemical analyses for sulfur (S). Sulfur as sulfate can cause water to be off flavored and diarrhea in animals not used to drinking it. Problems start when the sulfur level in water exceeds 167 ppm. Samples 3081 and 3082 have high sulfur.

No other water quality standards for livestock were exceeded.

### **Culinary:**

Dissolved salts in water are measured in the field as Electrical Conductivity (EC). Culinary standards, however, are designated as Total Dissolved Solids (TDS), calculated from EC. TDS levels for samples 3081, 3082, 3201, 3203 through 3205, and 3213 exceed the EPA aesthetic standard of 500. At this level the water may be off-flavored but it is not a health problem until TDS reaches 2,000 ppm.

EPA has set an aesthetic standard of 0.05 ppm for manganese (Mn). Water with high concentrations may cause discoloration of plumbing fixtures and have poor flavor. Samples 3205 and 3239 have high manganese concentration.

Sulfate (S) is a soluble form of sulfur that can cause flavor problems in drinking water at concentrations greater than 83 ppm sulfur. Bacteria in the water metabolize sulfur and produce hydrogen sulfide gas (rotten egg gas). The bacteria that produce this compound can live in plumbing fixtures and even hot water heaters. It is not uncommon to get strong odors when the hot water is turned on in areas where there is high sulfate. Generally people cannot tolerate the odor from this gas. Even if the gas is not present, high sulfate concentrations can cause diarrhea in people not used to drinking it. Samples 3081, 3082, 3213, have high sulfur which exceeds the EPA aesthetic standard of 83 ppm.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil, whereas *E. coli*, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of *E. coli* in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well casing, improper grouting, or lack of a casing. *E. coli* contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables.

Samples 3081, 3203, 3205, 3209, 3213, 3215, 3236, 3241, 3242, 3244, and 3247 in this district are contaminated with coliform bacteria.



## Sample Site Test Data for Duchesne County District

### General

<b>Id #</b>	<b>Be</b>	<b>Ca</b>	<b>K</b>	<b>Li</b>	<b>Mg</b>	<b>Na</b>	<b>P</b>	<b>pH</b>	<b>°C</b>	<b>TDS</b>
3080	-0.1000	53.65	2.69	0.6100	43.51	50.97	-0.10	7.61	9.50	461
3081	-0.1000	62.48	11.43	7.1400	124.06	407.05	-0.10	7.84	16.00	1374
3082	-0.1000	57.60	10.86	6.1500	110.35	423.14	-0.10	7.75	12.89	1290
3083	-0.1000	55.91	1.21	0.1300	17.30	11.61	-0.10	7.61	17.60	259
3084	-0.1000	42.58	1.14	0.3100	27.52	9.30	-0.10	8.10	13.30	256
3085	-0.1000	50.34	1.42	0.2500	21.92	8.41	-0.10	8.10	12.10	243
3086	-0.1000	3.62	2.22	0.4300	1.82	163.51	-0.10	9.14	14.89	438
3201	-0.1000	81.46	1.71	0.3500	40.68	60.82	-0.10	7.82	12.89	580
3203	-0.1000	51.67	2.78	0.4800	33.09	124.04	-0.10	7.82	14.89	625
3204	-0.1000	79.02	2.05	1.9300	53.17	203.73	-0.10	7.90	14.30	989
3205	-0.1000	103.90	2.65	0.9300	58.04	54.80	-0.10	7.90	15.69	704
3208	-0.1000	17.72	2.48	0.3400	11.86	68.90	-0.10	8.72	13.80	325
3209	-0.1000	5.22	1.45	0.3300	3.56	97.98	-0.10	9.15	13.80	330
3210	-0.1000	35.35	2.59	0.1300	10.27	3.66	-0.10	8.44	14.60	188
3211	-0.1000	41.15	3.07	0.2500	18.88	11.54	-0.10	8.06	12.89	273
3212	-0.1000	40.38	2.95	0.2800	17.38	10.93	-0.10	8.15	12.50	251
3213	-0.1000	170.13	2.31	0.7900	44.39	96.03	-0.10	7.46	16.20	848
3214	-0.1000	73.21	1.07	0.1300	18.89	9.49	-0.10	8.13	13.89	312
3215	-0.1000	43.81	0.81	0.1000	10.46	3.28	-0.10	8.22	15.19	182
3216	-0.1000	3.48	1.11	0.2900	2.71	69.81	-0.10	9.28	16.00	207
3236	-0.1000	51.90	1.01	0.4600	65.74	19.42	-0.10	8.14	12.39	462
3237	-0.1000	42.35	2.95	0.1300	17.17	10.85	-0.10	8.22	15.60	219
3238	-0.1000	76.10	0.99	0.5000	49.85	18.19	-0.10	8.25	12.50	456
3239	-0.1000	54.11	1.35	0.0800	12.40	10.06	-0.10	8.06	13.00	220
3240	-0.1000	58.02	1.87	0.1700	17.71	10.83	-0.10	8.11	15.69	263
3241	-0.1000	57.79	1.99	0.1600	18.53	10.48	-0.10	8.18	15.10	264
3242	-0.1000	77.33	0.42	0.3300	37.57	9.64	-0.10	8.38	20.20	389
3243	-0.1000	44.48	1.02	0.1200	12.67	16.69	-0.10	7.90	13.80	238
3244	-0.1000	51.95	0.78	0.1500	21.14	7.68	-0.10	8.39	15.69	261
3245	-0.1000	47.92	0.82	0.1400	13.85	26.69	-0.10	8.34	15.89	272
3247	-0.1000	1.87	0.75	0.2400	0.44	122.05	-0.10	9.73	14.10	358

Values of -0.1 are below detection limits of testing procedure.

