

**MUNICIPAL AND INDUSTRIAL
WATER SUPPLY AND USES
IN THE
KANAB CREEK/VIRGIN RIVER BASIN**

(Data Collected for Calendar Year 2002)

Prepared by

**Utah Department of Natural Resources
Division of Water Resources**

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Dennis Strong, Director

TABLE OF CONTENTS

ACKNOWLEDGMENTS	i
TABLE OF CONTENTS.....	iii
LIST OF FIGURES	v
LIST OF TABLES	vii
EXECUTIVE SUMMARY	ix
INTRODUCTION	1
Authority	1
Scope	1
Data Collection	3
General Description of the Basin	3
WATER SUPPLY AND USE METHODOLOGY.....	7
Background	7
Present Methodology for Community Water Systems	8
Present Methodology for Non-Community Water Systems	15
Present Methodology for Self-Supplied Industrial Water Systems	15
Present Methodology for Private Domestic Water Systems	16
DEFINITIONS OF WATER TERMS.....	17
Water Supply Terms.....	17
Water Use Terms	19
Other Water Terms.....	20
WATER RIGHTS IN THE KANAB CREEK/VIRGIN RIVER BASIN	23
Kanab and Johnson Creek	23
Virgin River.....	23
IRON COUNTY M&I WATER SUPPLIES AND USES	25
KANE COUNTY M&I WATER SUPPLIES AND USES	31
WASHINGTON COUNTY M&I WATER SUPPLIES AND USES	37

TABLE OF CONTENTS (continued)

APPENDIX A - IRON COUNTY DETAILED DESCRIPTION OF PUBLIC
COMMUNITY SYSTEMS..... 45

APPENDIX B - KANE COUNTY DETAILED DESCRIPTION OF PUBLIC
COMMUNITY SYSTEMS..... 49

APPENDIX C - WASHINGTON COUNTY DETAILED DESCRIPTION OF
PUBLIC COMMUNITY SYSTEMS..... 59

APPENDIX D – LA VERKIN WATER USE DATA FORM 97

APPENDIX E – 2002 KCVR DEPLETIONS..... 101

LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
1 Location of Study Area	2
2 Kanab Creek/Virgin River Basin Drainage Map.....	5
3 Location of Public Community Systems	6
4 Water Supply and Use Hydrograph.....	11

LIST OF TABLES

<u>Table</u>	<u>Page</u>
I Kanab Creek/Virgin River Basin Maximum Potable Water Supplies for Public Community Systems.....	ix
II Kanab Creek/Virgin River Basin Reliable Potable Water Supplies for Public Community Systems.....	x
III Kanab Creek/Virgin River Basin Water Use for Public Community Systems.....	xi
IV Kanab Creek/Virgin River Basin Average Per Capita Use.....	xii
V Kanab Creek/Virgin River Basin Total M&I Water Use for all Categories ...	xiii
VI Kanab Creek/Virgin River Basin Water Budget	xiii
1 Iron County Maximum Potable Water Supplies for Public Community Systems.....	25
2 Iron County Reliable Potable Water Supplies for Public Community Systems.....	26
3 Iron County Water Use for Public Community Systems	27
4 Iron County Secondary (Non-Potable) Water Use within Public Community Systems.....	28
5 Iron County Average Per Capita Water Use for Public Community Systems.....	28
6 Iron County Water Use for Public Non-Community Systems, Self-Supplied Industries, and Private Domestic Systems	29
7 Kane County Maximum Potable Water Supplies for Public Community Systems.....	31
8 Kane County Reliable Potable Water Supplies for Public Community Systems.....	32

LIST OF TABLES (continued)

<u>Table</u>	<u>Page</u>
9 Kane County Water Use for Public Community Systems	33
10 Kane County Secondary (Non-Potable) Water Use within Public Community Systems.....	34
11 Kane County Average Per Capita Water Use for Public Community Systems.....	35
12 Kane County Water Use for Public Non-Community Systems, Self-Supplied Industries, and Private Domestic Systems	36
13 Washington County Maximum Potable Water Supplies for Public Community Systems.....	38
14 Washington County Reliable Potable Water Supplies for Public Community Systems.....	39
15 Washington County Contract Amount for Public Community Systems.....	40
16 Washington County Water Use for Public Community Systems.....	41
17 Washington County Secondary (Non-Potable) Water Use within Public Community Systems.....	42
18 Washington County Average per Capita Water Use for Public Community Systems.....	43
19 Washington County Water Use for Public Non-Community Systems, Self-Supplied Industries, and Private Domestic Systems	44

EXECUTIVE SUMMARY

This document describes the municipal and industrial (M&I) water supplies and uses for the Kanab Creek/Virgin River (KCVR) Basin. Data is compiled by meeting with each public community and non-community system in the basin. The basin's total M&I water supply and uses are then tabulated by county. Portions of three counties comprise the KCVR Basin: Iron, Kane and Washington. The results reported herein represent totals for the 2002 calendar year.

The annual maximum potable water supplies for the public community water systems in the basin is 99,510 acre-feet. Of this total, springs account for approximately 6 percent, wells for 64 percent, and surface sources for 30 percent. Table I presents this data.

Table I
KANAB CREEK/VIRGIN RIVER BASIN
Maximum Potable Water Supplies for Public Community Systems
(Acre-Feet/Year)

County	Springs	Wells	Surface	Total
Iron	64.5	136.5	0.0	201.0
Kane	774.3	7,662.4	0.0	8,436.7
Washington	4,737.8	55,636.4	30,498.0	90,872.2
TOTALS	5,576.6	63,435.3	30,498.0	99,509.8

Note: All values represent maximum system source capacities limited by water rights, hydrologic constraints, and/or system constraints.

The basin’s annual reliable potable water supply under present conditions for the public community systems is 67,904 acre-feet. The breakdown of this supply is presented in Table II.

Table II
KANAB CREEK/VIRGIN RIVER BASIN
Reliable Potable Water Supplies for Public Community Systems
(Acre-Feet/Year)

County	Springs	Wells	Surface	Total
Iron	64.5	68.2	0.0	132.7
Kane	774.3	3,831.2	0.0	4,605.5
Washington	4,737.8	27,930.4	30,498.0	63,166.2
TOTALS	5,576.6	31,829.8	30,498.0	67,904.4

Total M&I water use can be divided into two categories: potable (culinary) and non-potable (secondary). Potable water is delivered by, and used within, public community, public non-community, self-supplied industrial, and private domestic systems. Separate irrigation companies typically deliver non-potable (secondary) water for residential, institutional, commercial and industrial uses. Some self-supplied industries utilize both potable and non-potable water from their own sources.

Table III, on the following page, shows water use data for the potable and non-potable categories of water delivered by the public community systems within the basin. Categorically, the total water uses were 21% - residential indoor, 36% - residential outdoor, 25% - commercial, 16% - institutional, and 2% - light industrial/stockwatering.

TABLE III
KANAB CREEK/VIRGIN RIVER BASIN
Water Use for Public Community Systems
(Acre-Feet/Year)

	Iron County	Kane County	Washington County	Total
Potable Use				
Residential Indoor	25.6	503.2	8,626.7	9,155.5
Residential Outdoor	77.5	955.9	11,908.9	12,942.3
Commercial	2.7	244.5	8,911.5	9,158.7
Institutional	8.6	676.8	1,881.0	2,566.4
Industrial/Stockwater	0.0	19.2	507.6	526.8
Total Potable	114.4	2,399.6	31,835.7	34,349.7
Secondary Use				
Residential Outdoor	58.8	472.2	2,093.2	2,624.2
Commercial	0.0	0.0	1,483.4	1,483.4
Institutional	0.0	91.8	4,081.2	4,173.0
Industrial/Stockwater	0.0	0.0	160.8	160.8
Total Secondary	58.8	564.0	7,818.6	8,441.4
TOTALS	173.2	2,963.6	39,654.3	42,791.1

Out of a total basin population of 112,500 in 2002, 112,210 people were served by the public community systems. For these systems, residential potable per capita water use calculates to 176 gallons per capita per day (gpcd). Similarly, non-potable residential water use calculated to 21 gpcd. The resultant total per capita water use is 197 gpcd for residential purposes within the public community systems of the basin. With the addition of commercial, institutional and industrial uses, the per capita water use for public community systems was 273 gpcd for potable uses and 67 gpcd for non-potable uses for a total use of approximately 340 gpcd. In 2003, the statewide average was 267 gpcd. The extremely hot, dry summer months and the long growing season, which greatly increases outside watering requirements, account for most of this above average value. These values are shown in Table IV, on the following page.

TABLE IV
KANAB CREEK/VIRGIN RIVER BASIN
Average Per Capita Use
(Supplied by Public Community Systems)

CATEGORY	Average Per Capita Use (Ac-Ft/Yr)	Average Per Capita Use (GPCD)
Residential Potable Use	0.197	176
Residential Potable Plus Secondary Use	0.220	197
Total Potable Use	0.306	273
Total Potable Plus Secondary Use	0.381	340

Note: Total potable categories include residential, commercial, institutional and industrial uses.

Table V, on the following page, indicates the total potable and non-potable M&I water use for all system types in the KCVR Basin for the year 2002. Public community systems deliver the majority of the potable water within the basin. The table indicates that the total potable M&I water use in 2002 was 34,639 acre-feet. Total non-potable M&I water use in 2002 for the basin was 8,523 acre-feet. Therefore, total M&I water use in 2002, for the KCVR basin, was 43,162 acre-feet.

TABLE V
KANAB CREEK/VIRGIN RIVER BASIN
Total M&I Water Use for all Categories
(Acre-Feet/Year)

	Iron County	Kane County	Washington County	Total
Potable Use				
Public Community Systems	114.4	2,399.6	31,835.7	34,349.7
Public Non-Community Systems	29.7	65.4	13.4	108.5
Self-Supplied Industries	0.0	2.0	95.0	97.0
Private Domestic	9.7	29.5	44.6	83.8
Total Potable	153.8	2,496.5	31,988.7	34,639.0
Secondary Use				
Secondary Irrigation Companies	58.8	564.0	7,818.6	8,441.4
Public Non-Community Systems	0.0	82.0	0.0	82.0
Self-Supplied Industries	0.0	0.0	0.0	0.0
Total Secondary	58.8	646.0	7,818.6	8,523.4
TOTALS	212.6	3,142.5	39,807.3	43,162.4

Table VI includes the “water budget” for Public Community Systems and all M&I uses for the basin. A water budget indicates the amount of water diverted for use within the system and the amount of water depleted from the system due to the use. Appendix E contains a table that indicates more specific details about the diversions and depletions from each individual community system within the basin.

TABLE VI
KANAB CREEK/VIRGIN RIVER BASIN
Water Budget
(Acre-Feet/Year)

	Iron County		Kane County		Washington County		Total	
	Diversions	Depletions	Diversions	Depletions	Diversions	Depletions	Diversions	Depletions
Public Community Systems	173.2	97.8	2,963.6	1,766.6	39,654.3	16,858.9	42,791.1	18,723.4
Municipal & Industrial (M&I)								
Indoor Use	38.6	2.7	914.2	366.5	16,758.8	1,612.5	17,711.7	1,981.7
Outdoor Use	174.0	116.0	2,228.3	1,485.5	23,048.5	15,365.7	25,450.7	16,967.2
Total M&I	212.6	118.7	3,142.5	1,852.0	39,807.3	16,978.2	43,162.4	18,948.8

INTRODUCTION

Authority

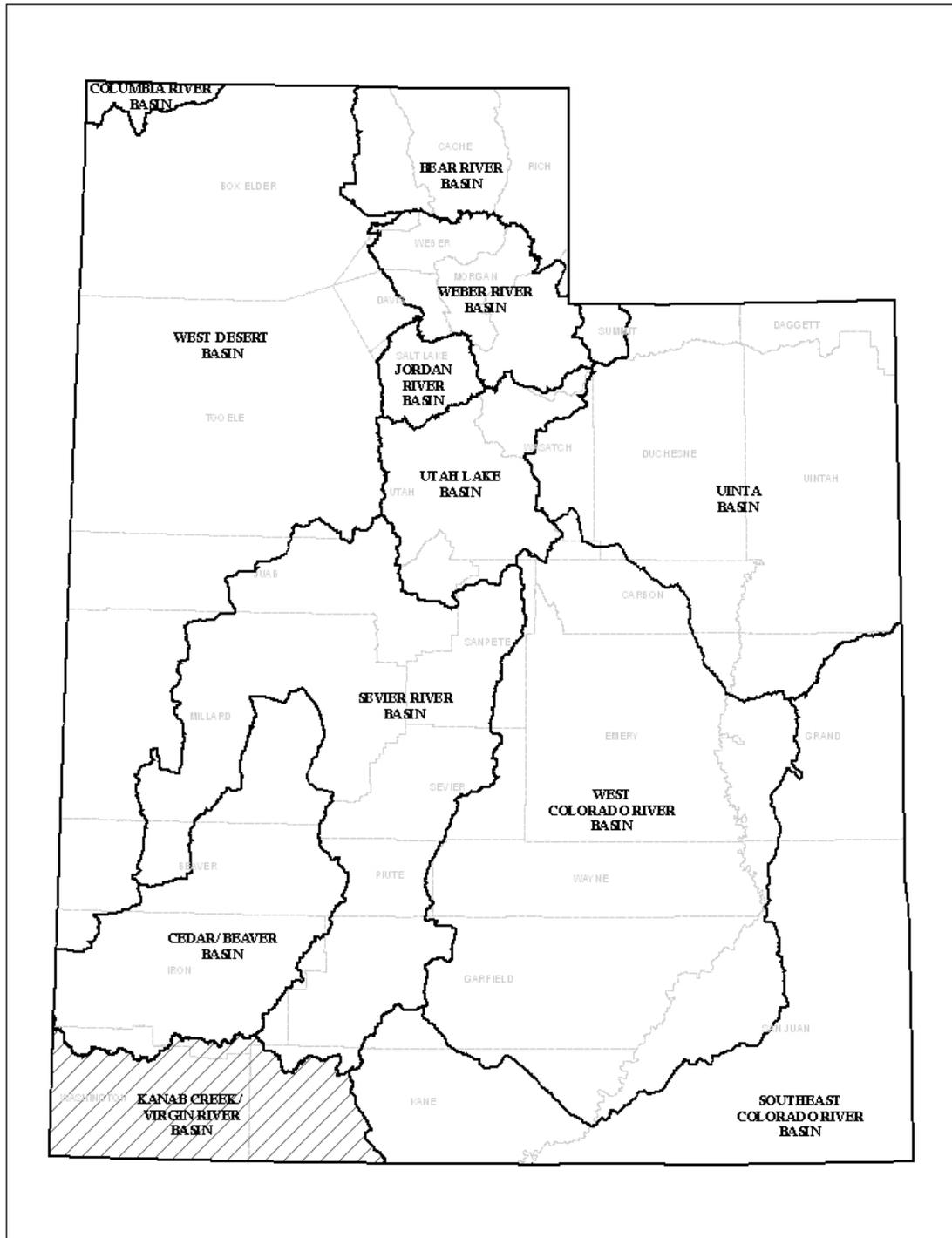
The Utah Division of Water Resources (DWR_e) has the overall responsibility for completing studies, investigations, and plans to assist the responsible development and utilization of the water resources of the state of Utah. The State Water Plan, prepared and distributed in early 1990 by the DWR_e, provided the foundation and overall direction to establish and implement the state policy framework of water management. As part of the state water planning process, the DWR_e prepares detailed plans for each of the 11 hydrologic basins in the state. The Kanab Creek/Virgin River (KCVR) Basin is one of these 11 basins. A location map of the KCVR Basin is shown in Figure 1 on the next page.

Each basin water plan identifies potential conservation and development projects and describes alternatives to efficiently satisfy the water needs of that basin. As part of this effort, background data reports are completed for each river basin. These include a Water-Related Land Use Report and a Municipal & Industrial Water Supply & Use Report.

Scope

As stated earlier, the subject of this M&I report is a determination of present M&I water supplies and uses within this basin. The data presented in this report may be used in the State Water Plan for the KCVR Basin as well as other DWR_e reports and studies. Information considered for this report also includes related investigations recently completed by the DWR_e and the Utah Division of Water Rights (DWR_i).

Figure 1. Location of Kanab Creek/Virgin River Basin



Data Collection

This study was initiated in September 2003. The 2002 *Municipal and Industrial Water Use Forms*, distributed by the DWR_e, in cooperation with the DWR_i and the Utah Division of Drinking Water (DDW), were used as the basis for the study. In all counties, the data collection process is as described in the following section, *Water Supply and Use Methodology*. Water rights discussions presented herein were prepared based on information obtained from the DWR_i.

General Description of the Basin

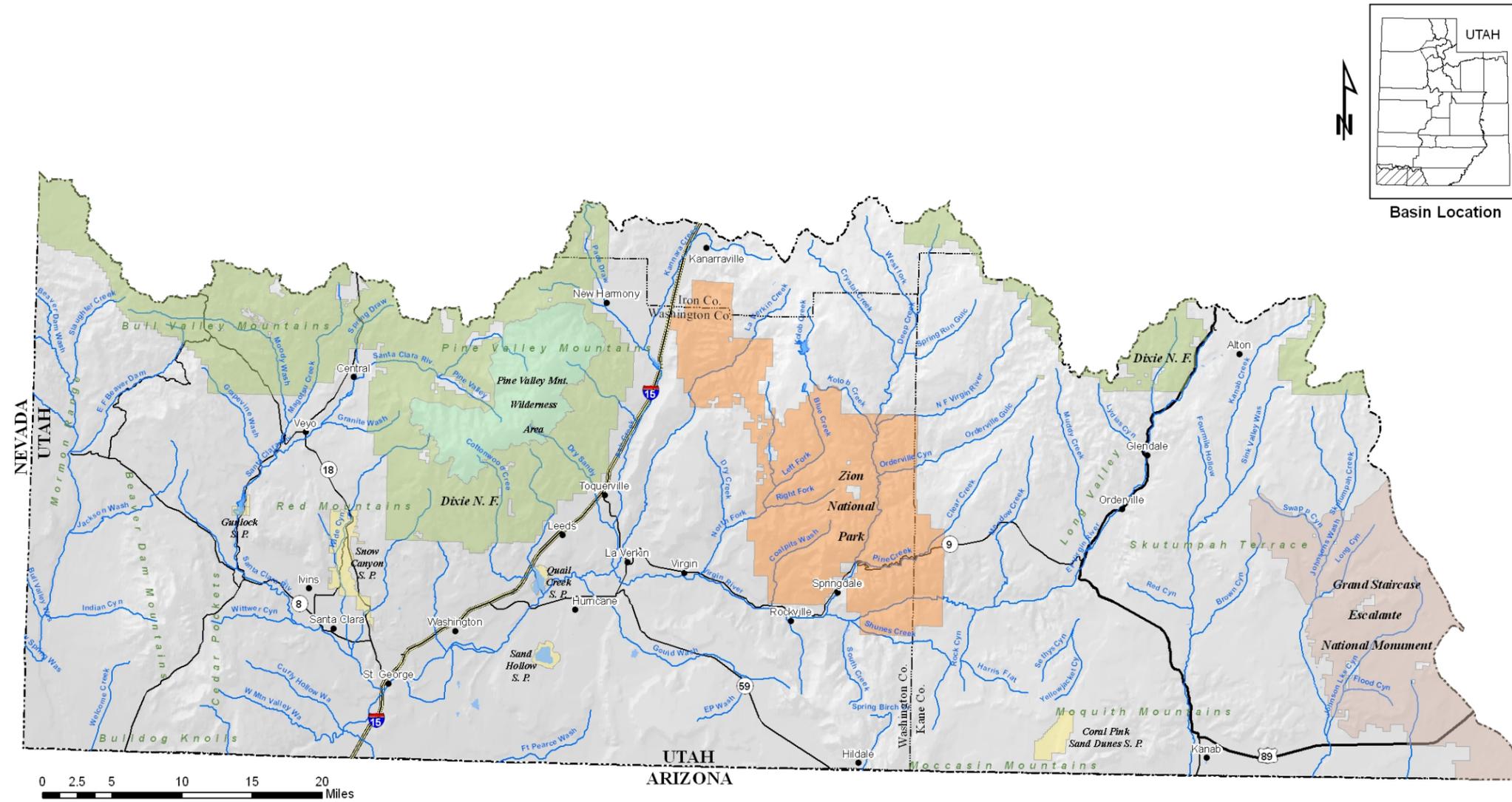
The Utah portion of the KCVR Basin includes approximately 3,500 square miles of land in the southwest corner of the state. Utah's portion of the basin extends from the Utah/Arizona state line on the south to the Bull Valley and Harmony Mountains to the north. On the west, the basin extends from the Utah/Nevada state line east to the divide between Johnson Wash and Kaibab Gulch Tributaries. The basin spans most of Washington County as well as part of Iron and Kane counties. The Virgin and Kanab hydrologic sub-areas form the basin.

Elevations within the basin vary from high points of 10,375 feet at Black Mountain in the Cedar Mountains and 10,365 feet at Signal Peak in the Pine Valley Mountains to lows of 2,297 feet and 2,461 feet where the Beaver Dam Wash and Virgin River, respectively, cross the Utah/Arizona state line. Notable features of the basin include Zion National Park, Snow Canyon and Coral Pink Sand Dunes State Parks and a portion of Grand Staircase-Escalante National Monument. Figure 2, on page 5, is a detailed map of the basin.

The basin has 42 public community water systems (including Fredonia and Colorado City, Arizona). These systems serve 112,210 people (almost all of the 112,500 total basin population). In addition, the basin has 16 public non-community systems. Figure 3, on page 6, shows the location of these systems. These systems serve National Recreation Areas, State Parks, summer home communities, campgrounds, isolated commercial establishments, and roadside rest stops and parks. The basin also has two self-supplied industries.

M&I water use is steadily increasing within the basin as the entire basin is currently experiencing accelerated growth. Tourism, industry and climate drive most of this growth, which is likely to continue well into the future.

Figure 2. Kanab Creek/Virgin River Basin Drainage Map



WATER SUPPLY AND USE METHODOLOGY

Background

Over the past 45 years, the DWRe has employed various procedures to obtain municipal and industrial water use (M&I) data. In recent years, these procedures have become more comprehensive. When the DWRe began water planning in the 1960's, available data consisted mainly of supplies and uses for the state as a whole. At that time, Utah's agricultural water uses far exceeded M&I uses. M&I water use was calculated simply by multiplying estimated per capita water use rates by census population data.

By the early 1980's, M&I diversions made up a larger percent of all statewide water uses and the entire water community increased their focus on M&I water supplies and uses. The DWRe launched a program to collect yearly, statewide M&I data from each public community water system. The procedure involved mailing a survey designed to query major public water suppliers about their sources of water supply. Additionally, the United States Geological Survey (USGS) began M&I water use studies. The DWRe relied on both data sources in its planning efforts by the late 1980's.

With the preparation of the State Water Plan Basin reports, and the increasing focus on water conservation, the DWRe saw the need to verify and improve the quality and quantity of the available data. The first method used included assisting the DWRe in the improvement of their M&I data collection program. Secondly, the DWRe began verifying the accuracy of the data through yearly field surveys described in the following four sections.

Present Methodology for Community Water Systems

Each year, the DWRe targets several hydrologic basins for M&I water supply and use analysis. The most recent water use information supplied by the DWRi is the basis used to begin the study. Prior to 2003, this information was submitted using a standard form by each water supplier. An example of the water use data form for La Verkin is found in Appendix D. Since 2003, the program has been updated, allowing for the water suppliers to electronically submit their data.

The DWRe staff contact the manager or operator of each community water system (as defined by the DDW) to schedule a data collection and analysis meeting.

These meetings are necessary because data often is not reported (either on the water use forms or electronically) in the detail required for a complete M&I water use study. During these meetings, staff clarifies and collects additional data as needed. Total water supply and usage of the water systems are calculated based on information gathered during these meetings. When data is not available, it is necessary to estimate a part or all of the system use.

A secondary objective of these meetings is to instruct the operator or manager on how to most accurately and effectively complete the water use data form and/or submit their information electronically. This methodology has been used since 1992.

Water Supply

Two factors define the potable water supply: maximum water supply available under present conditions and reliable water supply. The maximum water supply available under present conditions is defined as the water resource that is presently developed. It is limited by a mechanical constraint (such as pump capacity or pipe size), a hydrologic constraint (such as reliable stream flow or groundwater safe yield) or a legal constraint (such as a water right or contract). **The lesser amount of water supply, due to these three constraints, is considered to be the maximum water supply available under present conditions used in this analysis.** The determination of well pump capacities, average annual spring flow estimates,

treatment plant capacities, and water right information aid in the calculation of this value. It should be noted that, due to the complexity of water rights, contracts, exchanges, etc., a detailed search of water right limitations associated with each entity is not within the scope of this study.

The reliable potable water supply is defined as the capacity to meet peak day demands, expressed as an annual volume. It is valuable in determining future water supply capacities of the particular community water system sources (wells, springs, etc.). The reliable potable water supply is calculated by adding together the maximum water supply capacity of surface sources, one-half of the maximum yield of wells or their pump capacities (unless otherwise indicated by the system manager), and a percentage of the average annual flow of spring sources. The percentage of the spring source flows ranges between 50% and 100%. The determination of the percentage is based on information obtained concerning the yearly fluctuations of the springs.

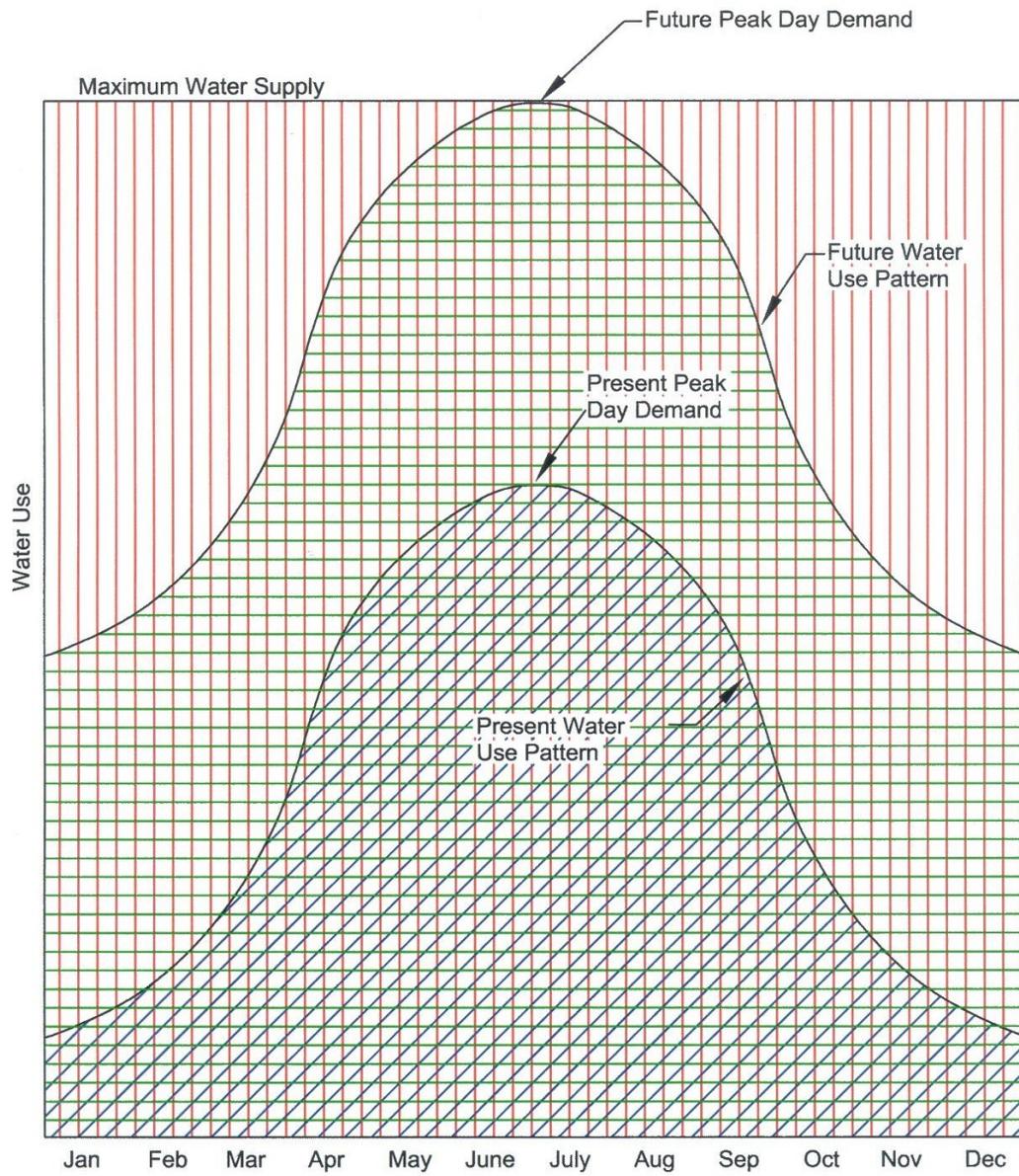
Figure 4, on page 11, graphically presents the relationship between the maximum water supply and the reliable potable water supply of a system. By quantifying the maximum and the reliable potable water supply of a system, the population that a system can potentially support can be determined. The current total yearly water use is the volume under the lower curve (*Present Water Use Pattern*). The future total yearly water use is the volume under the upper curve (*Future Water Use Pattern*). This total is equivalent to the reliable potable water supply.

The maximum water supply under present conditions is the volume under the upper line (*Maximum Water Supply*) in Figure 4. Because this amount is a yearly volume based upon a maximum daily flow rate (limited by the water right or system capacity), the line passes through the peak day demand point on the future water use curve (*Future Peak Day Demand*). Due to this, and the fact that most culinary water system storage tanks are designed to store only about one day's water demand, not all of the total maximum water supply is available to meet future water needs. Therefore, the reliable potable water supply, rather than the maximum water supply,

is the limiting factor in determining when future water demand equals current supplies.

Reliable secondary water supply is defined to be equal to the secondary use determined for each community system. The methodology for calculating secondary use is explained on page 13 under *Residential Use*.

Figure 4. Water Supply and Use Hydrograph



Present Yearly Water Use (Volume under curve)



Present Reliable Water Supply/Future Water Use (Volume under Curve)
When this volume is divided by annual per capita water use, this yields the potential population that can be reliably served.



Maximum Water Supply Available Under Present Conditions (Volume under line)

Water Use

Present water use, as defined herein, is the developed water supply that is actually diverted into the distribution system from surface or subsurface sources. Water use is divided into four categories: residential, commercial, institutional and industrial. For comparative purposes, the DWRe chose these categories to correlate with the USGS categories of domestic, commercial, industrial, and mining.

The DWRe's residential category is equivalent to the USGS domestic category and includes water used for both indoor and outdoor purposes at residences. The USGS commercial category is equivalent to the DWRe's combined commercial and institutional categories. The DWRe's commercial category includes water use for retail establishments and businesses. The DWRe's institutional category includes water use for government facilities, military facilities, schools, hospitals, churches, parks, cemeteries, golf courses, etc. The DWRe's industrial category is equivalent to the combined USGS categories of industrial and mining that includes a wide variety of water uses associated with businesses that produce a specific product (including stockwatering).

Residential Use

The staff collects data about the number of residential connections and the amount of water used by those connections from a water system representative. Water use in this category is divided into three subcategories: culinary-outdoor, culinary-indoor, and secondary-outdoor. While most systems will meter the total culinary residential water use, indoor and outdoor use are rarely metered separately. Secondary water use is rarely metered. Therefore, the DWRe usually estimates these subcategory totals.

Typically, culinary indoor use will be estimated first. One method to estimate the indoor use is to review residential meter reading totals for the system from the winter months, if available. Since outdoor watering typically does not occur during the winter months, it can be assumed that the water used in winter months is for indoor use only. The winter water use is then used to determine the total yearly indoor use.

When the above method does not yield a reasonable value for indoor use, the per capita indoor water use for a system can be estimated by using an equation that was developed in a detailed residential study, "Identifying Residential Water Use", completed by the DWRe in 2001. The mathematical equation that was developed is as follows:

$$\text{GPCD}_{\text{Indoor}} = 90.3 / P_{\text{PH}} + 42.3$$

where:

$\text{GPCD}_{\text{Indoor}}$ = gallons per capita day (per capita indoor water use)

P_{PH} = persons per household (US Census Bureau)

The total yearly indoor water use is then calculated for the system by multiplying the result of the above equation by the current population. Outdoor culinary water use can then be estimated by subtracting the total yearly indoor water use from the given total residential culinary water use.

Because very few entities meter secondary outdoor water use, the DWRe staff estimates the outdoor secondary water use by using the average lot size, percent irrigated, percent of residences that are supplied by separate secondary (pressurized and ditch) irrigation systems, water right-duty rates (volume of water required for turf growth) in the area, and other related information for each system. In determining residential secondary use, care is taken to not include irrigation water use for small pastures or farm fields that can often be found adjacent to residences, particularly in rural communities.

Commercial Use

For most systems, the system operator can separate metered commercial water use data from the total water use. In cases where this data is not available, or is extremely difficult to obtain, the DWRe staff attempts to estimate commercial water use by inventorying commercial businesses in the area and using published commercial water use estimates. The DDW and the Utah State Water Lab, among others, publish these estimates. In some rural communities where there are a relatively small number of commercial connections, the businesses are visited individually by the DWRe staff and asked about their water use.

Some commercial facilities use secondary water to irrigate outside landscapes. This is especially typical for commercial golf courses. Again, it is typical that secondary water is not metered. The DWRe staff estimates this use by multiplying the size of the irrigated area by a water right-duty rate or the evapotranspiration (ET) rate. The ET indicates the amount of water, in inches, necessary for turf growth.

Institutional Use

Institutional water use is water used for city, county, state and federal government facilities, parks, municipal golf courses, schools, hospitals, churches, military facilities, as well as fire hydrant testing and other municipal losses in the water system. Because this water use is often not metered, the process to acquire this data is difficult. The system operator is asked to provide information about city facilities such as the number and size (irrigated acreage) of parks, schools, churches, and municipal golf courses. Water right-duty rates (and/or the ET) are used to calculate the amount of water is used to irrigate these areas. Estimates of leakage and water use for testing of water system facilities and are also included in this category.

Industrial Use

Industrial water use is defined as water used in the production of a product. Therefore, such commercial establishments as dairies, mink farms, and greenhouses, as well as stockwatering, are included in this category, provided a community water system serves them. Industrial water use within community water systems is calculated with the same process used to calculate commercial water use data discussed earlier.

Present Methodology for Non-Community Water Systems

The DWRe staff attempts to contact each non-community system and/or make a personal visit to these systems. Non-community systems rarely meter their water use, so the DWRe staff estimate their annual water use. Questions are asked to determine the type of facility, population served, water source information, irrigation of outside areas, etc. This data, along with information found in water-related publications, is used to determine water use. The maximum and reliable water supplies for these systems are often not available and are not in the scope of this study.

Present Methodology for Self-Supplied Industrial Water Systems

Although self-supplied industries are included in the Non-Community Water Systems category as defined by the DDW, the DWRe has separated them into a separate category due to their importance. The category is equivalent to the DDW's Non-Community, Non-Transient category.

Water use is acquired for self-supplied industries by using data from the DWRi's Industrial Water Use Form and/or electronically submitted data. The DWRi collects annual water use data from most of the major self-supplied industrial water users in the state. This data is confidential. Therefore, the data presented in this M&I study is only presented as county totals. As with other non-community systems, the

maximum and reliable water supplies are often not available and are not in the scope of this study.

Present Methodology for Private Domestic Water Systems

Private domestic systems are residences that are not connected to any public community or non-community water system. They are usually supplied by individual wells. To determine the water use data for this category, the population of those served by private domestic systems is estimated. This population is estimated by subtracting the population served by community water systems from the county population data acquired from the Governor's Office of Planning and Budget (GOPB).

The remainder is assumed to be the population that is served by private domestic systems. The per capita water use rate for this category is assumed to be the same as the rate for the public community system residential category for that county. To determine the total water use by private domestic systems, the estimated population is then multiplied by this rate. Again, the maximum and reliable water supplies for private wells are not in the scope of this study.