## Sample Site Test Data for Duchesne County District

### Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
3080	-0.1000	0.42	5.98	-0.10	-0.1000	0.0400	<u>8.32</u>	-0.1000	-0.1000	-0.10	1.3	<u>768</u>
3081	-0.1000	<u>8.98</u>	51.40	-0.10	-0.1000	0.0200	<u>15.77</u>	0.0300	-0.1000	-0.10	<u>6.9</u>	<u>2,290</u>
3082	-0.1000	<u>8.30</u>	48.16	-0.10	-0.1000	-0.1000	<u>15.36</u>	-0.1000	-0.1000	-0.10	<u>7.5</u>	<u>2,150</u>
3083	-0.1000	0.19	5.36	-0.10	-0.1000	-0.1000	<u>4.07</u>	-0.1000	-0.1000	0.23	0.3	431
3084	-0.1000	0.13	6.29	-0.10	-0.1000	0.0400	<u>3.88</u>	-0.1000	-0.1000	-0.10	0.3	426
3085	0.0600	0.11	5.52	-0.10	-0.1000	0.0400	<u>3.47</u>	-0.1000	-0.1000	-0.10	0.2	405
3086	-0.1000	0.13	11.33	1.55	-0.1000	-0.1000	<u>5.02</u>	-0.1000	-0.1000	-0.10	<u>17.5</u>	730
3201	-0.1000	0.13	47.76	-0.10	0.0400	0.1800	<u>6.75</u>	0.0400	-0.1000	-0.10	1.4	<u>966</u>
3203	-0.1000	<u>0.96</u>	50.18	-0.10	0.0300	0.0600	<u>9.07</u>	-0.1000	-0.1000	-0.10	<u>3.3</u>	<u>1,042</u>
3204	-0.1000	<u>1.43</u>	117.43	-0.10	0.0400	0.0400	<u>10.53</u>	-0.1000	-0.1000	-0.10	<u>4.3</u>	<u>1,649</u>
3205	-0.1000	0.31	28.75	-0.10	0.0500	0.0400	<u>8.45</u>	0.1500	-0.1000	-0.10	1.1	<u>1,173</u>
3208	-0.1000	-0.10	11.86	-0.10	0.0400	0.0400	<u>3.53</u>	-0.1000	-0.1000	-0.10	<u>3.1</u>	541
3209	-0.1000	0.07	-0.10	-0.10	0.0300	0.0400	<u>4.42</u>	-0.1000	-0.1000	-0.10	<u>8.1</u>	550
3210	-0.1000	-0.10	-0.10	-0.10	0.0300	0.1900	<u>3.31</u>	0.0200	-0.1000	-0.10	0.1	314
3211	-0.1000	-0.10	-0.10	-0.10	0.0300	0.1300	<u>4.46</u>	-0.1000	-0.1000	0.07	0.4	455
3212	-0.1000	-0.10	-0.10	-0.10	0.0300	0.0900	<u>4.26</u>	-0.1000	-0.1000	-0.10	0.4	418
3213	-0.1000	0.22	22.32	-0.10	0.0400	0.0200	<u>8.01</u>	0.0200	-0.1000	-0.10	1.7	<u>1,414</u>
3214	-0.1000	0.09	4.34	-0.10	0.0300	0.0200	<u>5.78</u>	-0.1000	-0.1000	-0.10	0.3	520
3215	-0.1000	-0.10	-0.10	-0.10	0.0300	-0.1000	<u>4.15</u>	-0.1000	-0.1000	-0.10	0.1	303
3216	-0.1000	0.11	-0.10	-0.10	0.0300	0.0900	<u>4.67</u>	-0.1000	-0.1000	-0.10	<u>6.8</u>	345
3236	-0.1000	0.15	14.84	-0.10	0.0300	0.0600	<u>7.19</u>	-0.1000	-0.1000	-0.10	0.4	<u>770</u>
3237	-0.1000	0.08	-0.10	-0.10	-0.1000	0.0600	<u>3.76</u>	-0.1000	-0.1000	-0.10	0.4	365
3238	-0.1000	0.10	7.60	-0.10	-0.1000	0.0300	<u>8.05</u>	0.0200	-0.1000	-0.10	0.4	<u>760</u>
3239	-0.1000	-0.10	6.17	-0.10	-0.1000	0.0200	<u>4.69</u>	<u>0.3500</u>	-0.1000	-0.10	0.3	366
3240	-0.1000	-0.10	9.64	-0.10	0.0200	-0.1000	<u>4.84</u>	-0.1000	-0.1000	-0.10	0.3	438
3241	-0.1000	-0.10	10.80	-0.10	-0.1000	0.1700	<u>5.25</u>	-0.1000	-0.1000	-0.10	0.3	440
3242	-0.1000	0.08	5.76	-0.10	0.0300	0.0200	<u>8.07</u>	-0.1000	-0.1000	-0.10	0.2	648
3243	-0.1000	-0.10	15.27	-0.10	0.0200	0.0200	<u>3.80</u>	-0.1000	-0.1000	-0.10	0.6	397
3244	-0.1000	-0.10	32.46	1.00	0.0300	-0.1000	<u>4.30</u>	-0.1000	-0.1000	0.09	0.2	435
3245	-0.1000	0.08	4.27	-0.10	0.0400	0.1400	<u>4.96</u>	0.0500	-0.1000	0.04	0.9	454
3247	-0.1000	-0.10	90.03	-0.10	-0.1000	0.0300	<u>6.07</u>	-0.1000	-0.1000	-0.10	<u>20.8</u>	597

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

## Sample Site Test Data for Duchesne County District

### Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
3080	-0.1000	-0.1000	0.42	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	17.28	-0.1000	461	-0.1000	-0.10
3081	-0.1000	-0.1000	<u>8.98</u>	-0.1000	-0.1000	-0.1000	<u>0.0400</u>	-0.1000	-0.1000	<u>263.59</u>	-0.1000	1,374	-0.1000	-0.10
3082	-0.1000	-0.1000	<u>8.30</u>	-0.1000	-0.1000	-0.1000	<u>0.0400</u>	-0.1000	-0.1000	<u>254.75</u>	-0.1000	1,290	-0.1000	-0.10
3083	-0.1000	-0.1000	0.19	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	3.79	-0.1000	259	-0.1000	0.23
3084	-0.1000	-0.1000	0.13	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	4.26	-0.1000	256	0.0400	-0.10
3085	0.0600	-0.1000	0.11	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	8.92	-0.1000	243	0.0200	-0.10
3086	-0.1000	-0.1000	0.13	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	23.57	-0.1000	438	-0.1000	-0.10
3201	-0.1000	-0.1000	0.13	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	57.99	-0.1000	580	-0.1000	-0.10
3203	-0.1000	-0.1000	0.96	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	28.87	-0.1000	625	-0.1000	-0.10
3204	-0.1000	-0.1000	1.43	-0.1000	-0.1000	-0.1000	0.0100	-0.1000	-0.1000	78.33	-0.1000	989	-0.1000	-0.10
3205	-0.1000	-0.1000	0.31	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	82.06	-0.1000	704	-0.1000	-0.10
3208	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	40.62	-0.1000	325	-0.1000	-0.10
3209	-0.1000	-0.1000	0.07	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	26.21	-0.1000	330	-0.1000	-0.10
3210	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	13.08	-0.1000	188	-0.1000	-0.10
3211	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	16.10	-0.1000	273	-0.1000	0.07
3212	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	14.26	-0.1000	251	-0.1000	-0.10
3213	-0.1000	-0.1000	0.22	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	139.22	-0.1000	848	-0.1000	-0.10
3214	-0.1000	-0.1000	0.09	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	6.91	-0.1000	312	-0.1000	-0.10
3215	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	5.33	-0.1000	182	-0.1000	-0.10
3216	-0.1000	-0.1000	0.11	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	13.38	-0.1000	207	-0.1000	-0.10
3236	-0.1000	-0.1000	0.15	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	16.91	-0.1000	462	0.0400	-0.10
3237	-0.1000	-0.1000	0.08	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	17.82	-0.1000	219	-0.1000	-0.10
3238	-0.1000	-0.1000	0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	6.50	-0.1000	456	0.0200	-0.10
3239	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	5.41	-0.1000	220	-0.1000	-0.10
3240	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	6.34	-0.1000	263	-0.1000	-0.10
3241	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	6.43	-0.1000	264	0.0100	-0.10
3242	-0.1000	-0.1000	0.08	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	5.07	-0.1000	389	0.0600	-0.10
3243	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	10.37	-0.1000	238	-0.1000	-0.10
3244	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	6.06	-0.1000	261	-0.1000	0.09
3245	-0.1000	-0.1000	0.08	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	8.89	-0.1000	272	-0.1000	0.04
3247	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	22.84	-0.1000	358	-0.1000	-0.10

Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

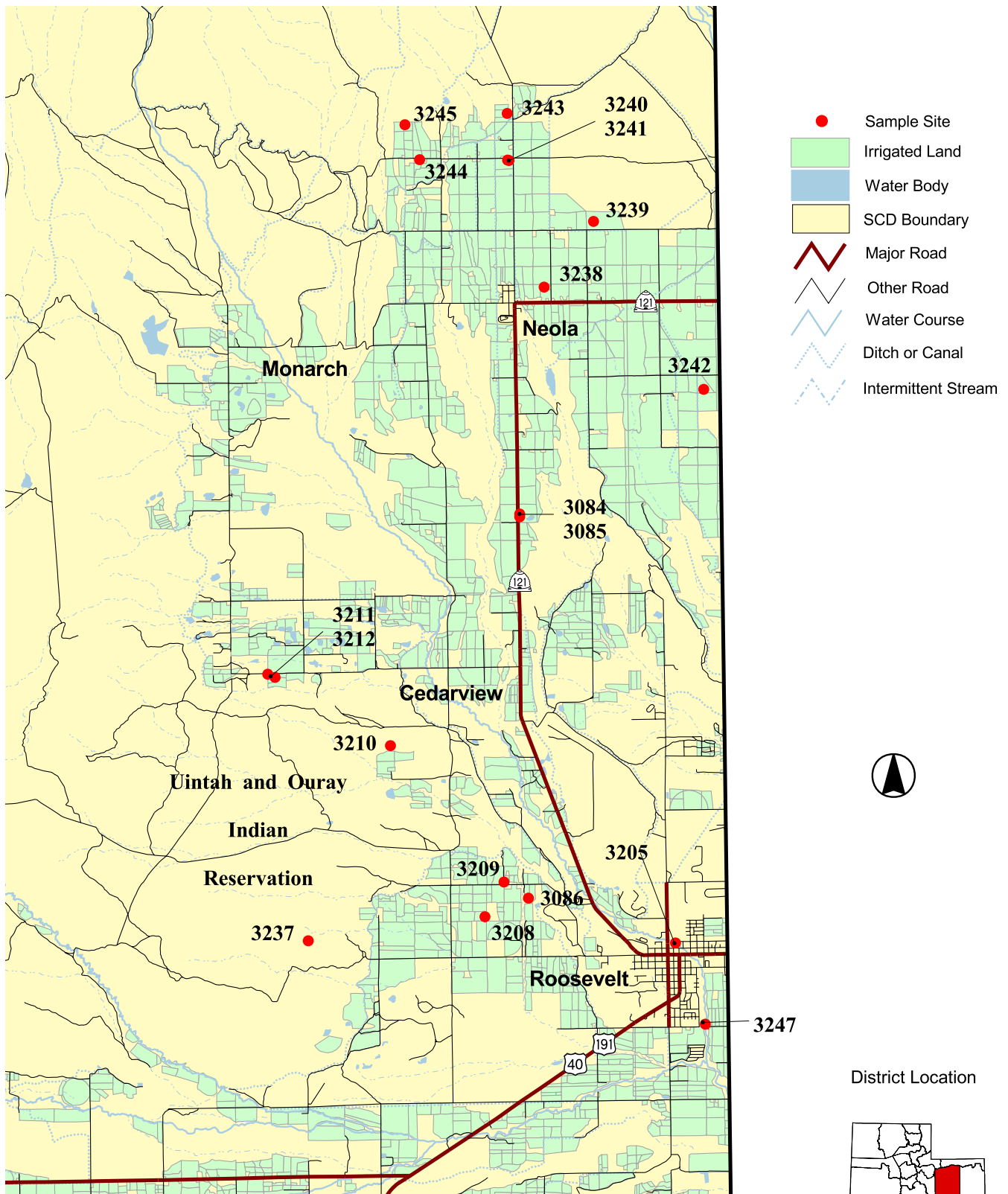
## Sample Site Test Data for Duchesne County District