DEFINITIONS OF WATER TERMS

Water Supply Terms

Water is supplied by a variety of systems for many users. The general term supply is defined as the amount of water available. Municipalities own most of the individual water supply systems. However, in some cases the owner/operator is a private company or a state or federal agency. Thus, a "public" water supply may be either publicly or privately owned. Also, systems may supply treated or untreated water. Following are definitions of some terms used in this study:

Maximum Potable Water Supply - The annual volume of potable (culinary) water which is the lesser of the hydrologic capacity of the water source, the physical capacity of the water system, or the amount allowed by the collective water rights.

Reliable Potable Water Supply - The annual quantity of the maximum water supply that is available to meet peak demands. This is generally calculated as 100% of the maximum supply from surface water sources, 50% of the maximum yield of wells, and between 50% and 100% of the average annual spring flows. When this number is divided by the average per capita usage, the resulting number represents the theoretical maximum population that the water source can serve.

Municipal and Industrial Water Supply - Includes all water (potable and non-potable) supplied for residential, commercial, institutional, light industry, and self-supplied industries. This supply is delivered by public community systems, public non-community (transient and non-transient) systems, self-supplied industrial systems, unregulated Indian water systems and private wells.

Potable Water Supply – Includes water meeting all applicable safe drinking water requirements for residential, commercial, institutional and industrial uses. It is sometimes referred to as culinary, or municipal, water supply.

Public Community Water Supply - Includes potable and non-potable water supplied by either privately or publicly owned community systems which serve at least 15 service connections or 25 individuals year round. Water from public community supplies may be used for both indoor and outdoor uses for residential, commercial, institutional, and industrial purposes.

Public Non-Community Water Supply - Includes potable and non-potable water supplied by either privately or publicly owned systems of two types: transient and non-transient. Transient systems are systems that do not serve 25 of the same non-resident persons per day for more than six months per year. Examples include campgrounds, RV parks, restaurants, convenience stores, etc. Non-transient systems are systems that regularly serve 25 of the same non-resident persons per day for more than six months per year. Examples include churches, schools and industries. This report lists the industrial non-transient systems as self-supplied industries.

Secondary Water Supply – Includes water not meeting safe drinking water requirements. Sometimes referred to as non-potable (non-culinary) water supply. This water is usually delivered by pressurized or open ditch water supply systems for irrigation of privately and publicly owned landscapes, gardens, parks, cemeteries, golf courses and other open areas. These systems, sometimes called "dual" water systems, are installed to provide an alternative to irrigating with culinary water for these outdoor areas. Irrigation companies often provide this water. However, some public community water systems may deliver this water as well. Self-supplied industries may also use secondary water for industrial processes.

Self-Supplied Industrial Supply - Includes potable and non-potable water supplied by individual privately owned industries (usually from their own wells or springs). This category is the equivalent of the DDW's Non-Community, Non-Transient systems category.

Water Use Terms

Water is used in a variety of ways and for many purposes. It is often said that water is "used" when it is diverted, demanded, withdrawn, depleted or consumed. But it is also "used" in place for such things as fish and wildlife habitat, recreation and hydropower production. **Water use in this report is defined as “diverted” water.** A table that includes the basin’s M&I water depletions is provided in Appendix E.

In most of the previous water supply terms the word “use” can be inserted where the word “supply” is written to define the current demand associated with those definitions. Some additional water use terms are as follows:

Commercial Use - Use normally associated with small business operations that may include drinking water, food preparation, personal sanitation, facility cleaning and maintenance and irrigation of facility landscapes. Examples include retail businesses, restaurants and hotels.

Industrial Use - Use associated with the manufacturing or production of products. The volume of water used by industrial businesses can be considerably greater than water used by commercial businesses. Examples include manufacturing plants, oil and gas producers, mining companies, mink farms and dairies.

Institutional Use - Use normally associated with general operation of various public agencies and institutions (i.e. schools, municipal buildings, churches) including drinking water, personal sanitation, facility cleaning and maintenance and irrigation of parks, cemeteries, playgrounds, recreational areas, golf courses, and other facilities. The amount of water used by cities for outside irrigation of public areas typically is not metered.

Municipal and Industrial (M&I) Use - Use includes all residential, commercial, institutional, and industrial uses. It includes total uses (potable and non-potable) supplied by public water systems (community and non-community), self-supplied industries, private domestic systems, and secondary irrigation companies.

Private Domestic Use – Use includes water from private wells or springs for use in individual homes, usually in rural areas not accessible to public community water systems.

Residential Use - Use associated with residential cooking, drinking water, washing clothes, miscellaneous cleaning, personal grooming and sanitation, irrigation of lawns, gardens and landscapes, and washing automobiles, driveways and other outside residential facilities. Examples include single-family homes, apartments, duplexes and condominiums.

Other Water Terms

Consumption - Water evaporated, transpired or irreversibly bound in either a physical, chemical or biological process. Consumed water results in a loss of the original water supplied.

Consumptive Use - Losses of water brought about by human endeavors when used for residential, commercial, institutional, industrial, agricultural, power generation, and recreation. Naturally occurring vegetation, fish and wildlife also consumptively use water.

Depletion - Water consumed and made unavailable for return to a given designated area, river system or basin. It is intended to represent the net loss to a system. The terms consumption and depletion are often used interchangeably but are not the same. For example, water exported from a basin is depletion from the basin system but is not consumed in the basin. The exported water is available for use (consumption) in another basin or system. Water diverted to irrigate crops in a given system, but not returned for later use, is depletion. Precipitation that falls on irrigated crops is not considered a part of the supply like surface water and groundwater diversions. For this reason, precipitation falling on and consumed by irrigated crops is not considered as being depletion from the system.

Diversion - Water diverted from supply sources such as streams, lakes, reservoirs or groundwater for a variety of purposes, including cropland irrigation, as well as residential, commercial, institutional and industrial uses.

Withdrawal - Water withdrawn from supply sources such as lakes, streams, reservoirs or groundwater. This term is normally used in association with groundwater withdrawal. The terms *diversion* and *withdrawal* are often used interchangeably. **Water use as presented in this report deals with diversions.**

WATER RIGHTS IN THE KANAB CREEK/VIRGIN RIVER BASIN

Although a detailed analysis of water rights is not part of this report, a water supply and use study would not be complete without at least a discussion on the current water right regulations in the area. The following discussion was obtained from the DWRi. It explains the current general water right regulations in the KCVR Basin with regards to M&I uses.

Kanab and Johnson Creek

Surface and ground waters are considered to be fully appropriated at this time. New diversions and uses must be accomplished by change applications filed on owned or acquired existing rights. Changes between surface and underground sources are reviewed to indicate hydrologic connection, that underlying rights are not enlarged or that there is no potential for interference with existing water rights. However, groundwater applications will be reviewed on an individual basis for isolated locations.

Virgin River

Surface and ground waters are considered to be fully appropriated at this time. New diversions and uses must be accomplished by change applications filed on owned or acquired existing rights. Changes between surface and underground sources are reviewed to indicate hydrologic connection, that underlying rights are not enlarged or that there is no potential for interference with existing water rights. However, exceptions for new groundwater appropriations are described below.

The Canaan Gap drainage, east of the Hurricane Cliffs, is still open to small underground appropriations for domestic filings. These filings are limited to the requirements of one family, ¼ acre of irrigation and up to 10 head of livestock.

The Beaver Dam Wash drainage area is open to small underground water appropriations for domestic filings. These filings are limited to the requirements of one family, $\frac{1}{4}$ acre of irrigation and up to 10 head of livestock.

IRON COUNTY M&I WATER SUPPLIES AND USES

The Iron County portion of the KCVR Basin claims Kanarraville as its only incorporated community. Within this portion of the basin, Kanarraville is the only public community system and the Kanarraville state highway rest stop is the only public non-community system. There are no self-supplied industries in this area. The locations of the public community and non-community systems are shown in Figure 3.

As shown in Table 1, the maximum annual potable water supply for public community systems in this portion of Iron County is 201 acre-feet: about 32% from springs and 68% from wells.

**TABLE 1
IRON COUNTY
Maximum Potable Water Supplies for Public Community Systems
(Acre-Feet/Year)**

WATER SUPPLIER	Springs	Wells	Surface	Total
IRON COUNTY				
Kanarraville	64.5	136.5	0.0	201.0
IRON COUNTY TOTALS	64.5	136.5	0.0	201.0

Note: All values represent maximum system source capacities limited by water rights, hydrologic constraints, and/or system constraints.

The reliable potable water supply for public community systems in the Iron County portion of the KCVR Basin is 133 acre-feet. The reliable supply is 66% of the maximum supply. The breakdown of this supply is presented in Table 2 on the following page.

TABLE 2
IRON COUNTY
Reliable Potable Water Supplies for Public Community Systems
(Acre-Feet/Year)

WATER SUPPLIER	Springs	Wells	Surface	Total*
IRON COUNTY				
Kanarraville	64.5	68.2	0.0	132.7
IRON COUNTY TOTALS	64.5	68.2	0.0	132.7

* Wells are limited to 50% of their "maximum" capacity for reliable supply when well/pu capacity is the limiting factor. Springs and surface water supplies are equal to their respective "maximum" capacities.

Table 3, on the following page, shows the breakdown of potable water use for each public community system. This table indicates that for Iron County, the current annual use of 114 acre-feet of water (within the public community systems) is about 86% of the reliable supply.

**TABLE 3
IRON COUNTY
Water Use for Public Community Systems**

WATER SUPPLIER	POTABLE USAGE (Ac-Ft/Yr)						POTABLE PER CAPITA USAGE		
	Residential Indoor Use	Residential Outdoor Use	Commercial Indoor and Outdoor Use	Institutional Indoor and Outdoor Use	Industrial/ Stockwater Indoor and Outdoor Use	Total Potable M & I Use	Population	Average Per Capita Water Use (Ac-Ft/Yr)	Average Per Capita Water Use (GPCPD)
IRON COUNTY									
Kanarraville	25.6	77.5	2.7	8.6	0.0	114.4	320	0.358	319.2
IRON COUNTY TOTALS	25.6	77.5	2.7	8.6	0.0	114.4	320	0.358	319.2
A	B	C	D	E	F	G	H	I	J

A, B, C, D, E, F, H
G=B+C+D+E+F
I=G/H
J=I*892.74

Input data
Potable Water Use
Average per capita water use
Conversion from ac-ft/yr to gpcd

Table 4 presents the amount of secondary water used for various categories within the boundaries of the Kanarraville public community system. A separate irrigation company, Kanarraville Reservoir & Irrigation Company, delivers secondary water to customers. Total secondary water use is 59 acre-feet.

**TABLE 4
IRON COUNTY
Secondary (Non-Potable) Water Use Within Public Community Systems
(Acre-Feet/Year)**

WATER SUPPLIER	Residential Use	Commercial Use	Institutional Use	Industrial/ Stockwater Use	Total Secondary Use
IRON COUNTY					
Kanarraville					
Kanarraville Reservoir and Irrigation Co.	58.8	0.0	0.0	0.0	58.8
IRON COUNTY TOTALS	58.8	0.0	0.0	0.0	58.8

Table 5 presents various per capita rates for the public community system in the Iron County portion of the KCVR Basin.

**TABLE 5
IRON COUNTY
Average Per Capita Water Use
for Public Community Systems**

CATEGORY	Average Per Capita Use (Ac-Ft/Yr)	Average Per Capita Use (GPCD)
Residential Potable Use	0.322	287.6
Residential Potable Plus Secondary Use	0.506	451.7
Total Potable Use	0.358	319.2
Total Potable Plus Secondary Use	0.541	483.2

Note: Total potable categories include residential, commercial, institutional and industrial uses.

Table 6 indicates water use for public non-community and private domestic systems in this portion of the KCVR Basin. Kanarraville state highway rest stop is the only non-community system in this area. There are no self-supplied industries and only a small number of private domestic wells. All of these uses amount to about 39 acre-feet of potable water.

**TABLE 6
IRON COUNTY
Water Use for Public Non-Community Systems,
Self-Supplied Industries and Private Domestic Systems
(Acre-Feet/Year)**

	POTABLE USAGE					Total Secondary Water Use
	Residential Use	Commercial Use	Institutional Use	Industrial/ Stockwater Use	Total Potable Use	
IRON COUNTY						
Non-Community System						
Kanarraville State Highway RS	0.0	0.0	29.7	0.0	29.7	0.0
Self-Supplied Industries						
None	0.0	0.0	0.0	0.0	0.0	0.0
Private Domestic	9.7	0.0	0.0	0.0	9.7	0.0
IRON COUNTY TOTALS	9.7	0.0	29.7	0.0	39.4	0.0

Collectively, the total potable M&I water use from all systems in this portion of the KCVR Basin is about 154 acre-feet, while secondary use is 59 acre-feet; giving a total M&I water use of 213 acre-feet. The data for the public community system in Iron County that is presented in the previous tables is included in Appendix A.

KANE COUNTY M&I WATER SUPPLIES AND USES

The Kane County portion of the KCVR Basin includes the incorporated communities of Alton, Glendale, Orderville and Kanab, as well as Fredonia, Arizona. Fredonia, Arizona is included with this basin because it receives water supplies from Utah. Within this area, there are 7 public community systems, 7 public non-community systems, and one self-supplied industry. The locations of the public community and non-community systems are shown in Figure 3.

As shown in Table 7, the maximum annual potable water supply for public community systems in Kane County is 8,437 acre-feet: about 9% from springs and 91% from wells.

**TABLE 7
KANE COUNTY
Maximum Potable Water Supplies for Public Community Systems
(Acre-Feet/Year)**

WATER SUPPLIER	Springs	Wells	Surface	Total
KANE COUNTY				
Alton	33.9	0.0	0.0	33.9
East Kanab Water Co.	0.0	333.9	0.0	333.9
Glendale	104.8	29.8	0.0	134.6
Kanab	193.6	5,903.6	0.0	6,097.2
Kane County WCD (Johnson Canyon)	0.0	192.6	0.0	192.6
Orderville	79.1	768.1	0.0	847.2
Fredonia (AZ)	362.9	434.4	0.0	797.3
KANE COUNTY TOTALS	774.3	7,662.4	0.0	8,436.7

Note: All values represent maximum system source capacities limited by water rights, hydrologic constraints, and/or system constraints.

The reliable potable water supply for public community systems in the Kane County portion of the KCVR Basin is 4,606 acre-feet. The reliable supply is 55% of the maximum supply. The breakdown of this supply is presented in Table 8.

**TABLE 8
KANE COUNTY
Reliable Potable Water Supplies for Public Community Systems
(Acre-Feet/Year)**

WATER SUPPLIER	Springs	Wells	Surface	Total*
KANE COUNTY				
Alton	33.9	0.0	0.0	33.9
East Kanab Water Co.	0.0	167.0	0.0	167.0
Glendale	104.8	14.9	0.0	119.7
Kanab	193.6	2,951.8	0.0	3,145.4
Kane County WCD (Johnson Canyon)	0.0	96.3	0.0	96.3
Orderville	79.1	384.1	0.0	463.2
Fredonia (AZ)	362.9	217.2	0.0	580.1
KANE COUNTY TOTALS	774.3	3,831.2	0.0	4,605.5

* Wells are limited to 50% of their "maximum" capacity for reliable supply when well/pump capacity is the limiting factor. Springs and surface water supplies are equal to their respective "maximum" capacities.

Table 9, on the following page, presents the breakdown of the potable water use for each public community system. These tables indicate that the current annual potable use of 2,400 acre-feet of water is about 52% of the reliable potable water supply of water in Kane County.

**TABLE 9
KANE COUNTY
Water Use for Public Community Systems**

WATER SUPPLIER	POTABLE USAGE (Ac-Ft/Yr)						POTABLE PER CAPITA USAGE		
	Residential Indoor Use	Residential Outdoor Use	Commercial Indoor and Outdoor Use	Institutional Indoor and Outdoor Use	Industrial/ Stockwater Indoor and Outdoor Use	Total Potable M & I Use	Population	Average Per Capita Water Use (Ac-Ft/Yr)	Average Per Capita Water Use (GPCPD)
KANE COUNTY									
Alton	11.9	3.3	0.0	0.3	0.0	15.5	140	0.111	98.8
East Kanab Water Co.	11.1	5.5	0.0	2.5	0.0	19.1	130	0.147	131.2
Glendale	29.8	78.0	1.3	5.2	0.4	114.7	350	0.328	292.6
Kanab	305.6	459.2	196.9	529.2	8.9	1,499.8	3,590	0.418	373.0
Kane County WCD (Johnson Canyon)	6.8	16.8	0.0	1.0	0.0	24.6	80	0.308	274.5
Orderville	51.1	48.2	33.2	92.7	2.0	227.2	600	0.379	338.1
Fredonia (AZ)	86.9	344.9	13.1	45.9	7.9	498.7	1,040	0.480	428.1
KANE COUNTY TOTALS	503.2	955.9	244.5	676.8	19.2	2,399.6	5,930	0.405	361.3
A	B	C	D	E	F	G	H	I	J

A, B, C, D, E, F, H
G=B+C+D+E+F
I=G/H
J=I*892.682

Input data
Potable Water Use
Average per capita water use
Conversion from ac-ft/yr to gpcd

Table 10 presents the annual amount of secondary water used for various categories within the boundaries of the public community systems. In Kane County, within the public community systems, separate irrigation companies deliver secondary water. Total secondary use is estimated to be about 564 acre-feet.

**TABLE 10
KANE COUNTY
Secondary (Non-Potable) Water Use Within Public Community Systems
(Acre-Feet/Year)**

WATER SUPPLIER	Residential Use	Commercial Use	Institutional Use	Industrial/ Stockwater Use	Total Secondary Use
KANE COUNTY					
Alton					
Alton Farmers Association	168.3	0.0	0.8	0.0	169.1
East Kanab Water Co.	0.0	0.0	0.0	0.0	0.0
Glendale					
Glendale Irrigation Co.	84.0	0.0	5.0	0.0	89.0
Kanab					
Kanab Irrigation Co.	132.9	0.0	0.0	0.0	132.9
Johnson Canyon Sub. (KCWCD)	0.0	0.0	0.0	0.0	0.0
Orderville					
Orderville Irrigation Co.	87.0	0.0	86.0	0.0	173.0
Fredonia (AZ)	0.0	0.0	0.0	0.0	0.0
KANE COUNTY TOTALS	472.2	0.0	91.8	0.0	564.0

Various per capita rates for public community systems in the Kane County portion of the KCVR Basin are given in Table 11.

**TABLE 11
KANE COUNTY
Average Per Capita Water Use
for Public Community Systems**

CATEGORY	Average Per Capita Use (Ac-Ft/Yr)	Average Per Capita Use (GPCD)
Residential Potable Use	0.246	219.7
Residential Potable Plus Secondary Use	0.326	290.8
Total Potable Use	0.405	361.3
Total Potable Plus Secondary Use	0.500	446.2

Note: Total potable categories include residential, commercial, institutional and industrial uses.

Table 12, on the following page, indicates annual water use for public non-community systems, self-supplied industries, and private domestic systems in this portion of the KCVR Basin. Coral Pink Sand Dunes State Park is among the 7 listed non-community systems. All of these uses amount to 97 acre-feet of potable water and 82 acre-feet of secondary water.

**TABLE 12
KANE COUNTY
Water Use for Public Non-Community Systems,
Self-Supplied Industries and Private Domestic Systems
(Acre-Feet/Year)**

	POTABLE USAGE					Total Secondary Water Use
	Residential Use	Commercial Use	Institutional Use	Industrial/ Stockwater Use	Total Potable Use	
KANE COUNTY						
Non-Community System						
Best Friends Animal Sanctuary	1.7	18.3	0.0	0.0	20.0	76.0
Bryce-Zion KOA	0.0	2.0	0.0	0.0	2.0	0.0
East Zion SSD	2.2	12.1	0.0	0.7	15.0	0.0
Shingle Creek State Highway Rest Stop	0.0	0.0	5.8	0.0	5.8	0.0
State Park Systems						
Coral Pink Sand Dunes	1.0	0.0	1.6	0.0	2.6	0.0
Zion Frontier Resort (Mukuntupweep)	0.3	7.6	0.0	0.0	7.9	0.0
Zion Mountain Resort	0.0	11.5	0.0	0.6	12.1	6.0
Self-Supplied Industries*	0.0	2.0	0.0	0.0	2.0	0.0
Private Domestic	29.5	0.0	0.0	0.0	29.5	0.0
KANE COUNTY TOTALS	34.7	53.5	7.4	1.3	96.9	82.0

*Milania Financial, Inc.

Collectively, the total potable M&I water use of all systems in this portion of the KCVR Basin is 2,497 acre-feet, while secondary use is 646 acre-feet; giving a total M&I water use of 3,143 acre-feet. The data for each public community system in Kane County that is presented in the previous tables is included in Appendix B.

WASHINGTON COUNTY M&I WATER SUPPLIES AND USES

The Washington County portion of the KCVR Basin includes the incorporated communities of Hildale, Hurricane, Ivins, La Verkin, Leeds, New Harmony, Rockville, Santa Clara, Springdale, St. George, Toquerville, Virgin and Washington, as well as Colorado City, Arizona. Colorado City is included with this basin because it is operated as one combined system with Hildale and receives some water supplies from Utah. Within this area there are 34 public community systems, 8 public non-community systems, and 1 self-supplied industry. Washington County Water Conservancy District wholesales water to Hurricane, Ivins, Kayenta, La Verkin, St. George, Toquerville, Virgin and Washington in addition to supplying retail customers in the Sky Ranch Subdivision. St. George City supplies water to Ivins and Santa Clara in addition to the service of retail customers. Locations of public community and non-community systems are shown in Figure 3.

As shown in Table 13, on the following page, the maximum annual potable water supply for public community systems in the KCVR portion of Washington County is 90,872 acre-feet; 5% from springs, 61% from wells, and 34% from surface treatment plants on Quail Creek Reservoir and the Virgin River.

The reliable potable water supply for public community systems in the Washington County portion of the KCVR Basin is 63,166 acre-feet. The reliable supply is 70% of the maximum supply. The breakdown of this supply is indicated in Table 14 on page 39.

TABLE 13
WASHINGTON COUNTY
Maximum Potable Water Supplies for Public Community Systems
(Acre-Feet/Year)

WATER SUPPLIER	Springs	Wells	Surface	Total
WASHINGTON COUNTY				
Angell Springs	80.7	33.5	0.0	114.2
Casa de Oro	0.0	N/A	0.0	0.0
Central	6.1	6.1	0.0	12.2
Dammeron Valley	0.0	852.1	0.0	852.1
Diamond Ranch Academy	0.0	27.5	0.0	27.5
Diamond Valley Acres	0.0	217.7	0.0	217.7
Dixie Deer SSD	0.0	219.3	0.0	219.3
Gunlock SSD	42.5	63.7	0.0	106.2
Harmony Farms Water Users	0.0	142.4	0.0	142.4
Harmony Heights	0.0	84.2	0.0	84.2
Hildale/Colorado City	42.4	2,724.0	0.0	2,766.4
Homespun Village Water Company	0.0	22.4	0.0	22.4
Hurricane	1,859.3	2,419.5	0.0	4,278.8
Ivins	48.4	704.1	0.0	752.5
Kayenta Water Users	0.0	0.0	0.0	0.0
La Verkin	661.3	0.0	0.0	661.3
Leeds Domestic Water Users	79.6	677.5	0.0	757.1
Little Plains	0.0	265.0	0.0	265.0
Mountain Springs Water Co.	0.0	248.0	0.0	248.0
New Harmony Water System	27.9	1,448.0	0.0	1,475.9
Pine Valley Irrigation Co.	90.5	47.0	0.0	137.5
Pine Valley Mt. Farms	0.0	185.2	0.0	185.2
Rockville	31.0	82.4	0.0	113.4
Santa Clara Municipal Water System	96.8	2,547.8	0.0	2,644.6
Silver Reef SSD	18.9	0.0	0.0	18.9
Springdale	204.8	258.0	498.0	960.8
St. George City	304.8	26,885.0	0.0	27,189.8
Toquerville	362.9	0.0	0.0	362.9
Veyo	239.5	81.5	0.0	321.0
Virgin	0.0	0.0	0.0	0.0
Washington County WCD	0.0	11,059.0	30,000.0	41,059.0
Washington Municipal Water System	0.0	3,796.0	0.0	3,796.0
Winchester Hills Water Co.	0.0	473.6	0.0	473.6
Zion Canyon Water System	540.4	66.0	0.0	606.4
WASHINGTON COUNTY TOTALS	4,737.8	55,636.4	30,498.0	90,872.2

Note: All values represent maximum system source capacities limited by water rights, hydrologic constraints, and/or system constraints.

TABLE 14
WASHINGTON COUNTY
Reliable Potable Water Supplies for Public Community Systems
(Acre-Feet/Year)

WATER SUPPLIER	Springs	Wells	Surface	Total (1)
WASHINGTON COUNTY				
Angell Springs	80.7	16.8	0.0	97.5
Casa de Oro (2)	0.0	5.8	0.0	5.8
Central (3)	6.1	3.1	0.0	9.2
Dammeron Valley	0.0	426.1	0.0	426.1
Diamond Ranch Academy	0.0	13.7	0.0	13.7
Diamond Valley Acres	0.0	163.0	0.0	163.0
Dixie Deer SSD	0.0	109.6	0.0	109.6
Gunlock SSD	42.5	31.9	0.0	74.4
Harmony Farms Water Users	0.0	71.2	0.0	71.2
Harmony Heights	0.0	42.1	0.0	42.1
Hildale/Colorado City	42.4	1,362.0	0.0	1,404.4
Homespun Village Water Company	0.0	11.2	0.0	11.2
Hurricane (3)	1,859.3	1,209.8	0.0	3,069.1
Ivins (3)	48.4	352.1	0.0	400.5
Kayenta Water Users (3)	0.0	0.0	0.0	0.0
La Verkin (3)	661.3	0.0	0.0	661.3
Leeds Domestic Water Users	79.6	338.8	0.0	418.4
Little Plains	0.0	132.5	0.0	132.5
Mountain Springs Water Co.	0.0	124.0	0.0	124.0
New Harmony Water System	27.9	724.0	0.0	751.9
Pine Valley Irrigation Co.	90.5	23.5	0.0	114.0
Pine Valley Mt. Farms (2)	0.0	114.6	0.0	114.6
Rockville	31.0	41.2	0.0	72.2
Santa Clara Municipal Water System (4)	96.8	1,273.9	0.0	1,370.7
Silver Reef SSD (5)	18.9	0.0	0.0	18.9
Springdale	204.8	129.0	498.0	831.8
St. George City (6) (3)	304.8	13,442.5	0.0	13,747.3
Toquerville (3)	362.9	0.0	0.0	362.9
Veyo (7)	239.5	40.8	0.0	280.3
Virgin (3)	0.0	0.0	0.0	0.0
Washington County WCD	0.0	5,529.5	30,000.0	35,529.5
Washington Municipal Water System (3)	0.0	1,898.0	0.0	1,898.0
Winchester Hills Water Co. (2)	0.0	267.0	0.0	267.0
Zion Canyon Water System	540.4	33.0	0.0	573.4
WASHINGTON COUNTY TOTALS	4,737.8	27,930.4	30,498.0	63,166.2

- (1) Wells are limited to 50% of their "maximum" capacity for reliable supply when well/pump capacity is the limiting factor. Springs and surface water supplies are equal to their respective "maximum" capacities.
- (2) Reliable water supply considered to be calculated water use.
- (3) Has contract with WCWCD for additional water supply
- (4) Reliable well supply is calculated based on Santa Clara's 24.7% ownership of wells in Snow Canyon Compact yield. However, Santa Clara can purchase more than their 24.7% share when needed.
- (5) Water supplied by Leeds Domestic
- (6) Reliable well supply is calculated based on St. George's 63.3% ownership of wells in Snow Canyon Compact yield. However, St. George has more well water rights available for more supply if needed.

Several public community systems in the Washington County portion of the basin have water supply contracts with either another public community system or a water conservancy district. They receive part or all of their water supply through these contracts. Table 15 indicates which systems have contracts, the system or water conservancy district that supplies the water, and the contract amount for the year 2002.

TABLE 15
WASHINGTON COUNTY
Contract Amounts for Public Community Systems
(Acre-Feet/Year)

Supplier/ Public Community System	2002 Contracts
WASHINGTON COUNTY	
Washington County Water Conservancy District	
Hurricane	2,000.0
Ivins	2,000.0
Kayenta Water Users	491.3
La Verkin	1,000.0
St. George City	10,000.0
Toquerville	500.0
Virgin	1,000.0
Washington Municipal Water System	2,000.0
Pine Valley Mountain Farms	
Veyo	8.4
WASHINGTON COUNTY TOTALS	18,999.7

Table 16, on the following page, presents the breakdown of the potable water use for each public community system. The current annual potable use of 31,836 acre-feet of water is about 50% of the reliable potable water supply of water in Washington County.

**TABLE 16
WASHINGTON COUNTY
Water Use for Public Community Systems**

WATER SUPPLIER	POTABLE USAGE (Ac-Ft/Yr)						POTABLE PER CAPITA USAGE		
	Residential Indoor Use	Residential Outdoor Use	Commercial Indoor and Outdoor Use	Institutional Indoor and Outdoor Use	Industrial/ Stockwater Indoor and Outdoor Use	Total Potable M & I Use	Population	Average Per Capita Water Use (Ac-Ft/Yr)	Average Per Capita Water Use (GPCPD)
WASHINGTON COUNTY									
Angell Springs	21.6	8.4	0.0	0.0	0.8	30.8	230	0.134	119.5
Casa de Oro	4.9	0.9	0.0	0.0	0.0	5.8	60	0.097	86.3
Central	8.1	0.0	0.0	0.0	5.6	13.7	100	0.137	122.3
Dammeron Valley	69.2	158.3	0.0	5.0	0.0	232.5	850	0.274	244.2
Diamond Ranch Academy	7.3	48.0	9.3	0.0	0.2	64.8	90	0.720	642.8
Diamond Valley Acres	81.4	65.1	0.0	15.8	0.0	162.3	1,000	0.162	144.9
Dixie Deer SSD	32.6	57.7	0.3	0.0	0.0	90.6	400	0.227	202.2
Gunlock SSD	10.6	8.8	0.0	3.0	1.8	24.2	130	0.186	166.2
Harmony Farms Water Users	27.7	27.8	4.1	9.1	0.7	69.4	340	0.204	182.2
Harmony Heights	10.6	6.0	0.0	0.0	1.0	17.6	130	0.135	120.9
Hildale/Colorado City	478.4	482.1	152.6	62.9	15.1	1,191.1	5,970	0.200	178.1
Homespun Village Water Company	2.4	0.3	0.0	0.0	0.1	2.8	30	0.093	83.3
Hurricane	754.9	806.4	382.1	268.8	3.1	2,215.3	9,270	0.239	213.3
Ivins	442.2	675.6	72.2	81.8	6.9	1,278.7	5,430	0.235	210.2
Kayenta Water Users	27.7	46.9	2.3	24.9	0.0	101.8	340	0.299	267.3
La Verkin	315.2	136.9	88.0	37.9	3.9	581.9	3,870	0.150	134.2
Leeds Domestic Water Users	53.7	123.1	22.5	8.5	0.0	207.8	660	0.315	281.1
Little Plains	29.3	56.3	0.0	0.5	1.0	87.1	360	0.242	216.0
Mountain Springs Water Co.	24.4	17.2	0.8	0.0	0.0	42.4	300	0.141	126.2
New Harmony Water System	16.3	42.1	0.0	11.2	0.0	69.6	200	0.348	310.7
Pine Valley Irrigation Co.	16.8	9.2	0.6	0.3	0.0	26.9	100	0.269	240.1
Pine Valley Mt. Farms	13.8	100.8	0.0	0.0	0.0	114.6	170	0.674	601.8
Rockville	19.5	17.0	0.0	0.0	6.1	42.6	240	0.178	158.5
Santa Clara Municipal Water System	425.1	869.9	21.5	104.0	5.5	1,426.0	5,220	0.273	243.9
Silver Reef SSD (included in Leeds)	7.3	17.0	0.4	1.0	0.0	25.7	90	0.286	254.9
Springdale	35.9	1.6	93.2	57.0	0.0	187.7	510	0.368	328.6
St. George City	4,519.6	6,136.4	7,239.1	1,023.1	386.1	19,304.3	55,500	0.348	310.5
Toquerville	81.4	105.8	1.0	2.0	0.0	190.2	1,000	0.190	169.8
Veyo	55.4	159.8	36.8	80.0	49.1	381.1	680	0.560	500.3
Virgin	35.8	52.8	5.9	0.5	0.0	95.0	440	0.216	192.8
Washington County WCD (Sky Ranch)	10.6	12.6	3.0	4.3	3.2	33.7	130	0.259	231.4
Washington Municipal Water System	890.1	1,459.4	708.2	43.1	17.4	3,118.2	10,930	0.285	254.7
Winchester Hills Water Co.	86.3	179.8	0.0	0.8	0.0	266.9	1,060	0.252	224.8
Zion National Park	10.6	18.9	67.6	35.5	0.0	132.6	130	1.020	910.6
WASHINGTON COUNTY TOTALS	8,626.7	11,908.9	8,911.5	1,881.0	507.6	31,835.7	105,960	0.300	268.2
A	B	C	D	E	F	G	H	I	J

A, B, C, D, E, F, and H
G = B+C+D+E+F
I = G/H
J = I*892.74

Input data
Potable M&I Water Use
Average per capita water use
Conversion from ac-ft/yr to gpcpd

Table 17 indicates the amount of secondary water used for various categories within the boundaries of the public community systems. In the Washington County portion of the KCVR Basin, various irrigation companies deliver secondary water to most of the systems. Total secondary use is 7,819 acre-feet.

**TABLE 17
WASHINGTON COUNTY
Secondary (Non-Potable) Water Use Within Public Community Systems
(Acre-Feet/Year)**

WATER SUPPLIER	Residential Use (Ac-Ft/Yr)	Commercial Use (Ac-Ft/Yr)	Institutional Use (Ac-Ft/Yr)	Industrial/ Stockwater Use (Ac-Ft/Yr)	Total Secondary Use (Ac-Ft/Yr)
WASHINGTON COUNTY					
Angell Springs					
Hidden Valley Irrigation	0.0	0.0	0.0	0.0	0.0
Casa de Oro	0.0	0.0	0.0	0.0	0.0
Central					
Central Canal & Irrigation Co.	29.0	0.0	0.0	0.0	29.0
Dammeron Valley	0.0	0.0	0.0	0.0	0.0
Diamond Ranch Academy	0.0	0.0	0.0	0.0	0.0
Diamond Valley Acres	0.0	0.0	0.0	0.0	0.0
Dixie Deer SSD	0.0	0.0	0.0	0.0	0.0
Gunlock SSD					
Gunlock Irrigation Co.	13.2	0.0	0.0	1.8	15.0
Harmony Farms Water Users	0.0	0.0	0.0	0.0	0.0
Harmony Heights					
Harmony Heights Sec. Water Assoc.	6.0	0.0	0.0	0.0	6.0
Hildale/Colorado City	74.3	N/A	N/A	N/A	74.3
Homespun Village Water Company	0.0	0.0	0.0	0.0	0.0
Hurricane	327.4	0.0	604.3	159.0	1,090.7
Ivins					
Ivins Irrigation	80.7	0.0	0.0	0.0	80.7
Kayenta Water Users	0.0	0.0	0.0	0.0	0.0
La Verkin					
La Verkin Bench Canal Co.	253.5	0.0	0.0	0.0	253.5
Leeds Domestic Water Users					
Leeds Water Company	76.6	0.0	0.0	0.0	76.6
Little Plains	0.0	0.0	0.0	0.0	0.0
Mountain Springs Water Co.	0.0	0.0	0.0	0.0	0.0
New Harmony Water System	12.6	0.0	0.0	0.0	12.6
Pine Valley Irrigation Co.	52.4	0.0	0.0	0.0	52.4
Pine Valley Mt. Farms	0.0	0.0	0.0	0.0	0.0
Rockville					
Rockville Ditch Co.	54.4	0.0	2.0	0.0	56.4
Santa Clara Municipal Water System	0.0	0.0	0.0	0.0	0.0
Silver Reef SSD (not public)	0.0	0.0	0.0	0.0	0.0
Springdale	82.4	0.0	20.0	0.0	102.4
St. George City					
Bloomington Irrigation Co.	704.0	1,000.0	2,743.0	0.0	4,447.0
Toquerville					
Toquerville Secondary System	166.3	0.0	3.0	0.0	169.3
Veyo					
Veyo Irrigation Company	23.0	0.0	0.0	0.0	23.0
Virgin					
Virgin Canal Company	37.4	0.0	2.0	0.0	39.4
Washington County WCD (Sky Ranch)	0.0	0.0	0.0	0.0	0.0
Washington Municipal Water System	100.0	483.4	696.9	0.0	1,280.3
Winchester Hills Water Co.	0.0	0.0	0.0	0.0	0.0
Zion National Park	0.0	0.0	10.0	0.0	10.0
WASHINGTON COUNTY TOTALS	2,093.2	1,483.4	4,081.2	160.8	7,818.6

Various per capita rates for the public community systems in the Washington County portion of the KCVR Basin are given in Table 18.