### Culinary

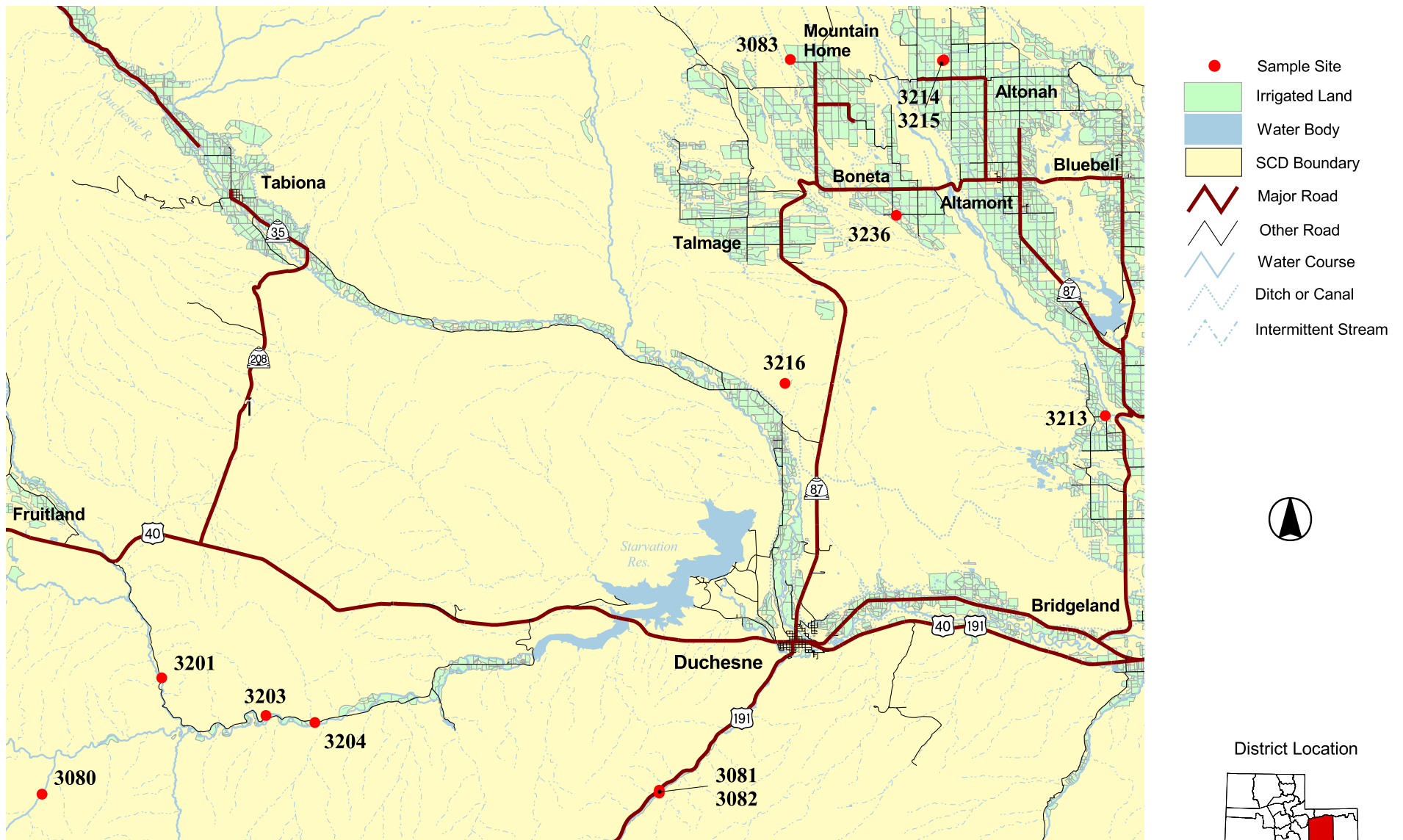
Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
3080	-0.1000	0.0900	-0.1000	-0.1000	-0.1000	0.0400	-0.1000	0.2	-0.1000	17.28	-0.1000	461	-0.10	7.61	0	0	5.7
3081	-0.1000	0.0200	-0.1000	-0.1000	-0.1000	0.0200	0.0300	-0.1	-0.1000	<u>263.59</u>	-0.1000	<u>1,374</u>	-0.10	7.84	1	0	10.9
3082	-0.1000	0.0200	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.9	-0.1000	<u>254.75</u>	-0.1000	<u>1,290</u>	-0.10	7.75	0	0	9.8
3083	-0.1000	0.0700	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.9	-0.1000	3.79	-0.1000	259	0.23	7.61	0	0	4.3
3084	-0.1000	0.3900	-0.1000	-0.1000	-0.1000	0.0400	-0.1000	0.4	-0.1000	4.26	-0.1000	256	-0.10	8.10	0	0	4.1
3085	-0.1000	0.2700	-0.1000	-0.1000	-0.1000	0.0400	-0.1000	0.8	-0.1000	8.92	-0.1000	243	-0.10	8.10	0	0	4.2
3086	-0.1000	0.0300	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.3	-0.1000	23.57	-0.1000	438	-0.10	<u>9.14</u>	0	0	0.3
3201	-0.1000	0.0300	-0.1000	-0.1000	0.0400	0.1800	0.0400	-0.1	-0.1000	57.99	-0.1000	<u>580</u>	-0.10	7.82	0	0	7.1
3203	-0.1000	0.0600	-0.1000	-0.1000	0.0300	0.0600	-0.1000	-0.1	-0.1000	28.87	-0.1000	<u>625</u>	-0.10	7.82	1	0	5.0
3204	-0.1000	0.0400	-0.1000	-0.1000	0.0400	0.0400	-0.1000	-0.1	-0.1000	78.33	-0.1000	<u>989</u>	-0.10	7.90	0	0	7.7
3205	-0.1000	0.0500	-0.1000	-0.1000	0.0500	0.0400	<u>0.1500</u>	-0.1	-0.1000	82.06	-0.1000	<u>704</u>	-0.10	7.90	1	0	9.5
3208	-0.1000	0.0300	-0.1000	-0.1000	0.0400	0.0400	-0.1000	-0.1	-0.1000	40.62	-0.1000	325	-0.10	<u>8.72</u>	0	0	1.7
3209	-0.1000	-0.1000	-0.1000	-0.1000	0.0300	0.0400	-0.1000	-0.1	-0.1000	26.21	-0.1000	330	-0.10	<u>9.15</u>	1	0	0.5
3210	-0.1000	0.0400	-0.1000	-0.1000	0.0300	0.1900	0.0200	-0.1	-0.1000	13.08	-0.1000	188	-0.10	8.44	0	0	2.7
3211	-0.1000	0.0500	-0.1000	-0.1000	0.0300	0.1300	-0.1000	-0.1	-0.1000	16.10	-0.1000	273	0.07	8.06	0	0	3.5
3212	-0.1000	0.0500	-0.1000	-0.1000	0.0300	0.0900	-0.1000	-0.1	-0.1000	14.26	-0.1000	251	-0.10	8.15	0	0	3.4
3213	-0.1000	0.0800	-0.1000	-0.1000	0.0400	0.0200	0.0200	-0.1	-0.1000	<u>139.22</u>	-0.1000	<u>848</u>	-0.10	7.46	1	0	12.5
3214	-0.1000	0.0900	-0.1000	-0.1000	0.0300	0.0200	-0.1000	1.0	-0.1000	6.91	-0.1000	312	-0.10	8.13	0	0	5.4
3215	-0.1000	0.1000	-0.1000	-0.1000	0.0300	-0.1000	-0.1000	-0.1	-0.1000	5.33	-0.1000	182	-0.10	8.22	1	0	3.2
3216	-0.1000	0.0300	-0.1000	-0.1000	0.0300	0.0900	-0.1000	-0.1	-0.1000	13.38	-0.1000	207	-0.10	<u>9.28</u>	0	0	0.4
3236	-0.1000	0.1300	-0.1000	-0.1000	0.0300	0.0600	-0.1000	-0.1	-0.1000	16.91	-0.1000	462	-0.10	8.14	1	0	6.9
3237	-0.1000	0.0300	-0.1000	-0.1000	-0.1000	0.0600	-0.1000	-0.1	-0.1000	17.82	-0.1000	219	-0.10	8.22	0	0	3.5
3238	-0.1000	0.2600	-0.1000	-0.1000	-0.1000	0.0300	0.0200	-0.1	-0.1000	6.50	-0.1000	456	-0.10	8.25	0	0	7.4
3239	-0.1000	0.1400	-0.1000	-0.1000	-0.1000	0.0200	<u>0.3500</u>	3.0	-0.1000	5.41	-0.1000	220	-0.10	8.06	0	0	3.9
3240	-0.1000	0.2700	-0.1000	-0.1000	0.0200	-0.1000	-0.1000	0.9	-0.1000	6.34	-0.1000	263	-0.10	8.11	0	0	4.4
3241	-0.1000	0.3000	-0.1000	-0.1000	-0.1000	0.1700	-0.1000	0.9	-0.1000	6.43	-0.1000	264	-0.10	8.18	1	0	4.5
3242	-0.1000	0.5700	-0.1000	-0.1000	0.0300	0.0200	-0.1000	0.6	-0.1000	5.07	-0.1000	389	-0.10	8.38	1	0	6.7
3243	-0.1000	0.2000	-0.1000	-0.1000	0.0200	0.0200	-0.1000	0.6	-0.1000	10.37	-0.1000	238	-0.10	7.90	0	0	3.3
3244	-0.1000	0.2900	-0.1000	-0.1000	0.0300	-0.1000	-0.1000	-0.1	-0.1000	6.06	-0.1000	261	0.09	8.39	1	0	4.3
3245	-0.1000	0.2100	-0.1000	-0.1000	0.0400	0.1400	0.0500	-0.1	-0.1000	8.89	-0.1000	272	0.04	8.34	0	0	3.6
3247	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.0300	-0.1000	-0.1	-0.1000	22.84	-0.1000	358	-0.10	<u>9.73</u>	1	0	0.1

Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.

**Map 28. Duchesne County District, Eastern Section**



Map 29. Duchesne County District, Western Section



Map Scale 1:261,867 (1 inch = 4.1 miles)

## Uintah County District

### **General:**

Three samples were collected in the Uintah County District. Water in this district varies from soft to moderate-hard with grains per gallon (gpg) ranging from 1.8 to 6.5, with a mean of 4.5. Sampled water temperature ranges from 12.2 °C to 15.1 °C, with a mean of 13.73 °C. The pH for the district ranges from 8.15 to 9.01 with a mean of 8.44.

### **Irrigation:**

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in  $\mu\text{mhos/cm}$ . Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750  $\mu\text{mhos/cm}$ , salt-sensitive plants begin to be affected. When EC exceeds 3,000  $\mu\text{mhos/cm}$ , most plants would be severely injured. Samples 3206 and 3246 have EC values greater than 750  $\mu\text{mhos/cm}$ .

The sodium absorption ratio (SAR) measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 marks the beginning of problems and values greater than 9 indicate severe problems. Sample 3246 has elevated SAR values.

Bicarbonate ( $\text{HCO}_3$ ) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l and severe problems appear when it exceeds 8.5 meq/l. All of the samples collected in this area have high bicarbonate, which is common for water in Utah.

No other elements were found in concentrations harmful to plants.

### **Livestock:**

No livestock standards were exceeded.

### **Culinary:**

Dissolved salts in water are measured in the field as Electrical Conductivity (EC). Culinary standards, however, are designated as Total Dissolved Solids (TDS), calculated from EC. TDS levels of 500 ppm exceed the aesthetic standard for EPA. At this level the water may be off-flavored but it is not a health problem until TDS reaches 2,000 ppm. Sample 3246 exceeded the aesthetic standard.

Sulfate (S) is a soluble form of sulfur that can cause flavor problems in drinking water at concentrations greater than 83 ppm sulfur. Bacteria in the water metabolize sulfur and produce hydrogen sulfide gas (rotten egg gas). The bacteria that produce this compound can live in plumbing fixtures and even hot water heaters. It is not uncommon to get strong odors when the hot water is turned on in areas where there is high sulfate. Generally people cannot tolerate the odor from this gas. Even if the gas is not present, high sulfate concentrations can cause diarrhea in people not used to drinking it. Sample 3246 has high sulfur which exceeds the EPA aesthetic standard of 83 ppm.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil, whereas E. coli, a type of coliform, develops

only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of *E. coli* in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well casing, improper grouting, or lack of a casing. *E. coli* contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables.