**TABLE 18
WASHINGTON COUNTY
Average Per Capita Water Use
for Public Community Systems**

CATEGORY	Average Per Capita Use (Ac-Ft/Yr)	Average Per Capita Use (GPCD)
Residential Potable Use	0.194	173.0
Residential Potable Plus Secondary Use	0.214	190.7
Total Potable Use	0.300	268.2
Total Potable Plus Secondary Use	0.374	334.1

Note: Total potable categories include residential, commercial, institutional and industrial uses.

Table 19, on the following page, indicates water use for public non-community systems, self-supplied industries, and private domestic systems in this portion of the KCVR Basin. Zion National Park is among the 8 listed non-community systems. Some residences use private wells. All of these uses amount to 153 acre-feet of potable water.

TABLE 19
WASHINGTON COUNTY
Water Use for Public Non-Community Systems,
Self-Supplied Industries and Private Domestic Systems
(Acre-Foot/Year)

	POTABLE USAGE					Total Secondary Water Use
	Residential Use	Commercial Use	Institutional Use	Industrial/ Stockwater Use	Total Potable Use	
WASHINGTON COUNTY						
Non-Community Systems						
Home Valley Park Subdivision	0.3	0.0	0.0	0.0	0.3	0.0
Little Creek Travel Center	0.0	2.0	0.0	0.0	2.0	0.0
National Forest Systems						
Juniper Park Campground	0.0	0.0	0.1	0.0	0.1	0.0
National Park Systems						
Zion National Park - Kolob Canyon	0.0	0.0	0.7	0.0	0.7	0.0
Zion National Park - Sinawava Temple	0.0	0.0	3.7	0.0	3.7	0.0
Pine Valley Ranchos (1)	4.5	0.0	0.0	0.0	4.5	0.0
Woodland & Kolob Acres	1.4	0.0	0.0	0.0	1.4	0.0
Zion Panorama Subdivision	0.7	0.0	0.0	0.0	0.7	0.0
Self Supplied Industries						
Staker & Parson Co (Western Rock)	0.0	0.0	0.0	95.0	95.0	0.0
Private Domestic	44.6	0.0	0.0	0.0	44.6	0.0
WASHINGTON COUNTY TOTALS	51.5	2.0	4.5	95.0	153.0	0.0

(1) Incorporated into Pine Valley Irrigation System in 2003.

Collectively, the total potable M&I water use for all systems in Washington County is 31,989 acre-feet. Non-potable use is 7,819 acre-feet. This amounts to a total M&I water use of 39,808 acre-feet for the county. The data for each public community system in Washington County presented in the previous tables is included in Appendix C.

APPENDIX A
IRON COUNTY
PUBLIC COMMUNITY WATER SYSTEMS

Iron County per Capita (gpcd)

$$\text{GPCD}_{\text{Indoor}} = 90.3 / P_{\text{PH}} + 42.3$$

$$P_{\text{PH (Iron)}} = 3.11$$

$$\text{GPCD}_{\text{Indoor}} = (90.3 / 3.11) + 42.3 = \mathbf{71.3 \text{ gpcd}}$$

KANARRAVILLE

Population = 320

Total number of connections = 169

Residential connections = 159

Commercial connections = 6

Institutional connections = 4

Industrial/Stockwater connections = 0

Average number of people per residential connection = 2.01

Average lot size = 0.5 acre

Percent lot irrigated = 60%

Domestic Waste Water = Septic tanks

A. Water Supply

- 1. Source Capacity:** Springs = 64.5 ac-ft/yr
Wells = 725.9 ac-ft/yr
Surface = None
- 2. Water Rights:** Springs & Wells = 201.0 ac-ft/yr
Surface = None
- 3. Maximum Potable Water Supply:** 64.5 ac-ft/yr (Springs) + 136.5 ac-ft/yr (Wells) = 201.0 ac-ft/yr
- 4. Reliable Potable Water Supply:** 64.5 ac-ft/yr (Springs) + 68.2 ac-ft/yr (Wells) = 132.7 ac-ft/yr

B. Primary Water Use

- 1. Residential Indoor:** (320 people)(71.3 gpcd)(365 days/yr)(1 ac-ft/325,851 gal) = 25.6 ac-ft (estimate)
- 2. Residential Outdoor:** Total residential (given) = 111.1 ac-ft. Estimated 8.0 ac-ft reported residential is institutional. Residential outdoor = 111.1 ac-ft (total res.) – 25.6 ac-ft (res. in) – 8.0 ac-ft (inst) = 77.5 ac-ft (estimate)
- 3. Institutional Indoor and Outdoor:** (0.75 acre + 1.0 acre)(4.0 ac-ft/ac) = 7.0 ac-ft + 1.0 ac-ft (dance hall/firehouse indoor – estimate) + 0.6 ac-ft (given) = 8.6 ac-ft (estimate)
- 4. Commercial Indoor and Outdoor:** 2.7 ac-ft (given)
- 5. Industrial/Stockwater Indoor and Outdoor:** None

C. Secondary Water Use

- 1. Residential:** (49 conn)(0.5 ac/conn)(60% irr ac/ac)(4.0 ac-ft/ac) = 58.8 ac-ft (estimate)
- 2. Institutional:** None
- 3. Commercial:** None
- 4. Industrial/Stockwater:** None

APPENDIX B

KANE COUNTY
PUBLIC COMMUNITY WATER SYSTEMS

Kane County per Capita (gpcd)

$$\text{GPCD}_{\text{Indoor}} = 90.3 / P_{\text{PH}} + 42.3$$

$$P_{\text{PH (Kane)}} = 2.67$$

$$\text{GPCD}_{\text{Indoor}} = (90.3 / 2.67) + 42.3 = \mathbf{76.1 \text{ gpcd}}$$

ALTON

Population = 140

Total number of connections = 57

Residential connections = 55

Commercial connections = 0

Institutional connections = 2

Industrial/Stockwater connections = 0

Average number of people per residential connection = 2.55

Average lot size = 1.7 acre

Percent lot irrigated = 45%

Domestic Waste Water = Septic tanks

A. Water Supply

- 1. Source Capacity:** Springs = 33.9 ac-ft/yr
Wells = None
Surface = None
- 2. Water Rights:** Springs = 181.3 ac-ft/yr
Wells = 362.0
Surface = None
- 3. Maximum Potable Water Supply:** 33.9 ac-ft/yr (Springs)
- 4. Reliable Potable Water Supply:** 33.9 ac-ft/yr (Springs)

B. Primary Water Use

- 1. Residential Indoor:** $(140 \text{ people})(76.1 \text{ gpcd})(365 \text{ days})(1 \text{ ac-ft}/325,851 \text{ gal}) = 11.9 \text{ ac-ft}$ (estimate)
- 2. Residential Outdoor:** Total delivered (given) = 15.5 ac-ft. Total residential = 15.5 – 0.3 ac-ft (inst.) = 15.2 ac-ft (estimated); Res. outdoor = 15.2 ac-ft (total res.) – 11.9 = 3.3 ac-ft (estimate)
- 3. Institutional Indoor and Outdoor:** $(11,000 \text{ gal} + 58,000 \text{ gal} + 20,000 \text{ gal})(1 \text{ ac-ft}/325,851 \text{ gal}) = 0.3 \text{ ac-ft}$ (estimate)
- 4. Commercial Indoor and Outdoor:** None
- 5. Industrial/Stockwater Indoor and Outdoor:** None

C. Secondary Water Use

- 1. Residential:** $(55 \text{ conn})(100 \% \text{ use sec})(1.7 \text{ ac}/\text{conn})(45\% \text{ irr ac}/\text{ac})(4.0 \text{ ac-ft}/\text{ac}) = 168.3 \text{ ac-ft}$ (estimate)
- 2. Institutional:** $(0.1 \text{ acre} + 0.1 \text{ acre})(4.0 \text{ ac-ft}/\text{ac}) = 0.8 \text{ ac-ft}$ (estimate)
- 3. Commercial:** None
- 4. Industrial/Stockwater:** None

EAST KANAB WATER COMPANY

Population = 130

Total number of connections = 70

Residential connections = 70

Commercial connections = 0

Institutional connections = 0

Industrial/Stockwater connections = 0

Average number of people per residential connection = 1.86

Average lot size = N/A

Percent lot irrigated = N/A

Domestic Waste Water = Septic tanks

A. Water Supply

- 1. Source Capacity:** Springs = None
Wells = 333.9 ac-ft/yr
Surface = None
- 2. Water Rights:** Springs = None
Wells = 591.3 ac-ft/yr
Surface = None
- 3. Maximum Potable Water Supply:** 333.9 ac-ft/yr (Wells)
- 4. Reliable Potable Water Supply:** 167.0 ac-ft/yr (Wells)

B. Primary Water Use

- 1. Residential Indoor:** $(130 \text{ people})(76.1 \text{ gpcd})(365 \text{ days/yr})(1 \text{ ac-ft}/325,851 \text{ gal}) = 11.1 \text{ ac-ft}$ (estimate)
- 2. Residential Outdoor:** Total delivered (given) = 19.1 ac-ft. Residential outdoor = 19.1 ac-ft (total delivered) – 11.1 ac-ft (res. in) – 2.5 ac-ft (inst.) = 5.5 ac-ft (estimate)
- 3. Institutional Indoor and Outdoor:** $(55 \text{ hydrants})(500 \text{ gallon/min})(10 \text{ min/flush})(3 \text{ flushes/yr})(1 \text{ ac-ft}/325,851 \text{ gal}) = 2.5 \text{ ac-ft}$ (estimate)
- 4. Commercial Indoor and Outdoor:** None
- 5. Industrial/Stockwater Indoor and Outdoor:** None

C. Secondary Water Use

- 1. Residential:** None
- 2. Institutional:** None
- 3. Commercial:** None
- 4. Industrial/Stockwater:** None

FREDONIA, ARIZONA

Population = 1,040

Total number of connections = 749

Residential connections = 659

Commercial connections = 49

Institutional connections = 17

Industrial/Stockwater connections = 24

Average number of people per residential connection = 1.58

Average lot size = N/A

Percent lot irrigated = N/A

Domestic Waste Water = Ponds (10 acres)

A. Water Supply

- 1. Source Capacity:** Springs = 362.9 ac-ft/yr
Wells = 556.5 ac-ft/yr
Surface = None
- 2. Water Rights:** Springs = 473.1 ac-ft/yr
Wells = 434.4 ac-ft/yr
Surface = None
- 3. Maximum Potable Water Supply:** 362.9 ac-ft/yr (Springs) + 434.4 ac-ft/yr (Wells) = 797.3 ac-ft/yr
- 4. Reliable Potable Water Supply:** 362.9 ac-ft/yr (Springs) + 217.2 ac-ft/yr (Wells) = 580.1 ac-ft/yr

B. Primary Water Use

- 1. Residential Indoor:** GPCD (indoor – Coconino Co.) = 90.3/Ppa + 42.3 (Ppa = 2.28 per 2000 Census) = 74.6 gpcd
(1,040 people)(74.6 gpcd)(365 days/yr)(1 ac-ft/325,851 gal) = 86.9 ac-ft (estimate)
- 2. Residential Outdoor:** Total residential = 162.500 MG (total delivered) – 1.382 MG (stockwater) – 1.181 MG (ind.) – 4.276 MG (comm.) – 13.360 MG (inst.) – 1.594 MG (inst.) = 140.707 MG(1 ac-ft/325,851 gal) = 431.8 ac-ft (given). Residential outdoor = 431.8 ac-ft (total res.) – 86.9 ac-ft (res. in) = 344.9 ac-ft (estimate)
- 3. Institutional Indoor and Outdoor:** (13.360 MG – 1.594 MG)(1 ac-ft/325,851 gal) = 45.9 ac-ft (given)
- 4. Commercial Indoor and Outdoor:** (4.276 MG)(1 ac-ft/325,851 gal) = 13.1 ac-ft (given)
- 5. Industrial/Stockwater Indoor and Outdoor:** (1.181 MG + 1.328 MG)(1 ac-ft/325,851 gal) = 7.9 ac-ft (given)

C. Secondary Water Use

- 1. Residential:** None
- 2. Institutional:** None
- 3. Commercial:** None
- 4. Industrial/Stockwater:** None

GLENDALE

Population = 350

Total number of connections = 171

Residential connections = 162

Commercial connections = 3

Institutional connections = 4

Industrial/Stockwater connections = 2

Average number of people per residential connection = 2.16

Average lot size = 0.5 acre (1997 report)

Percent lot irrigated = 50% (1997 report)

Domestic Waste Water = Ponds (10.76 acres – shares with Orderville)

A. Water Supply

- 1. Source Capacity:** Springs = 104.8 ac-ft/yr
Wells = 201.6 ac-ft/yr
Surface = None
- 2. Water Rights:** Springs = 26.1 ac-ft/yr
Wells = 108.6 ac-ft/yr
Surface = None
- 3. Maximum Potable Water Supply:** 104.8 ac-ft/yr (Springs) + 29.8 ac-ft/yr (Wells) = 134.6 ac-ft/yr
- 4. Reliable Potable Water Supply:** 104.8 ac-ft/yr (Springs) + 14.9 ac-ft/yr (Wells) = 119.7 ac-ft/yr

B. Primary Water Use

- 1. Residential Indoor:** (350 people)(76.1 gpcd)(365 days/yr)(1 ac-ft/325,851 gal) = 29.8 ac-ft (estimate)
- 2. Residential Outdoor:** (78 conn)(0.5 ac/conn)(50% irr ac/ac)(4.0 ac-ft/ac) = 78.0 ac-ft (estimate)
- 3. Institutional Indoor and Outdoor:** 5.2 ac-ft (given)
- 4. Commercial Indoor and Outdoor:** 1.3 ac-ft (given)
- 5. Industrial/Stockwater Indoor and Outdoor:** 0.4 ac-ft (given)

C. Secondary Water Use

- 1. Residential:** (84 conn)(0.5 acre/conn)(50% irr ac-ac)(4.0 ac-ft/ac) = 84.0 ac-ft (estimate)
- 2. Institutional:** (0.75 acre + 0.5 acre)(4.0 ac-ft/ac) = 5.0 ac-ft
- 3. Commercial:** None
- 4. Industrial/Stockwater:** None

KANE COUNTY WCD – JOHNSON CANYON

Population = 80

Total number of connections = 50

Residential connections = 50

Commercial connections = 0

Institutional connections = 0

Industrial/Stockwater connections = 0

Average number of people per residential connection = 1.60

Average lot size = N/A

Percent lot irrigated = N/A

Domestic Waste Water = Septic tanks

A. Water Supply

- 1. Source Capacity:** Springs = None
Wells = 688.8 ac-ft/yr
Surface = None
- 2. Water Rights:** Springs = None
Wells = 192.6 ac-ft/yr
Surface = None
- 3. Maximum Potable Water Supply:** 192.6 ac-ft/yr (Wells)
- 4. Reliable Potable Water Supply:** 96.3 ac-ft/yr (Wells)

B. Primary Water Use

- 1. Residential Indoor:** $(80 \text{ people})(76.1 \text{ gpcd})(365 \text{ days})(1 \text{ ac-ft}/325,851 \text{ gal}) = 6.8 \text{ ac-ft}$ (estimate)
- 2. Residential Outdoor:** Total residential use (given) = 23.6 ac-ft. Residential outdoor = $23.6 \text{ ac-ft} - 6.8 \text{ ac-ft} = 16.8 \text{ ac-ft}$ (estimate)
- 3. Institutional Indoor and Outdoor:** 1.0 ac-ft (given)
- 4. Commercial Indoor and Outdoor:** None
- 5. Industrial/Stockwater Indoor and Outdoor:** None

C. Secondary Water Use

- 1. Residential:** None
- 2. Institutional:** None
- 3. Commercial:** None
- 4. Industrial/Stockwater:** None

KANAB

Population = 3,590

Total number of connections = 1,460

Residential connections = 1,246

Commercial connections = 137

Institutional connections = 61

Industrial/Stockwater connections = 16

Average number of people per residential connection = 2.88

Average lot size = 0.3 acre

Percent lot irrigated = 20%

Domestic Waste Water = Ponds (250,000 gallons/month; 102 acres available, 60 acres used)

A. Water Supply

- 1. Source Capacity:** Springs = 193.6 ac-ft/yr
Wells = 5,903.6 ac-ft/yr
Surface = None
- 2. Water Rights:** Springs = 385.9 ac-ft/yr
Wells = 9,140.1 ac-ft/yr
Surface = None
- 3. Maximum Potable Water Supply:** 193.6 ac-ft/yr (Springs) + 5,903.6 ac-ft/yr (Wells) = 6,097.2 ac-ft/yr
- 4. Reliable Potable Water Supply:** 193.6 ac-ft/yr (Springs) + 2,951.8 ac-ft/yr (Wells) = 3,145.4 ac-ft/yr

B. Primary Water Use

- 1. Residential Indoor:** (3,590 people)(76.0 gpcd)(365 days/yr)(1 ac-ft/325,851 gal) = 305.6 ac-ft (estimate)
- 2. Residential Outdoor:** Total residential (given) = (5,317 gal + 97,912 gal + 145,974 gal)(1,000)(1 ac-ft/325,851 gal) = 764.8 ac-ft. Residential outdoor = 764.8 ac-ft (total res.) – 305.6 ac-ft (res. in) = 459.2 ac-ft (estimate)
- 3. Institutional Indoor and Outdoor:** (8,762 gal + 121,473 gal + 3,661 gal + 3,999 gal + 34,650 gal)(1,000)(1 ac-ft/325,851 gal) = 529.2 ac-ft (given)
- 4. Commercial Indoor and Outdoor:** (64,157 gal)(1,000)(1 ac-ft/325,851 gal) = 196.9 ac-ft (given)
- 5. Industrial/Stockwater Indoor and Outdoor:** (1,775 gal + 1,126 gal)(1,000)(1 ac-ft/325,851 gal) = 8.9 ac-ft (given)

C. Secondary Water Use

- 1. Residential:** (1,246 conn)(20% use sec)(1/3 ac/conn)(50 % irr ac/ac)(4.0 ac-ft/ac) = 132.9 ac-ft (estimate)
- 2. Institutional:** None
- 3. Commercial:** None
- 4. Industrial/Stockwater:** None

ORDERVILLE

Population = 600

Total number of connections = N/A

Residential connections = 195 (calculated from 3.07 people/conn – 2000 Census)

Commercial connections = N/A

Institutional connections = N/A

Industrial/Stockwater connections = N/A

Average number of people per residential connection = 3.07 (2000 Census)

Average lot size = 0.5 acre (1997 report)

Percent lot irrigated = 50%

Domestic Waste Water = Ponds (10.76 acres – shares with Glendale)

A. Water Supply

- 1. Source Capacity:** Springs = 103.2 ac-ft/yr
Wells = 806.5 ac-ft/yr
Surface = None
- 2. Water Rights:** Springs = 79.1 ac-ft/yr
Wells = 768.1 ac-ft/yr
Surface = None
- 3. Maximum Potable Water Supply:** 79.1 ac-ft/yr (Springs) + 768.1 ac-ft/yr (Wells) = 847.2 ac-ft/yr
- 4. Reliable Potable Water Supply:** 79.1 ac-ft/yr (Springs) + 384.1 ac-ft/yr (Wells) = 463.2 ac-ft/yr

B. Primary Water Use

- 1. Residential Indoor:** (600 people)(76.1 gpcd)(365 days/yr)(1 ac-ft/325,851 gal) = 51.1 ac-ft (estimate)
- 2. Residential Outdoor:** Total residential delivered (given) = (3,082 gal + 27,982 gal + 61 gal + 1,235 gal)(1,000)(1 ac-ft/325,851 gal) = 99.3 ac-ft. Residential outdoor = 99.3 ac-ft – 51.1 ac-ft = 48.2 ac-ft (estimate)
- 3. Institutional Indoor and Outdoor:**
 - Metered: (13,050 gal)(1,000)(1 ac-ft/325,851 gal) = 40.0 ac-ft (given)
 - Unmetered indoor: estimate 1.0 ac-ft for Visitor Center, Senior Citizen building, and town office (estimate)
 - Unmetered outdoor: (0.25 acre + 1.0 acre + 0.25 acre + 0.25 acre + 3.0 acre + 1.0 acre)(4.0 ac-ft/ac) = 23.0 ac-ft (estimate)
 - Unmetered hydrant flushing: (65 hydrants)(1,200 gpm)(60 min/flush)(2 flushes)(1 ac-ft/325,851 gal) = 28.7 ac-ft (estimate)
 - **Total:** 40.0 ac-ft + 1.0 ac-ft + 23.0 ac-ft + 28.7 ac-ft = 92.7 ac-ft (estimate)
- 4. Commercial Indoor and Outdoor:** (10,807 gal)(1,000)(1 ac-ft/325,851 gal) = 33.2 ac-ft (given)
- 5. Industrial/Stockwater Indoor and Outdoor:** (549 gal + 106 gal)(1,000)(1 ac-ft/325,851 gal) = 2.0 ac-ft (given)

APPENDIX C
WASHINGTON COUNTY
PUBLIC COMMUNITY WATER SYSTEMS

Washington County per Capita (gpcd)

$$\text{GPCD}_{\text{Indoor}} = 90.3 / P_{\text{PH}} + 42.3$$

$$P_{\text{PH (Washington)}} = 2.97$$

$$\text{GPCD}_{\text{Indoor}} = (90.3 / 2.97) + 42.3 = \mathbf{72.7 \text{ gpcd}}$$

ANGELL SPRINGS SSD (became part of Leeds Domestic in 2003)

Population = 230

Total number of connections = 79

Residential connections = 79

Commercial connections = 0

Institutional connections = 0

Industrial/Stockwater connections = 0

Average number of people per residential connection = 2.91

Average lot size = 1.0 acre

Percent lot irrigated = 1%

Domestic Waste Water = Septic tanks

A. Water Supply

- 1. Source Capacity:** Springs = 80.7 ac-ft/yr
Wells = 483.9 ac-ft/yr
Surface = None
- 2. Water Rights:** Springs & Wells (combined) = 113.156 ac-ft/yr
Wells = 1.0 ac-ft/yr
Surface = None
- 3. Maximum Potable Water Supply:** 80.7 ac-ft/yr (Springs) + 33.5 ac-ft/yr (Wells) = 114.2 ac-ft/yr
- 4. Reliable Potable Water Supply:** 80.7 ac-ft/yr (Springs) + 16.8 ac-ft/yr (Wells) = 97.5 ac-ft/yr

B. Primary Water Use

- 1. Residential Indoor:** November 2003 total usage = 600,000 gal/month (equivalent to residential indoor use). Indoor individual usage = 600,000 gal/month – 21,750 gal/month (estimated stockwatering) = 578,250 gal/month; (578,250 gal/month)(1 month/30 days)(1/230 people) = 83.8 gpcd. Therefore, total residential indoor usage = (230 people)(83.8 gpcd)(365 days/yr)(1 ac-ft/325,851 gal) = 21.6 ac-ft (estimate)
- 2. Residential Outdoor:** Total delivered = 30.8 ac-ft (given); residential outdoor = 30.8 ac-ft (total) – 21.6 ac-ft (res. in) – 0.8 ac-ft (ind/stock) = 8.4 ac-ft (estimate)
- 3. Institutional Indoor and Outdoor:** None
- 4. Commercial Indoor and Outdoor:** None
- 5. Industrial/Stockwater Indoor and Outdoor:** (25 horse + 4 cattle)(25 gal/day)(365 days/yr)(1 ac-ft/325,851 gal) = 0.8 ac-ft (estimate)

C. Secondary Water Use

- 1. Residential:** None
- 2. Institutional:** None
- 3. Commercial:** None
- 4. Industrial/Stockwater:** None

CASA DE ORO WATER COMPANY

Population = 60

Total number of connections = 15

Residential connections = 15

Commercial connections = 0

Institutional connections = 0

Industrial/Stockwater connections = 0

Average number of people per residential connection = 4.00

Average lot size = 1.50 acre

Percent lot irrigated = 1%

Domestic Waste Water = Septic tanks

A. Water Supply

- 1. Source Capacity:** Springs = None
Wells = 161.2 ac-ft/yr
Surface = None
- 2. Water Rights:** Springs = None
Wells = None
Surface = None
- 3. Maximum Potable Water Supply:** None (Reliable Supply equals Estimated Use)
- 4. Reliable Potable Water Supply:** 5.8 ac-ft

B. Primary Water Use

- 1. Residential Indoor:** $(60 \text{ people})(72.7 \text{ gpcd})(365 \text{ days/yr})(1 \text{ ac-ft}/325,851 \text{ gal}) = 4.9 \text{ ac-ft}$
(estimate)
- 2. Residential Outdoor:** $(15 \text{ conn})(1.5 \text{ ac/conn})(1\% \text{ irr ac/ac})(4.0 \text{ ac-ft/ac}) = 0.9 \text{ ac-ft}$
(estimate)
- 3. Institutional Indoor and Outdoor:** None
- 4. Commercial Indoor and Outdoor:** None
- 5. Industrial/Stockwater Indoor and Outdoor:** None

C. Secondary Water Use

- 1. Residential:** None
- 2. Institutional:** None
- 3. Commercial:** None
- 4. Industrial/Stockwater:** None

CENTRAL CULINARY WATER COMPANY

Population = 100

Total number of connections = 29

Residential connections = 29

Commercial connections = 0

Institutional connections = 0

Industrial/Stockwater connections = 0

Average number of people per residential connection = 3.45

Average lot size = 0.25 acre (1997 report)

Percent lot irrigated = 100% (1997 report)

Domestic Waste Water = Septic tanks

A. Water Supply

- 1. Source Capacity:** Springs = 56.5 ac-ft/yr
Wells = 96.8 ac-ft/yr
Surface = None
- 2. Water Rights:** Springs = 6.1 ac-ft/yr
Wells = 6.1 ac-ft/yr
Surface = None
- 3. Maximum Potable Water Supply:** 6.1 ac-ft/yr (Springs) + 6.1 ac-ft/yr (Wells) = 12.2 ac-ft/yr
- 4. Reliable Potable Water Supply:** 6.1 ac-ft/yr (Springs) + 3.1 ac-ft/yr (Wells) = 9.2 ac-ft/yr

B. Primary Water Use

- 1. Residential Indoor:** (100 people)(72.7 gpcd)(365 days/yr)(1 ac-ft/325,851 gal) = 8.1 ac-ft (estimate)
- 2. Residential Outdoor:** None
- 3. Institutional Indoor and Outdoor:** None
- 4. Commercial Indoor and Outdoor:** None
- 5. Industrial/Stockwater Indoor and Outdoor:** (400 head)(25 gal/head/day)(1 yr)(50% occupancy)(1 ac-ft/325,851 gal) = 5.6 ac-ft (estimate)

C. Secondary Water Use

- 1. Residential:** (29 conn)(100% use sec)(0.25 ac/conn)(4.0 ac-ft/ac) = 29.0 ac-ft (estimate)
- 2. Institutional:** None
- 3. Commercial:** None
- 4. Industrial/Stockwater:** None

DAMMERON VALLEY WATER WORKS

Population = 850

Total number of connections = 248

Residential connections = 246

Commercial connections = 0

Institutional connections = 2

Industrial/Stockwater connections = 0

Average number of people per residential connection = 3.46

Average lot size = N/A

Percent lot irrigated = N/A

Domestic Waste Water = Septic tanks

A. Water Supply

- 1. Source Capacity:** Springs = None
Wells = 1,209.8 ac-ft/yr
Surface = None
- 2. Water Rights:** Springs = None
Wells = 852.1 ac-ft/yr
Surface = None
- 3. Maximum Potable Water Supply:** 852.1 ac-ft/yr (Wells)
- 4. Reliable Potable Water Supply:** 426.1 ac-ft/yr (Wells)

B. Primary Water Use

- 1. Residential Indoor:** $(850 \text{ people})(72.7 \text{ gpcd})(365 \text{ days/yr})(1 \text{ ac-ft}/325,851 \text{ gal}) = 69.2 \text{ ac-ft}$ (estimate)
- 2. Residential Outdoor:** Total supplied (given) = 232.5 ac-ft. Residential outdoor = 232.5 ac-ft (total res.) – 69.2 ac-ft (res. in) – 5.0 (inst.) = 158.3 ac-ft (estimate)
- 3. Institutional Indoor and Outdoor:** Total from source (given) = 71,805,000 gal + 3,948,000 gal = 75,753,000 gal = 232.5 ac-ft. Institutional = 232.5 ac-ft (total source) – 231.5 ac-ft (res total) = 1.0 ac-ft (estimate) + (1.0 acre)(4.0 ac-ft/ac) = 5.0 ac-ft (estimate)
- 4. Commercial Indoor and Outdoor:** None
- 5. Industrial/Stockwater Indoor and Outdoor:** None

C. Secondary Water Use

- 1. Residential:** None
- 2. Institutional:** None
- 3. Commercial:** None
- 4. Industrial/Stockwater:** None

DIAMOND RANCH ACADEMY

Population = 90

Total number of connections = N/A

Residential connections = N/A

Commercial connections = N/A

Institutional connections = N/A

Industrial/Stockwater connections = N/A

Average number of people per residential connection = N/A

Average lot size = N/A

Percent lot irrigated = N/A

Domestic Waste Water = Septic tanks

A. Water Supply

- 1. Source Capacity:** Springs = None
Wells = N/A
Surface = None
- 2. Water Rights:** Springs = None
Wells = 27.5 ac-ft/yr
Surface = None
- 3. Maximum Potable Water Supply:** 27.5 ac-ft/yr (Wells)
- 4. Reliable Potable Water Supply:** 13.7 ac-ft/yr (Wells)

B. Primary Water Use

- 1. Residential Indoor:** $(60 \text{ students} + 30 \text{ staff})(72.7 \text{ gpcd})(365 \text{ days/yr})(1 \text{ ac-ft}/325,851 \text{ gal}) = 7.3 \text{ ac-ft (estimate)}$
- 2. Residential Outdoor:** $(12.0 \text{ acres})(4.0 \text{ ac-ft/yr}) = 48.0 \text{ ac-ft (estimate)}$
- 3. Institutional Indoor and Outdoor:** None
- 4. Commercial Indoor and Outdoor:** $(10 \text{ staff})(30 \text{ gpcd})(365 \text{ days/yr})(1 \text{ ac-ft}/325,851 \text{ gal}) = 0.3 \text{ ac-ft (estimate)} + ((3.0 \text{ acres})(2.0 \text{ ac-ft/yr}) + (1.0 \text{ acre})(3.0 \text{ ac-ft/yr})) = 9.0 \text{ ac-ft (estimate)} = 9.3 \text{ ac-ft (estimate total)}$
- 5. Industrial/Stockwater Indoor and Outdoor:** $((6 \text{ head})(25 \text{ gal/head/day}) + (1 \text{ head})(10 \text{ gal/head/day}))(365 \text{ days/yr})(1 \text{ ac-ft}/325,851 \text{ gal}) = 0.2 \text{ ac-ft (estimate)}$

C. Secondary Water Use

- 1. Residential:** None
- 2. Institutional:** None
- 3. Commercial:** None
- 4. Industrial/Stockwater:** None

DIAMOND VALLEY ACRES

Population = 1,000

Total number of connections = 258

Residential connections = 255

Commercial connections = 0

Institutional connections = 3

Industrial/Stockwater connections = 0

Average number of people per residential connection = 3.92

Average lot size = 1.0 acre (1997 report)

Percent lot irrigated = 12.5 % (1997 report)

Domestic Waste Water = Septic tanks

A. Water Supply

- 1. Source Capacity:** Springs = 29.0 ac-ft/yr
Wells = 564.6 ac-ft/yr
Surface = None
- 2. Water Rights:** Springs = None
Wells = 217.7 ac-ft/yr
Surface = None
- 3. Maximum Potable Water Supply:** 217.7 ac-ft/yr (Wells)
- 4. Reliable Potable Water Supply:** 163.0 ac-ft/yr (Wells)

B. Primary Water Use

- 1. Residential Indoor:** $(1,000 \text{ people})(72.7 \text{ gpcd})(365 \text{ days/yr})(1 \text{ ac-ft}/325,851 \text{ gal}) = 81.4 \text{ ac-ft}$ (estimate)
- 2. Residential Outdoor:** Total residential (given) = 148.5 ac-ft. Residential outdoor = 148.5 ac-ft (total res.) $- 81.4 \text{ ac-ft}$ (res. in) $- 2.0 \text{ ac-ft}$ (park) = 65.1 ac-ft (estimate)
- 3. Institutional Indoor and Outdoor:** Park = $(0.5 \text{ acre})(4.0 \text{ ac-ft/ac}) = 2.0 \text{ ac-ft}$ (estimate) + 13.8 ac-ft (given) = 15.8 ac-ft (estimate)
- 4. Commercial Indoor and Outdoor:** None
- 5. Industrial/Stockwater Indoor and Outdoor:** None

C. Secondary Water Use

- 1. Residential:** None
- 2. Institutional:** None
- 3. Commercial:** None
- 4. Industrial/Stockwater:** None

DIXIE DEER SSD

Population = 400

Total number of connections = 303

Residential connections = 300

Commercial connections = 1

Institutional connections = 2

Industrial/Stockwater connections = 0

Average number of people per residential connection = 1.33

Average lot size = 0.02 acre (1997 report)

Percent lot irrigated = 100% (1997 report)

Domestic Waste Water = Septic tanks

A. Water Supply

- 1. Source Capacity:** Springs = None
Wells = 403.3 ac-ft/yr
Surface = None
- 2. Water Rights:** Springs = None
Wells = 219.3 ac-ft/yr
Surface = None
- 3. Maximum Potable Water Supply:** 219.3 ac-ft/yr (Wells)
- 4. Reliable Potable Water Supply:** 109.6 ac-ft/yr (Wells)

B. Primary Water Use

- 1. Residential Indoor:** $(400 \text{ people})(72.7 \text{ gpcd})(365 \text{ days/yr})(1 \text{ ac-ft}/325,851 \text{ gal}) = 32.6 \text{ ac-ft}$ (estimate)
- 2. Residential Outdoor:** Total residential (given) = 90.3 ac-ft. Residential outdoor = 90.3 ac-ft (total res.) – 32.6 ac-ft (res. in) = 57.7 ac-ft (estimate)
- 3. Institutional Indoor and Outdoor:** Negligible (3,000 gal - given)
- 4. Commercial Indoor and Outdoor:** 0.3 ac-ft (given)
- 5. Industrial/Stockwater Indoor and Outdoor:** None

C. Secondary Water Use

- 1. Residential:** None
- 2. Institutional:** None
- 3. Commercial:** None
- 4. Industrial/Stockwater:** None

GUNLOCK SPECIAL SERVICE DISTRICT

Population = 130

Total number of connections = 55

Residential connections = 51

Commercial connections = 0

Institutional connections = 4

Industrial/Stockwater connections = 0

Average number of people per residential connection = 2.55

Average lot size = N/A (5.5 irrigated acres total)