Sample 3206 in this district is contaminated with coliform bacteria.



## Sample Site Test Data for Uintah County District

### General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
3206	-0.1000	70.49	8.89	0.7200	39.96	18.01	-0.10	8.17	12.2	476
3207	-0.1000	61.63	0.53	0.5500	25.91	3.85	-0.10	8.15	15.1	320
3246	-0.1000	11.41	4.28	1.0800	20.03	206.76	-0.10	9.01	13.9	784

Values of -0.1 are below detection limits of testing procedure.

### Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
3206	-0.1000	0.13	57.58	-0.10	0.0500	0.0300	<u>6.49</u>	-0.1000	-0.1000	-0.10	0.4	<u>794</u>
3207	-0.1000	0.07	6.43	-0.10	0.0300	-0.1000	<u>5.93</u>	-0.1000	-0.1000	-0.10	0.1	534
3246	-0.1000	0.10	11.27	-0.10	0.0300	-0.1000	<u>4.71</u>	-0.1000	-0.1000	-0.10	<u>8.5</u>	<u>1,307</u>

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

### Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
3206	-0.1000	-0.1000	0.13	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	13.15	-0.1000	476	0.0400	-0.10
3207	-0.1000	-0.1000	0.07	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	5.16	-0.1000	320	0.0400	-0.10
3246	-0.1000	-0.1000	0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	95.13	-0.1000	784	-0.1000	-0.10

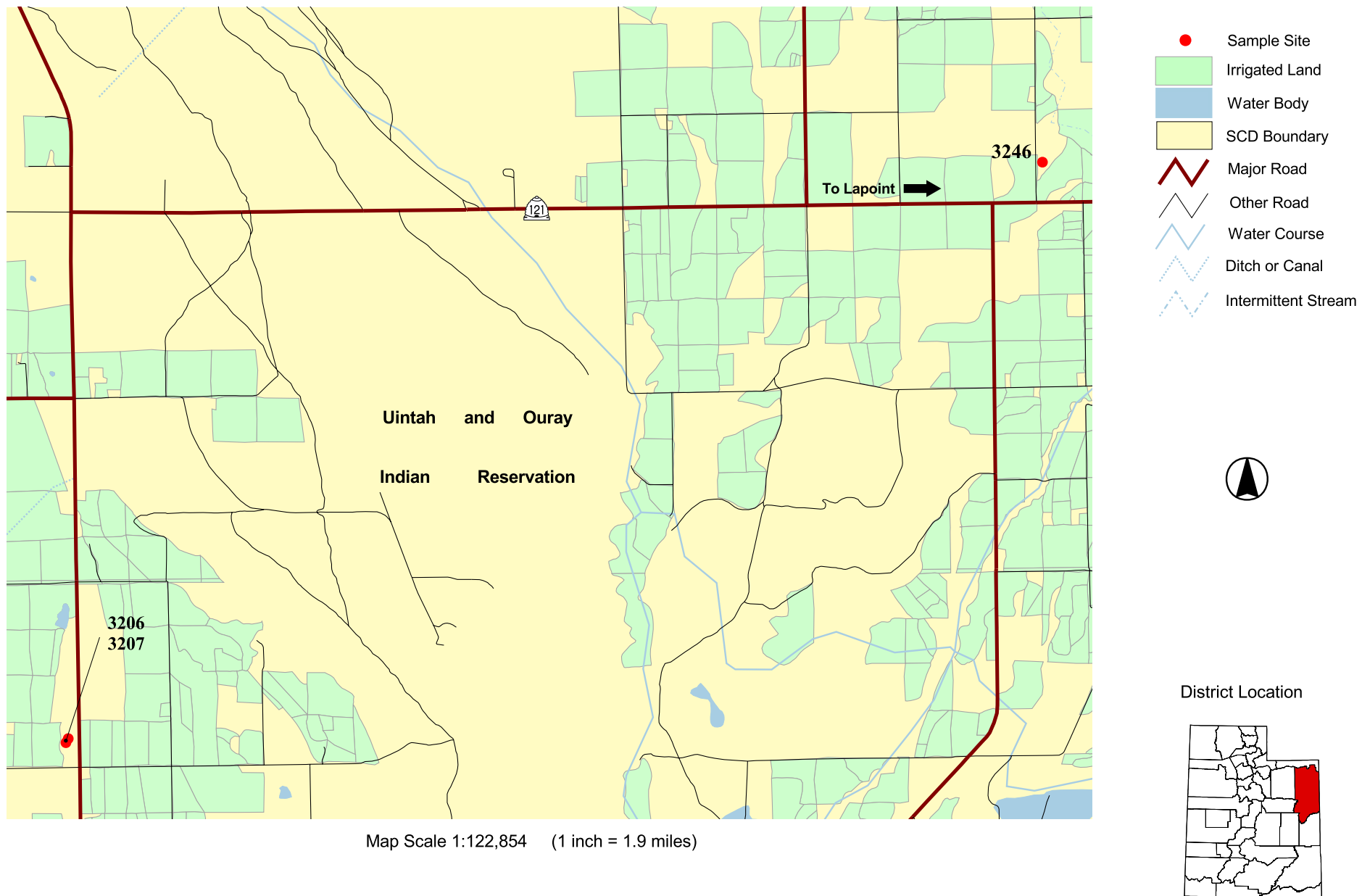
Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

### Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
3206	-0.1000	0.5800	-0.1000	-0.1000	0.0500	0.0300	-0.1000	6.3	-0.1000	13.15	-0.1000	476	-0.10	8.17	<u>1</u>	0	6.5
3207	-0.1000	0.3900	-0.1000	-0.1000	0.0300	-0.1000	-0.1000	0.5	-0.1000	5.16	-0.1000	320	-0.10	8.15	0	0	5.1
3246	-0.1000	0.0200	-0.1000	-0.1000	0.0300	-0.1000	-0.1000	-0.1	-0.1000	<u>95.13</u>	-0.1000	<u>784</u>	-0.10	<u>9.01</u>	0	0	1.8

Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.

Map 30. Uintah County District



## Zone 7

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UACD Zone 7 consists of five districts in four counties: Carbon, Emery, Grand, and San Juan counties.

Eight sites were sampled in three districts of Zone 7 during the spring, summer, and fall of 2003. These include one site in the Grand County District, four sites in the Green River District, and three sites in the Price River Watershed District. A separate narrative report is presented for each district sampled. Each report includes data tables and maps showing approximate locations of sample sites. Each report covers three categories of water quality criteria—irrigation, livestock and culinary. Since water use may overlap among these categories for a single well, analytical results are compared to all three sets of criteria.

### Grand District

#### General:

One sample was collected in the Grand County District. Water in this district is classified as moderate-hard with grains per gallon (gpg) of 4.6 gpg. Sampled water temperature was 19.9 °C. The pH for the sample was 8.68.

#### Irrigation:

Bicarbonate ( $\text{HCO}_3$ ) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l and severe problems appear when it exceeds 8.5 meq/l. Sample 3280 is high in bicarbonate, which is common for water in Utah.

No other elements were found in concentrations harmful to plants.

#### Livestock:

No water quality standards for livestock were exceeded.

#### Culinary:

No drinking water standards were exceeded.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil, whereas *E. coli*, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of *E. coli* in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well casing, improper grouting, or lack of a casing. *E. coli* contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables.

The sample in this district was not contaminated with coliform bacteria or *E. coli* bacteria.

# Sample Site Test Data for Grand County District

## General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
3280	-0.1000	49.62	3.83	0.0800	28.95	69.33	-0.10	8.68	19.9	371

Values of -0.1 are below detection limits of testing procedure.

## Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
3280	-0.1000	-0.10	66.82	-0.10	0.0600	-0.1000	<u>2.98</u>	-0.1000	-0.1000	0.11	1.9	618

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

## Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
3280	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	33.85	-0.1000	371	-0.1000	0.11

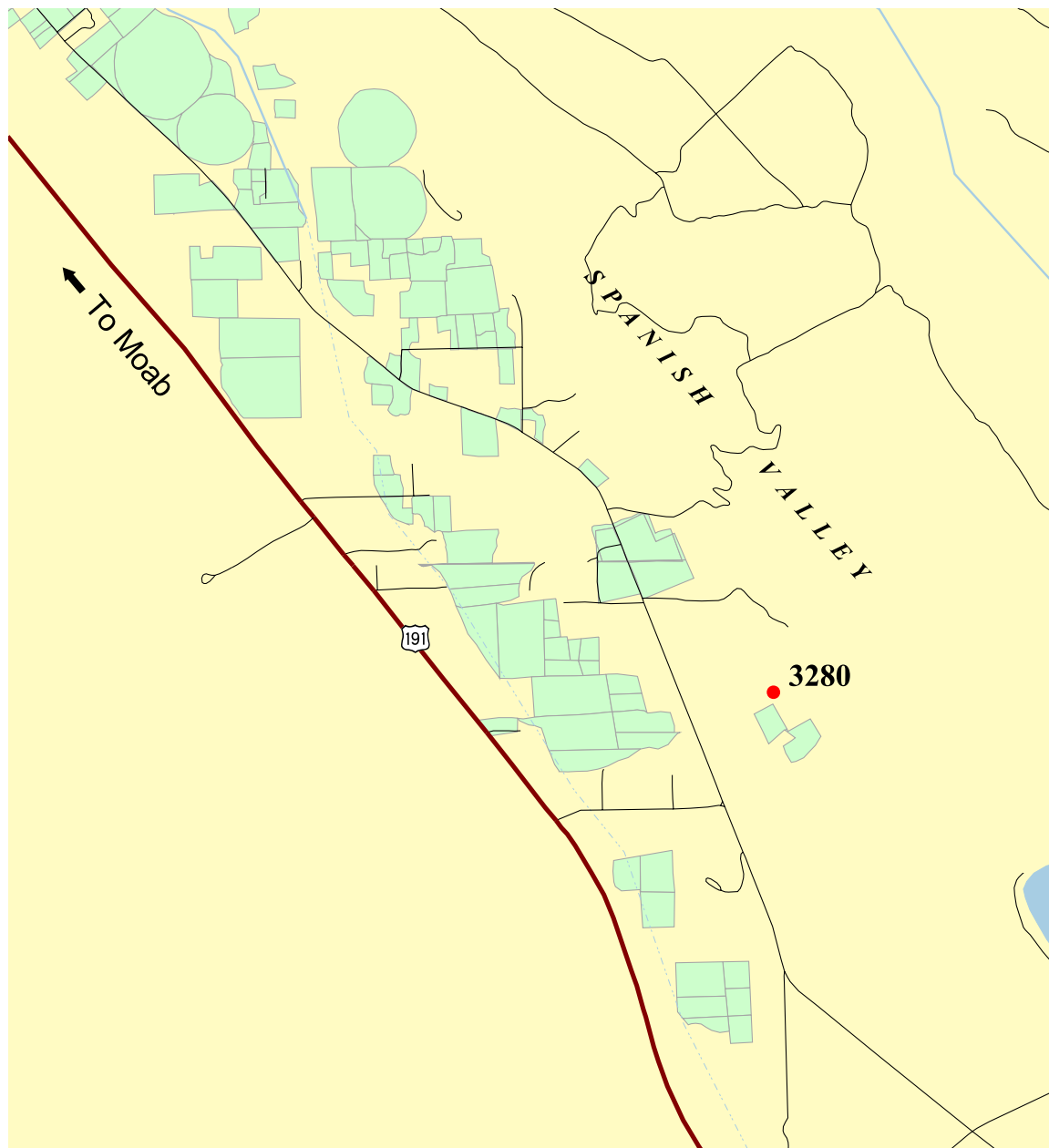
Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

## Culinary










Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
3280	-0.1000	0.0400	-0.1000	-0.1000	0.0600	-0.1000	-0.1000	-0.1	-0.1000	33.85	-0.1000	371	0.11	<u>8.68</u>	0	0	4.6

Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.

## Map 31. Grand County District

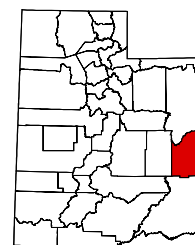


Map Scale 1:38,000 (1 inch = 0.6 miles)

-  Sample Site
-  Irrigated Land
-  Water Body
-  SCD Boundary
-  Major Road
-  Other Road
-  Water Course
-  Ditch or Canal
-  Intermittent Stream



District Location



## **Green River District**

### **General:**

Four samples were collected in the Green River District. Water in this district varies from hard to very hard with grains per gallon (gpg) ranging from 8.0 to 38.4 gpg with a mean of 21.80 gpg. Sampled water temperature ranges from 16.4 °C to 18.0 °C, with a mean of 17.47 °C. The pH for the district ranges from 7.94 to 8.44 with a mean of 8.06.

### **Irrigation:**

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in  $\mu\text{mhos/cm}$ . Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750  $\mu\text{mhos/cm}$ , salt-sensitive plants begin to be affected. When EC exceeds 3,000  $\mu\text{mhos/cm}$ , most plants would be severely injured. All samples have EC values greater than 750  $\mu\text{mhos/cm}$ .

SAR measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 marks the beginning of problems and values greater than 9 indicate severe problems. Sample 3279 exceeded the SAR standard.

Bicarbonate ( $\text{HCO}_3$ ) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l and severe problems appear when it exceeds 8.5 meq/l. All of the samples have high bicarbonate, which is common for water in Utah.

Manganese (Mn) above 0.2 ppm can injure plants and cause reduction in dry matter production. Excess manganese interferes with the plant's ability to use other nutrients such as calcium (Ca). Samples 3277 and 3278 have elevated manganese.

No other elements were found in concentrations harmful to plants.

### **Livestock:**

Sulfur (S) in the form of sulfate can cause water to be off flavored and causes diarrhea in animals not used to drinking it. Problems start when the sulfur level in water exceeds 167 ppm. Samples 3276, 3277, and 3278 have sulfur concentrations which exceed the livestock standard for sulfur. Samples 3277 and 3278 have very high sulfur concentrations, and should not be used for livestock.

No other livestock water quality standards were exceeded.

### **Culinary:**

Dissolved salts in water are measured in the field as Electrical Conductivity (EC). Culinary standards, however, are designated as Total Dissolved Solids (TDS), calculated from EC. TDS for all samples exceed the EPA aesthetic standard of 500 ppm. At this level the water may be off-flavored, but it is not a health problem until TDS reaches 2,000 ppm.

EPA has set an aesthetic standard of 0.05 ppm for manganese (Mn). Water with high concentrations may cause discoloration of plumbing fixtures and have poor flavor. All samples also have high manganese concentrations.