Percent lot irrigated = N/A

Domestic Waste Water = Septic tanks

A. Water Supply

- 1. Source Capacity:** Springs = 161.3 ac-ft/yr
Wells = 161.3 ac-ft/yr
Surface = None
- 2. Water Rights:** Springs = 42.5 ac-ft/yr
Wells = 63.7 ac-ft/yr
Surface = N/A
- 3. Maximum Potable Water Supply:** 42.5 ac-ft/yr (Springs) + 63.7 ac-ft/yr (Wells) = 106.2 ac-ft/yr
- 4. Reliable Potable Water Supply:** 42.5 ac-ft/yr (Springs) + 31.9 ac-ft/yr (Wells) = 74.4 ac-ft/yr

B. Primary Water Use

- 1. Residential Indoor:** (130 people)(72.7 gpcd)(365 days/yr)(1 ac-ft/325,851 gal) = 10.6 ac-ft (estimate)
- 2. Residential Outdoor:** (5.5 acres)(40 use cul)(4.0 ac-ft/ac) = 8.8 ac-ft
- 3. Institutional Indoor and Outdoor:** Outdoor = (0.41 ac)(4.0 ac-ft/ac) = 1.7 ac-ft + 1.0 ac-ft (estimate church in/out) + 0.3 ac-ft (estimate park/arena) = 3.0 ac-ft (estimate)
- 4. Commercial Indoor and Outdoor:** None
- 5. Industrial/Stockwater Indoor and Outdoor:** 100 head of stock year round + 50 head of stock for 6 months = equivalent 125 head year round. (125 head)(25 gal/head/day)(365 days/yr)(1 ac-ft/325,851 gal)(50% use culinary) = 1.8 ac-ft (estimate)

C. Secondary Water Use

- 1. Residential:** (5.5 acres)(60% use sec)(4.0 ac-ft/ac) = 13.2 ac-ft (estimate)
- 2. Institutional:** None (negligible)
- 3. Commercial:** None
- 4. Industrial/Stockwater:** (125 head)(25 gal/head/day)(365 days/yr)(1 ac-ft/325,851 gal)(50% use sec) = 1.8 ac-ft (estimate)

HARMONY FARMS WATER USERS

Population = 340

Total number of connections = 89

Residential connections = 89

Commercial connections = 0

Institutional connections = 0

Industrial/Stockwater connections = 0

Average number of people per residential connection = 3.82

Average lot size = 0.25 acre (1997 report)

Percent lot irrigated = 100% (1997 report)

Domestic Waste Water = Septic tanks

A. Water Supply

- 1. Source Capacity:** Springs = None
Wells = 403.3 ac-ft/yr
Surface = None
- 2. Water Rights:** Springs = None
Wells = 142.4 ac-ft/yr
Surface = None
- 3. Maximum Potable Water Supply:** 142.4 ac-ft/yr (Wells)
- 4. Reliable Potable Water Supply:** 71.2 ac-ft/yr (Wells)

B. Primary Water Use

- 1. Residential Indoor:** $(340 \text{ people})(72.7 \text{ gpcd})(365 \text{ days/yr})(1 \text{ ac-ft}/325,851 \text{ gal}) = 27.7 \text{ ac-ft}$ (estimate)
- 2. Residential Outdoor:** Total residential (given) = 56.5 ac-ft (res. given) – 1.0 ac-ft (estimate for Texaco) = 55.5 ac-ft. Residential outdoor = 55.5 ac-ft (total res.) – 27.7 ac-ft (res. in) = 27.8 ac-ft (estimate)
- 3. Institutional Indoor and Outdoor:** 9.1 ac-ft (given)
- 4. Commercial Indoor and Outdoor:** 3.1 ac-ft (given) + 1.0 ac-ft (estimate for Texaco) = 4.1 ac-ft (estimate)
- 5. Industrial/Stockwater Indoor and Outdoor:** 0.7 ac-ft (given)

C. Secondary Water Use

- 1. Residential:** None
- 2. Institutional:** None
- 3. Commercial:** None
- 4. Industrial/Stockwater:** None

HARMONY HEIGHTS

Population = 130

Total number of connections = 74

Residential connections = 74

Commercial connections = 0

Institutional connections = 0

Industrial/Stockwater connections = 0

Average number of people per residential connection = 1.76

Average lot size = 1.5 acres (one full time user)

Percent lot irrigated = 100%

Domestic Waste Water = Septic tanks

A. Water Supply

- 1. Source Capacity:** Springs = None
Wells = 322.6 ac-ft/yr
Surface = None
- 2. Water Rights:** Springs = None
Wells = 84.2 ac-ft/yr
Surface = None
- 3. Maximum Potable Water Supply:** 84.2 ac-ft/yr (Wells)
- 4. Reliable Potable Water Supply:** 42.1 ac-ft/yr (Wells)

B. Primary Water Use

- 1. Residential Indoor:** $(130 \text{ people})(72.7 \text{ gpcd})(365 \text{ days/yr})(1 \text{ ac-ft}/325,851 \text{ gal}) = 10.6 \text{ ac-ft}$ (estimate)
- 2. Residential Outdoor:** Total residential use (given) = 17.6 ac-ft. Residential outdoor = $17.6 \text{ ac-ft (total res.)} - 10.6 \text{ ac-ft (res. in)} - 1.0 \text{ ac-ft (ind/stock)} = 6.0 \text{ ac-ft}$ (estimate)
- 3. Institutional Indoor and Outdoor:** None
- 4. Commercial Indoor and Outdoor:** None
- 5. Industrial/Stockwater Indoor and Outdoor:** $20 \text{ head year round} + 24 \text{ head 8 months of year} = (20 + 24(8/12))(25 \text{ gal/head/day})(365 \text{ days/yr})(1 \text{ ac-ft}/325,851 \text{ gal}) = 1.0 \text{ ac-ft}$ (estimate)

C. Secondary Water Use

- 1. Residential:** $(1.5 \text{ acres})(4.0 \text{ ac-ft/ac}) = 6.0 \text{ ac-ft}$ (estimate)
- 2. Institutional:** None
- 3. Commercial:** None
- 4. Industrial/Stockwater:** None

HILDALE/COLORADO CITY

Population = 5,970 (2,160 in Utah, 3,710 in Arizona)

Total number of connections = 857

Residential connections = 743

Commercial connections = 86

Institutional connections = 24

Industrial/Stockwater connections = 4

Average number of people per residential connection = 8.03

Average lot size = 1.0 acre

Percent lot irrigated = 25%

Domestic Waste Water = Ponds (93 acres – capacity of 1 MG – uses only 40%)

A. Water Supply

- 1. Source Capacity:** Springs = 161.3 ac-ft/yr (UT)
Wells = 2,193.7 ac-ft/yr (AZ)
Surface = None
- 2. Water Rights:** Springs = 42.4 ac-ft/yr (UT) + N/A (AZ)
Wells = 530.6 ac-ft/yr (UT) + N/A (AZ)
Surface = None
- 3. Maximum Potable Water Supply:** 42.4 ac-ft/yr (UT-Springs) + 2,724.0 ac-ft/yr (UT-Wells) = 2,766.4 ac-ft/yr
- 4. Reliable Potable Water Supply:** 42.4 ac-ft/yr (UT-Springs) + 1,362 ac-ft/yr (UT-Wells) = 1,404.4 ac-ft/yr

B. Primary Water Use

- 1. Residential Indoor:** (4,853,000 gal/mon)(1 mon/31 days)(365 days/year)(1 ac-ft/325,851 gal) (UT) + (8,385,000 gal/mon)(1 mon/31 days)(365 days/year)(1 ac-ft/325,851 gal) (AZ) = 478.4 ac-ft (given)
- 2. Residential Outdoor:** [(113,735,000 gal)(1 ac-ft/325,851 gal) – 175.4 ac-ft] (UT) + [(199,269,000 gal)(1 ac-ft/325,851 gal) - 303.0 ac-ft] (AZ) = 482.1 ac-ft (given)
- 3. Institutional Indoor and Outdoor:** 4.3 ac-ft (UT) + 58.6 ac-ft (AZ) = 62.9 ac-ft (given)
- 4. Commercial Indoor and Outdoor:** 83.6 ac-ft (UT) + 69.0 ac-ft (AZ) = 152.6 ac-ft (given)
- 5. Industrial/Stockwater Indoor and Outdoor:** 3.5 ac-ft (UT) + 11.6 ac-ft (AZ) = 15.1 ac-ft (given)

C. Secondary Water Use

- 1. Residential:** Utah: (242 conn)(10% use sec)(1.0 ac/conn)(25% irr ac/ac) (4.0 ac-ft/ac) = 24.2 ac-ft (estimate)
Arizona: (501 conn)(10% use sec)(1.0 ac/conn)(25% irr ac/ac) (4.0 ac-ft/ac) = 50.1 ac-ft (estimate)
Utah & Arizona Total = 74.3 ac-ft (estimate)
- 2. Institutional:** N/A
- 3. Commercial:** N/A
- 4. Industrial/Stockwater:** N/A

HOMESPUN VILLAGE WATER COMPANY

Population = 30

Total number of connections = 8

Residential connections = 8

Commercial connections = 0

Institutional connections = 0

Industrial/Stockwater connections = 0

Average number of people per residential connection = 3.75

Average lot size = 0.9 acre

Percent lot irrigated = 2.3% (only 3 homes)

Domestic Waste Water = Septic tanks

A. Water Supply

- 1. Source Capacity:** Springs = None
Wells = 104.8 ac-ft/yr
Surface = None
- 2. Water Rights:** Springs = None
Wells = 22.4 ac-ft/yr
Surface = None
- 3. Maximum Potable Water Supply:** 22.4 ac-ft/yr (Wells)
- 4. Reliable Potable Water Supply:** 11.2 ac-ft/yr (Wells)

B. Primary Water Use

- 1. Residential Indoor:** $(30 \text{ people})(72.7 \text{ gpcd})(365 \text{ days/yr})(1 \text{ ac-ft}/325,851 \text{ gal}) = 2.4 \text{ ac-ft}$ (estimate)
- 2. Residential Outdoor:** Only 3 homes; say 1,000 ft² each; $(3,000 \text{ ft}^2)(1 \text{ ac}/43,560 \text{ ft}^2)(4.0 \text{ ac-ft/ac}) = 0.3 \text{ ac-ft}$ (estimate)
- 3. Institutional Indoor and Outdoor:** None
- 4. Commercial Indoor and Outdoor:** None
- 5. Industrial/Stockwater Indoor and Outdoor:** $(4 \text{ head})(25 \text{ gal/head/day})(365 \text{ days})(1 \text{ ac-ft}/325,851 \text{ gal}) = 0.1 \text{ ac-ft}$ (estimate)

C. Secondary Water Use

- 1. Residential:** None
- 2. Institutional:** None
- 3. Commercial:** None
- 4. Industrial/Stockwater:** None

HURRICANE

Population = 9,270

Total number of connections = 3,628

Residential connections = 3,315

Commercial connections = 254

Institutional connections = 50

Industrial/Stockwater connections = 9

Average number of people per residential connection = 2.80

Average lot size = 0.4 acre

Percent lot irrigated = 50%

Domestic Waste Water = Ponds (61 acres – Ash Creek - shares with La Verkin and Toquerville)

A. Water Supply

- 1. Source Capacity:** Springs = 6,935.9 ac-ft/yr
Wells = 2,419.5 ac-ft/yr
Surface = None
- 2. Water Rights:** Springs = 1,859.3 ac-ft/yr
Wells = 3,919.3 ac-ft/yr
Surface = None
- 3. Maximum Potable Water Supply:** 1,859.3 ac-ft/yr (Springs) + 2,419.5 ac-ft/yr (Wells) = 4,278.8 ac-ft/yr
- 4. Reliable Potable Water Supply:** 1,859.3 ac-ft/yr (Springs) + 1,209.8 ac-ft/yr (Wells) = 3,069.1 ac-ft/yr

B. Primary Water Use

- 1. Residential Indoor:** $(9,270 \text{ people})(72.7 \text{ gpcd})(365 \text{ days/yr})(1 \text{ ac-ft}/325,851 \text{ gal}) = 754.9 \text{ ac-ft}$ (estimate)
- 2. Residential Outdoor:** Total residential (given) = 1,561.3 ac-ft. Residential outdoor = $1,561.3 \text{ ac-ft}$ (total res.) – 754.9 ac-ft (res. in) = 806.4 ac-ft (estimate)
- 3. Institutional Indoor and Outdoor:** Total culinary water use in Hurricane = 2,201.3 ac-ft (given by Hurricane). Institutional and commercial use = 2,201.3 ac-ft (total delivered) – $1,561.3 \text{ ac-ft}$ (res. total) – 3.1 ac-ft (ind/stock) = 636.9 ac-ft . According to Hurricane City, institutional use equals 40% of remainder; commercial use equals 60% of remainder. Institutional use = $(0.40)(639.9 \text{ ac-ft}) = 254.8 \text{ ac-ft}$ + $(3.5 \text{ acres unmetered})(4.0 \text{ ac-ft/ac}) = 268.8 \text{ ac-ft}$ (estimate)
- 4. Commercial Indoor and Outdoor:** $(0.60)(639.9 \text{ ac-ft}) = 382.1 \text{ ac-ft}$ (estimate – see explanation in Institutional Indoor/Outdoor category)
- 5. Industrial/Stockwater Indoor and Outdoor:** 3.1 ac-ft (given)

C. Secondary Water Use

- 1. Residential:** $(682 \text{ conn})(0.2 \text{ ac/conn})(60\% \text{ irr-ac/ac})(4.0 \text{ ac-ft/irr-ac}) = 327.4 \text{ ac-ft}$ (estimate)
- 2. Institutional:** 543.6 ac-ft (given by WCWCD – golf course) + $(11 \text{ acres unmetered})(4.0 \text{ ac-ft/ac})$ + 16.7 ac-ft (given by WCWCD – fairgrounds) = 604.3 ac-ft (estimate)
- 3. Commercial:** None
- 4. Industrial/Stockwater:** 159.0 ac-ft (given by WCWCD – Interstate Rock)

IVINS

Population = 5,430

Total number of connections = 1,961

Residential connections = 1,920

Commercial connections = 26

Institutional connections = 10

Industrial/Stockwater connections = 5

Average number of people per residential connection = 2.83

Average lot size = 0.25 acre (1997 report)

Percent lot irrigated = 50% (1997 report)

Domestic Waste Water = 85% - treatment plant (St. George); 15% - septic tanks

A. Water Supply

- 1. Source Capacity:** Springs = 48.4 ac-ft/yr
Wells = 4,048.6 ac-ft/yr
Surface = None
- 2. Water Rights:** Springs = 72.4 ac-ft/yr
Wells = 704.1 ac-ft/yr
Surface = None
- 3. Maximum Potable Water Supply:** 48.4 ac-ft/yr (Spring) + 704.1 ac-ft/yr (Wells) = 752.5 ac-ft/yr
- 4. Reliable Potable Water Supply:** 48.4 ac-ft/yr (Spring) + 352.1 ac-ft/yr (Wells) = 400.5 ac-ft/yr

B. Primary Water Use

- 1. Residential Indoor:** (5,430 people)(72.7 gpcd)(365 days/yr)(1 ac-ft/325,851 gal) = 442.2 ac-ft (estimate)
- 2. Residential Outdoor:** Total delivered (given) = 1,278.7 ac-ft. Residential outdoor = 1,278.7 ac-ft (total res.) – 442.2 ac-ft (res. in.) – 81.8 ac-ft (inst) – 72.2 ac-ft (comm.) – 6.9 ac-ft (ind/stock) = 675.6 ac-ft (estimate)
- 3. Institutional Indoor and Outdoor:** 81.8 ac-ft (given)
- 4. Commercial Indoor and Outdoor:** 72.2 ac-ft (given)
- 5. Industrial/Stockwater Indoor and Outdoor:** 6.9 ac-ft (given)

C. Secondary Water Use

- 1. Residential:** (1,920 conn)(10% use sec)(4,580 sq.ft/conn)(1 ac/43,560 sq.ft)(4.0 ac-ft/ac) = 80.7 ac-ft (estimate)
- 2. Institutional:** None
- 3. Commercial:** None
- 4. Industrial/Stockwater:** None

KAYENTA WATER USERS, INCORPORATED (K.W.U., INC.)