Sulfate is a soluble form of sulfur that can cause flavor problems in drinking water if there is more than 83 ppm sulfur (S). Bacteria in the water use sulfur and produce hydrogen sulfide gas (rotten egg gas). The bacteria that produce this compound can live in plumbing fixtures and even hot water heaters. It is not uncommon to get strong odors when the hot water is turned on in areas where there is high sulfate. Generally people cannot tolerate the odor from this gas. Even if the gas is not present high sulfate concentrations can cause diarrhea in people not used to drinking it. All samples have high sulfur.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil, whereas *E. coli*, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of *E. coli* in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well casing, improper grouting, or lack of a casing. *E. coli* contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables.

Sample 3278 is contaminated with coliform bacteria, and tested positive for *E. coli* bacteria which is a coliform. This water should not be used for drinking until the source of contamination is identified and corrected.

# Sample Site Test Data for Green River District

## General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
3276	-0.1000	217.03	3.61	0.3700	76.50	139.71	-0.10	7.94	18.0	991
3277	-0.1000	265.93	4.44	0.3400	139.60	208.39	-0.10	7.90	17.6	1272
3278	-0.1000	469.38	7.22	0.5600	186.50	237.37	-0.10	7.94	16.4	1800
3279	-0.1000	103.77	3.59	0.6000	33.43	175.09	-0.10	8.44	17.9	773

Values of -0.1 are below detection limits of testing procedure.

## Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
3276	-0.1000	0.24	36.99	-0.10	0.0200	0.1700	<u>8.20</u>	0.1000	-0.1000	-0.10	2.1	<u>1,651</u>
3277	-0.1000	0.34	47.44	-0.10	-0.1000	0.0600	<u>8.38</u>	<u>0.7800</u>	-0.1000	-0.10	2.6	<u>2,120</u>
3278	-0.1000	0.52	71.08	-0.10	-0.1000	0.0700	<u>7.31</u>	<u>1.7500</u>	-0.1000	-0.10	2.3	<u>3,000</u>
3279	-0.1000	0.17	142.80	-0.10	0.0200	-0.1000	<u>3.49</u>	0.1700	-0.1000	-0.10	<u>3.8</u>	<u>1,288</u>

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

## Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
3276	-0.1000	-0.1000	0.24	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	<u>169.16</u>	-0.1000	991	-0.1000	-0.10
3277	-0.1000	-0.1000	0.34	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	<u>352.98</u>	-0.1000	1,272	-0.1000	-0.10
3278	-0.1000	-0.1000	0.52	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	<u>671.07</u>	-0.1000	1,800	-0.1000	-0.10
3279	-0.1000	-0.1000	0.17	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	103.60	-0.1000	773	-0.1000	-0.10

Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

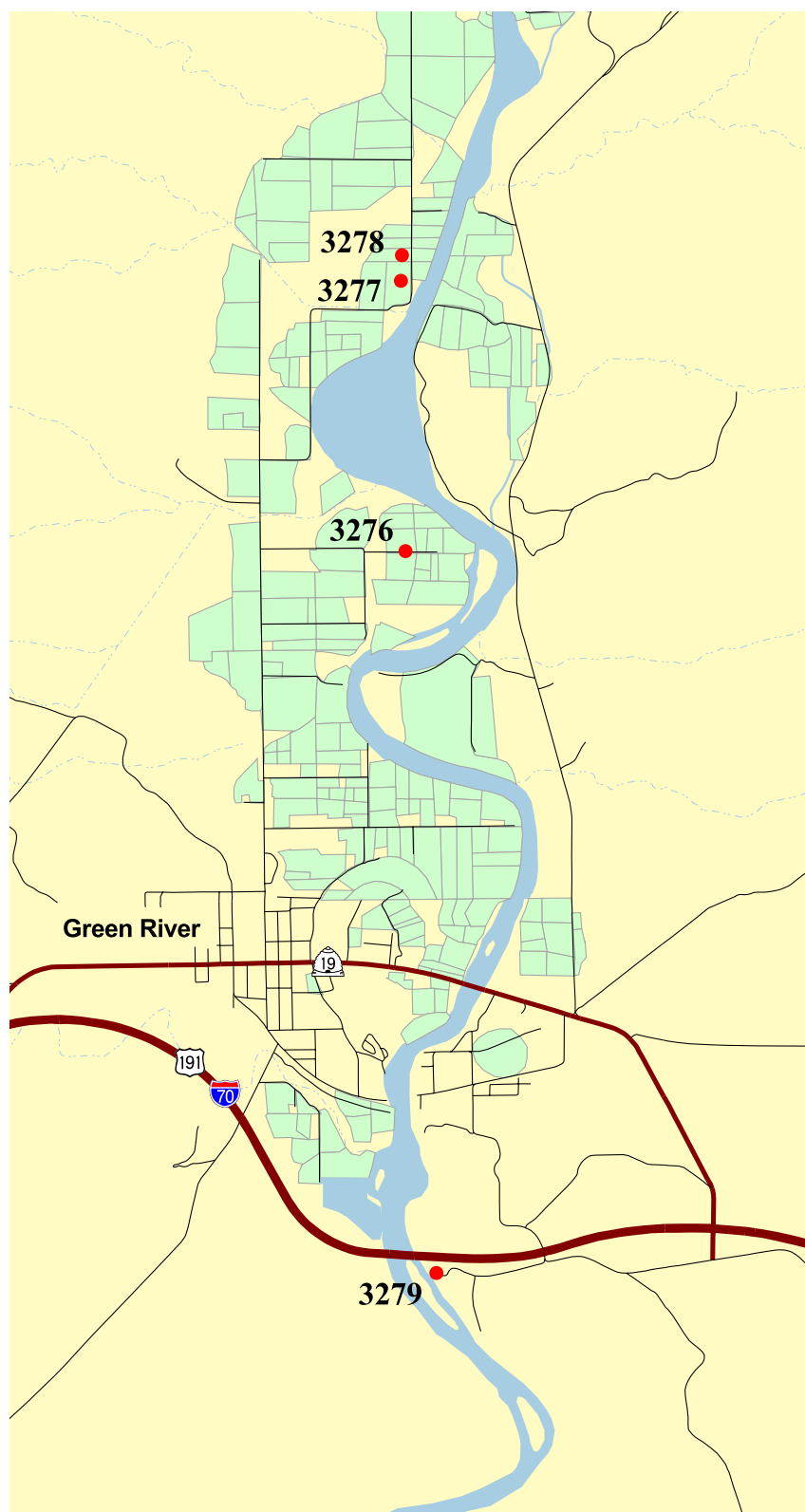
## Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
3276	-0.1000	0.0200	-0.1000	-0.1000	0.0200	0.1700	<u>0.1000</u>	-0.1	-0.1000	<u>169.16</u>	-0.1000	<u>991</u>	-0.10	7.94	0	0	17.2
3277	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.0600	<u>0.7800</u>	-0.1	-0.1000	<u>352.98</u>	-0.1000	<u>1,272</u>	-0.10	7.90	0	0	23.7
3278	-0.1000	0.0200	-0.1000	-0.1000	-0.1000	0.0700	<u>1.7500</u>	-0.1	-0.1000	<u>671.07</u>	-0.1000	<u>1,800</u>	-0.10	7.94	<u>1</u>	<u>1</u>	38.4
3279	-0.1000	0.0500	-0.1000	-0.1000	0.0200	-0.1000	<u>0.1700</u>	-0.1	-0.1000	<u>103.60</u>	-0.1000	<u>773</u>	-0.10	8.44	0	0	8.0

Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.



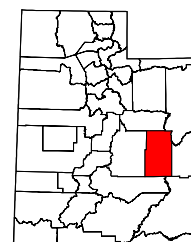
## Map 32. Green River District



- Sample Site
- Irrigated Land
- Water Body
- SCD Boundary
- Major Road
- Other Road
- Water Course
- Ditch or Canal
- Intermittent Stream



District Location



Map Scale 1:57,270 (1 inch = 0.9 miles)

## **Price River District**

### **General:**

Three samples were collected in the Price River Watershed District. Water in this district varies from hard to very hard with grains per gallon (gpg) ranging from 9.4 to 10.0 gpg with a mean of 9.80 gpg. Sampled water temperature ranges from 14.3 °C to 15.0 °C, with a mean of 14.70 °C. The pH for the district ranges from 8.39 to 8.52 with a mean of 8.45.

### **Irrigation:**

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in  $\mu\text{mhos/cm}$ . Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750  $\mu\text{mhos/cm}$ , salt-sensitive plants begin to be affected. When EC exceeds 3,000  $\mu\text{mhos/cm}$ , most plants would be severely injured. All samples have EC values greater than 750  $\mu\text{mhos/cm}$ .

Bicarbonate ( $\text{HCO}_3$ ) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l and severe problems appear when it exceeds 8.5 meq/l. All of the samples have high bicarbonate, which is common for water in Utah. Sample 3301 exceeds the 8.5 level and can cause serious problems.

No other elements were found in concentrations harmful to plants.

### **Livestock:**

No livestock water quality standards were exceeded.

### **Culinary:**

Dissolved salts in water are measured in the field as Electrical Conductivity (EC). Culinary standards, however, are designated as Total Dissolved Solids (TDS), calculated from EC. TDS for all samples exceed the EPA aesthetic standard of 500 ppm. At this level the water may be off-flavored, but it is not a health problem until TDS reaches 2,000 ppm.

Sulfate (S) is a soluble form of sulfur that can cause flavor problems in drinking water if there is more than 83 ppm sulfur. Bacteria in the water use sulfur and produce hydrogen sulfide gas (rotten egg gas). The bacteria that produce this compound can live in plumbing fixtures and even hot water heaters. It is not uncommon to get strong odors when the hot water is turned on in areas where there is high sulfate. Generally people cannot tolerate the odor from this gas. Even if the gas is not present high sulfate concentrations can cause diarrhea in people not used to drinking it. All samples have high sulfur.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil, whereas *E. coli*, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of *E. coli* in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well

casing, improper grouting, or lack of a casing. E. coli contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables.

All of the samples from this district are contaminated with coliform bacteria.

## Sample Site Test Date for Price River District

### General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
3301	-0.1000	67.02	2.62	0.0800	101.76	146.63	-0.10	8.44	14.8	924
3302	-0.1000	62.85	2.85	0.0600	98.05	129.83	-0.10	8.52	14.3	892
3303	-0.1000	68.68	2.55	0.0700	102.56	123.33	-0.10	8.39	15.0	887

Values of -0.1 are below detection limits of testing procedure.

### Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
3301	-0.1000	0.20	47.06	-0.10	0.0200	-0.1000	8.78	-0.1000	-0.1000	-0.10	2.6	1,540
3302	-0.1000	0.15	71.30	-0.10	-0.1000	-0.1000	6.22	-0.1000	-0.1000	-0.10	2.4	1,487
3303	-0.1000	0.15	61.61	-0.10	-0.1000	-0.1000	7.89	-0.1000	-0.1000	-0.10	2.2	1,479

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

### Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
3301	-0.1000	-0.1000	0.20	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	155.84	-0.1000	924	-0.1000	-0.10
3302	-0.1000	-0.1000	0.15	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	125.35	-0.1000	892	-0.1000	-0.10
3303	-0.1000	-0.1000	0.15	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	136.01	-0.1000	887	-0.1000	-0.10

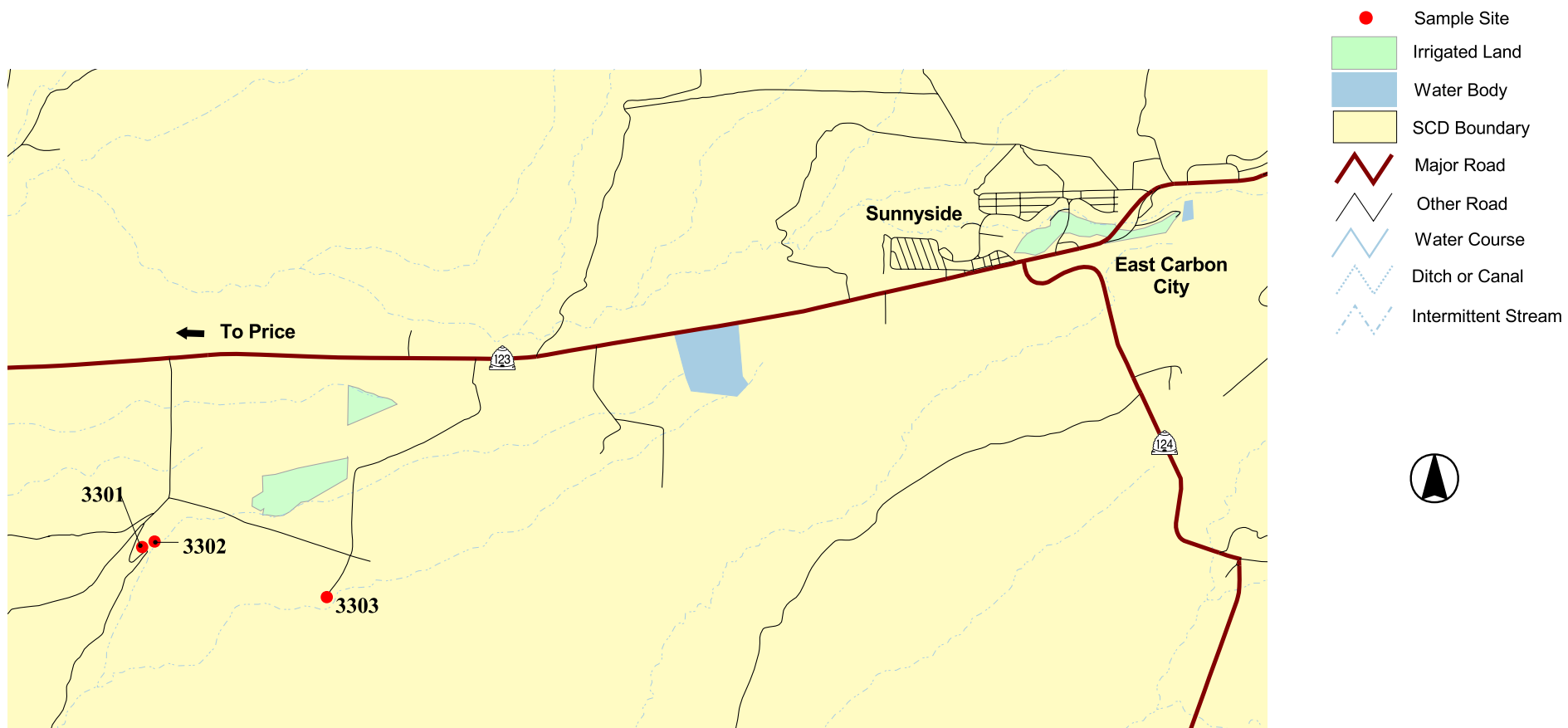
Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

### Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
3301	-0.1000	-0.1000	-0.1000	-0.1000	0.0200	-0.1000	-0.1000	0.9	-0.1000	155.84	-0.1000	924	-0.10	8.44	1	0	9.9
3302	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.1	-0.1000	125.35	-0.1000	892	-0.10	8.52	1	0	9.4
3303	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	2.1	-0.1000	136.01	-0.1000	887	-0.10	8.39	1	0	10.0

Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.

### Map 33. Price River Watershed District



Map Scale 1: 56,888 (1 inch = 0.9 miles)

District Location