Population = 340

Total number of connections = 226

Residential connections = 222

Commercial connections = 4

Institutional connections = 0

Industrial/Stockwater connections = 0

Average number of people per residential connection = 1.53

Average lot size = N/A

Percent lot irrigated = N/A

Domestic Waste Water = Septic tanks

A. Water Supply

- 1. Source Capacity:** Springs = None
Wells = None
Surface = None
- 2. Water Rights:** Springs = None
Wells = None
Surface = None
- 3. Maximum Potable Water Supply:** None (contract with WCWCD)
- 4. Reliable Potable Water Supply:** None (contract with WCWCD)

B. Primary Water Use

- 1. Residential Indoor:** $(340 \text{ people})(72.7 \text{ gpcd})(365 \text{ days/yr})(1 \text{ ac-ft}/325,851 \text{ gal}) = 27.7 \text{ ac-ft}$ (estimate)
- 2. Residential Outdoor:** Total residential (given) = 74.6 ac-ft. Residential outdoor = 74.6 ac-ft (total res.) – 27.7 ac-ft (res. in) = 46.9 ac-ft (estimate)
- 3. Institutional Indoor and Outdoor:** 7.5 ac-ft (given) + 85% (given estimate) of difference of total source and total delivered. 101.8 ac-ft (total source) – 82.1 ac-ft (total delivered) = 19.7 ac-ft . Estimated 1.5 ac-ft from leaks and 3.0 ac-ft for construction. 19.7 ac-ft (difference) – 1.5 ac-ft (leaks) – 3.0 ac-ft (construction) = 15.2 ac-ft (estimate). $(85\% \text{ institutional})(15.2 \text{ ac-ft}) + 1.5 \text{ ac-ft}$ (leaks) + 3.0 ac-ft (construction) + 7.5 ac-ft (given) = 24.9 ac-ft (estimate)
- 4. Commercial Indoor and Outdoor:** 15% of difference of total source and total delivered = $(15\% \text{ commercial})(15.2 \text{ ac-ft}) = 2.3 \text{ ac-ft}$ (estimate)
- 5. Industrial/Stockwater Indoor and Outdoor:** None

C. Secondary Water Use

- 1. Residential:** None
- 2. Institutional:** None
- 3. Commercial:** None
- 4. Industrial/Stockwater:** None

LA VERKIN

Population = 3,870

Total number of connections = 1,186

Residential connections = 1,076

Commercial connections = 88

Institutional connections = 12

Industrial/Stockwater connections = 10

Average number of people per residential connection = 3.60

Average lot size = 0.25 acre (1997 report)

Percent lot irrigated = 50% (1997 report)

Domestic Waste Water = Ponds (61 acres – Ash Creek – shares with Hurricane and Toquerville)

A. Water Supply

1. **Source Capacity:** Springs = 661.3 ac-ft/yr
Wells = None
Surface = None
2. **Water Rights:** Springs = 714.5 ac-ft/yr
Wells = None
Surface = None
3. **Maximum Potable Water Supply:** 661.3 ac-ft/yr (Springs)
4. **Reliable Potable Water Supply:** 661.3 ac-ft/yr (Springs)

B. Primary Water Use

1. **Residential Indoor:** $(3,870 \text{ people})(72.7 \text{ gpcd})(365 \text{ days/yr})(1 \text{ ac-ft}/325,851 \text{ gal}) = 315.2 \text{ ac-ft}$ (estimate)
2. **Residential Outdoor:** Total residential (given) = 452.1 ac-ft. Residential outdoor = $452.1 \text{ ac-ft (total)} - 315.2 \text{ ac-ft (res. in)} = 136.9 \text{ ac-ft}$ (estimate)
3. **Institutional Indoor and Outdoor:** 37.9 ac-ft (given)
4. **Commercial Indoor and Outdoor:** 88.0 ac-ft (given)
5. **Industrial/Stockwater Indoor and Outdoor:** 3.9 ac-ft (given)

C. Secondary Water Use

1. **Residential:** $(507 \text{ conn})(0.25 \text{ ac/conn})(50\% \text{ irr-ac/ac})(4.0 \text{ ac-ft/ac}) = 253.5 \text{ ac-ft}$
2. **Institutional:** None
3. **Commercial:** None
4. **Industrial/Stockwater:** None

LEEDS DOMESTIC WATER USERS

Population = 660

Total number of connections = 244

Residential connections = 223

Commercial connections = 17

Institutional connections = 4

Industrial/Stockwater connections = 0

Average number of people per residential connection = 2.96

Average lot size = 0.7 acre

Percent lot irrigated = 50%

Domestic Waste Water = Septic tanks

A. Water Supply

- 1. Source Capacity:** Springs = 258.1 ac-ft/yr
Wells = 677.5 ac-ft/yr
Surface = None
- 2. Water Rights:** Springs = 79.6 ac-ft/yr
Wells = 910.4 ac-ft/yr
Surface = None
- 3. Maximum Potable Water Supply:** 79.6 ac-ft/yr (Springs) + 677.5 ac-ft/yr (Wells) = 757.1 ac-ft/yr
- 4. Reliable Potable Water Supply:** 79.6 ac-ft/yr (Springs) + 338.8 ac-ft/yr (Wells) = 418.4 ac-ft/yr

B. Primary Water Use

- 1. Residential Indoor:** (660 people)(72.7 gpcd)(365 days/yr)(1 ac-ft/325,851 gal) = 53.7 ac-ft (estimate)
- 2. Residential Outdoor:** Total residential (given) = 176.8 ac-ft. Residential outdoor = 176.8 ac-ft – 53.7 ac-ft = 123.1 ac-ft (estimate)
- 3. Institutional Indoor and Outdoor:** 4.5 ac-ft (given) + (1 acre)(4.0 ac-ft/ac) = 8.5 ac-ft (estimate)
- 4. Commercial Indoor and Outdoor:** 26.5 ac-ft (given) – 4.0 ac-ft (park estimate) = 22.5 ac-ft (estimate)
- 5. Industrial/Stockwater Indoor and Outdoor:** None

C. Secondary Water Use

- 1. Residential:** (24,966,047 gal)(1 ac-ft/325,851 gal) = 76.6 ac-ft (estimate)
- 2. Institutional:** None
- 3. Commercial:** None
- 4. Industrial/Stockwater:** None

LITTLE PLAINS

Population = 360

Total number of connections = 175

Residential connections = 174

Commercial connections = 0

Institutional connections = 1

Industrial/Stockwater connections = 0

Average number of people per residential connection = 2.06

Average lot size = 0.125 acre

Percent lot irrigated = 50%

Domestic Waste Water = Septic tanks

A. Water Supply

- 1. Source Capacity:** Springs = None
Wells = 693.6 ac-ft/yr
Surface = None
- 2. Water Rights:** Springs = None
Wells = 265.0 ac-ft/yr
Surface = None
- 3. Maximum Potable Water Supply:** 265.0 ac-ft/yr (Wells)
- 4. Reliable Potable Water Supply:** 132.5 ac-ft/yr (Wells)

B. Primary Water Use

- 1. Residential Indoor:** $(460 \text{ people})(72.7 \text{ gpcd})(365 \text{ days/yr})(1 \text{ ac-ft}/325,851 \text{ gal}) = 29.3 \text{ ac-ft}$ (estimate)
- 2. Residential Outdoor:** Total delivered (given) = 87.1 ac-ft. Residential outdoor = 87.1 ac-ft (total delivered) – 29.3 ac-ft (res. in.) – 0.5 ac-ft (inst.) – 1.0 ac-ft (ind/stock) = 56.3 ac-ft (estimate)
- 3. Institutional Indoor and Outdoor:** (given) 0.5 ac-ft
- 4. Commercial Indoor and Outdoor:** None
- 5. Industrial/Stockwater Indoor and Outdoor:** $(35 \text{ head})(25 \text{ gal/head/day})(365 \text{ days/yr})(1 \text{ ac-ft}/325,851 \text{ gal}) = 1.0 \text{ ac-ft}$ (estimate)

C. Secondary Water Use

- 1. Residential:** None
- 2. Institutional:** None
- 3. Commercial:** None
- 4. Industrial/Stockwater:** None

MOUNTAIN SPRINGS WATER COMPANY

Population = 300

Total number of connections = 125

Residential connections = 125

Commercial connections = 0

Institutional connections = 0

Industrial/Stockwater connections = 0

Average number of people per residential connection = 2.40

Average lot size = 2,500 square feet (irrigated area per connection)

Percent lot irrigated = 60% (connections with irrigated area)

Domestic Waste Water = Septic tanks

A. Water Supply

- 1. Source Capacity:** Springs = None
Wells = 2,096.9 ac-ft/yr
Surface = None
- 2. Water Rights:** Springs = None
Wells = 248.0 ac-ft/yr
Surface = None
- 3. Maximum Potable Water Supply:** 248.0 ac-ft/yr (Wells)
- 4. Reliable Potable Water Supply:** 124.0 ac-ft/yr (Wells)

B. Primary Water Use

- 1. Residential Indoor:** $(300 \text{ people})(72.7 \text{ gpcd})(365 \text{ days/yr})(1 \text{ ac-ft}/325,851 \text{ gal}) = 24.4 \text{ ac-ft}$ (estimate)
- 2. Residential Outdoor:** $(2,500 \text{ ft}^2)(1 \text{ ac}/43,560 \text{ ft}^2)(60\% \text{ conn})(125 \text{ conn})(4.0 \text{ ac-ft/ac}) = 17.2 \text{ ac-ft}$ (estimate)
- 3. Institutional Indoor and Outdoor:** None
- 4. Commercial Indoor and Outdoor:** $(52 \text{ fire hydrants})(2 \text{ flushes/yr})(5 \text{ min/flush})(500 \text{ gal/min})(1 \text{ ac-ft}/325,851 \text{ gal}) = 0.8 \text{ ac-ft}$ (estimate)
- 5. Industrial/Stockwater Indoor and Outdoor:** None

C. Secondary Water Use

- 1. Residential:** None
- 2. Institutional:** None
- 3. Commercial:** None
- 4. Industrial/Stockwater:** None

NEW HARMONY WATER SYSTEM

Population = 200

Total number of connections = 104

Residential connections = 101

Commercial connections = 0

Institutional connections = 3

Industrial/Stockwater connections = 0

Average number of people per residential connection = 1.98

Average lot size = 0.5 acre

Percent lot irrigated = 25%

Domestic Waste Water = Septic tanks

A. Water Supply

- 1. Source Capacity:** Springs = 435.4 ac-ft/yr
Wells = 1,613.0 ac-ft/yr
Surface = None
- 2. Water Rights:** Springs = 27.9 ac-ft/yr
Wells = 1,448.0 ac-ft/yr
Surface = None
- 3. Maximum Potable Water Supply:** 27.9 ac-ft/yr (Springs) + 1,448.0 ac-ft/yr (Wells) = 1,475.9 ac-ft/yr
- 4. Reliable Potable Water Supply:** 27.9 ac-ft/yr (Springs) + 724.0 ac-ft/yr (Wells) = 751.9 ac-ft/yr

B. Primary Water Use

- 1. Residential Indoor:** $(200 \text{ people})(72.7 \text{ gpcd})(365 \text{ days/yr})(1 \text{ ac-ft}/325,851 \text{ gal}) = 16.3 \text{ ac-ft}$ (estimate)
- 2. Residential Outdoor:** Total residential (given) = 58.4 ac-ft. Residential outdoor = 58.4 ac-ft (total res.) – 16.3 ac-ft (res. in) = 42.1 ac-ft (estimate)
- 3. Institutional Indoor and Outdoor:** Total supply = 69.6 (given). Institutional = 69.6 (total supply) – 21.2 ac-ft (res. in.) – 37.2 ac-ft (res. out.) = 11.2 ac-ft
- 4. Commercial Indoor and Outdoor:** None
- 5. Industrial/Stockwater Indoor and Outdoor:** None

C. Secondary Water Use

- 1. Residential:** $(101 \text{ conn})(25\% \text{ use sec})(0.25 \text{ ac}/\text{conn})(50\% \text{ irr ac}/\text{ac})(4.0 \text{ ac-ft}/\text{ac}) = 12.6 \text{ ac-ft}$ (estimate)
- 2. Institutional:** None
- 3. Commercial:** None
- 4. Industrial/Stockwater:** None

PINE VALLEY IRRIGATION COMPANY

Population = 100 (full-time estimate using 2.97 people per residential connection)

Total number of connections = 415

Residential connections = 411 (35 full-time)

Commercial connections = 2

Institutional connections = 2

Industrial/Stockwater connections = 0

Average number of people per residential connection = 2.97 (Washington Co. 2000 Census)

Average lot size = 0.5 acre

Percent lot irrigated = 10%

Domestic Waste Water = Septic tanks

A. Water Supply

- 1. Source Capacity:** Springs = 722.6 ac-ft/yr
Wells = 47.0 ac-ft/yr
Surface = None
- 2. Water Rights:** Springs = 90.5 ac-ft/yr
Wells = 1,279.2 ac-ft/yr
Surface = None
- 3. Maximum Potable Water Supply:** 90.5 ac-ft/yr (Springs) + 47.0 ac-ft/yr (Wells) = 137.5 ac-ft/yr
- 4. Reliable Potable Water Supply:** 90.5 ac-ft/yr (Springs) + 23.5 ac-ft/yr (Wells) = 114.0 ac-ft/yr

B. Primary Water Use

- 1. Residential Indoor:** Full-time: (100 people)(72.7 gpcd)(365 days/yr)(1 ac-ft/325,851 gal) = 8.1 ac-ft (estimate)
Part-time: (376 part-time conn)(50% occ)(4 people)(2 days/wk)(26 weeks)(72.7 gpcd)(1 ac-ft/325,851 gal) = 8.7 ac-ft (estimate)
Total residential = 8.1 ac-ft + 8.7 ac-ft = 16.8 ac-ft (estimate)
- 2. Residential Outdoor:** (411 conn)(15% use cul)(0.5 acre/conn)(10% irr ac/ac)(3.0 ac-ft/ac) = 9.2 ac-ft (estimate)
- 3. Institutional Indoor and Outdoor:** (8,000 gal/month)(12 months)(1 ac-ft/325,851 gal) = 0.3 ac-ft (estimate)
- 4. Commercial Indoor and Outdoor:** (122,000 gal + 78,000 gal)(1 ac-ft/325,851 gal) = 0.6 ac-ft (given)
- 5. Industrial/Stockwater Indoor and Outdoor:** None

C. Secondary Water Use

- 1. Residential:** (411 conn)(85% use sec)(0.5 acre/conn)(10% irr ac/ac)(3.0 ac-ft/ac) = 52.4 ac-ft (estimate)
- 2. Institutional:** None
- 3. Commercial:** None
- 4. Industrial/Stockwater:** None

PINE VALLEY MT. FARMS

Population = 170

Total number of connections = 58

Residential connections = 58

Commercial connections = 0

Institutional connections = 0

Industrial/Stockwater connections = 0

Average number of people per residential connection = 2.93

Average lot size = N/A

Percent lot irrigated = N/A

Domestic Waste Water = Septic tanks

A. Water Supply

1. **Source Capacity:** Springs = None
Wells = 685.5 ac-ft/yr
Surface = None
2. **Water Rights:** Springs = None
Wells = 185.2 ac-ft/yr
Surface = None
3. **Maximum Potable Water Supply:** 185.2 ac-ft/yr (Wells)
4. **Reliable Potable Water Supply:** 114.6 ac-ft/yr (Wells)

B. Primary Water Use

1. **Residential Indoor:** $(170 \text{ people})(72.7 \text{ gpcd})(365 \text{ days/yr})(1 \text{ ac-ft}/325,851 \text{ gal}) = 13.8 \text{ ac-ft}$ (estimate)
2. **Residential Outdoor:** Total residential (given) = 114.6 ac-ft. Residential outdoor = $114.6 \text{ (total res.)} - 13.8 \text{ ac-ft (res. in)} = 100.8 \text{ ac-ft}$
3. **Institutional Indoor and Outdoor:** None
4. **Commercial Indoor and Outdoor:** None
5. **Industrial/Stockwater Indoor and Outdoor:** None

C. Secondary Water Use

1. **Residential:** None
2. **Institutional:** None
3. **Commercial:** None
4. **Industrial/Stockwater:** None

ROCKVILLE PIPELINE COMPANY

Population = 240

Total number of connections = 151

Residential connections = 145

Commercial connections = 0

Institutional connections = 1

Industrial/Stockwater connections = 5

Average number of people per residential connection = 1.66

Average lot size = 0.5 acre

Percent lot irrigated = 25% (1997 report)

Domestic Waste Water = Ponds (Springdale) – 25 acres; 85% - sewer system; 15% - septic tanks

A. Water Supply

- 1. Source Capacity:** Springs = 31.0 ac-ft/yr
Wells = 104.8 ac-ft/yr
Surface = None
- 2. Water Rights:** 113.4 ac-ft/yr (Springs + Wells)
- 3. Maximum Potable Water Supply:** 31.0 ac-ft/yr (Springs) + 82.4 ac-ft/yr (Wells) = 113.4 ac-ft/yr
- 4. Reliable Potable Water Supply:** 31.0 ac-ft/yr (Springs) + 41.2 ac-ft/yr (Wells) = 72.2 ac-ft/yr

B. Primary Water Use

- 1. Residential Indoor:** (240 people)(72.7 gpcd)(365 days/yr)(1 ac-ft/325,851 gal) = 19.5 ac-ft (estimate)
- 2. Residential Outdoor:** Total residential = 42.6 ac-ft (given total use) – 6.1 ac-ft (ind) = 36.5 ac-ft. Residential outdoor = 36.5 ac-ft – 19.5 ac-ft = 17.0 ac-ft (estimate)
- 3. Institutional Indoor and Outdoor:** None (park w/ toilets – negligible)
- 4. Commercial Indoor and Outdoor:** None
- 5. Industrial/Stockwater Indoor and Outdoor:** 6.1 ac-ft (given)

C. Secondary Water Use

- 1. Residential:** (145 conn)(75% use sec)(0.5 ac/conn)(25% irr ac/ac)(4.0 ac-ft/ac) = 54.4 ac-ft
- 2. Institutional:** (0.5 acre)(4.0 irr ac/ac) = 2.0 ac-ft
- 3. Commercial:** None
- 4. Industrial/Stockwater:** None

SANTA CLARA

Population = 5,220

Total number of connections = 1,525

Residential connections = 1,413

Commercial connections = 50

Institutional connections = 23

Industrial/Stockwater connections = 9

Average number of people per residential connection = 3.69

Average lot size = 0.25 acre (1997 report)

Percent lot irrigated = 60% (1997 report)

Domestic Waste Water = Treatment plant (St. George)

A. Water Supply

- 1. Source Capacity:** Springs = 96.8 ac-ft/yr
Wells = 2,557.0 ac-ft/yr
Surface = None
- 2. Water Rights:** Springs = 190.4 ac-ft/yr
Wells = 2,547.8 ac-ft/yr
Surface = None
- 3. Maximum Potable Water Supply:** 96.8 ac-ft/yr (Springs) + 2,547.8 ac-ft/yr (Wells) = 2,644.6 ac-ft/yr
- 4. Reliable Potable Water Supply:** 96.8 ac-ft/yr (Springs) + 1,273.9 ac-ft/yr (Wells) = 1,370.7 ac-ft/yr

B. Primary Water Use

- 1. Residential Indoor:** $(5,220 \text{ people})(72.7 \text{ gpcd})(365 \text{ days/yr})(1 \text{ ac-ft}/325,851 \text{ gal}) = 425.1 \text{ ac-ft}$ (estimate)
- 2. Residential Outdoor:** Total residential (given) = 1,295.0 ac-ft. Residential outdoor = $1,295.0 \text{ (total res.)} - 425.1 \text{ ac-ft (res. in)} = 869.9 \text{ ac-ft}$ (estimate)
- 3. Institutional Indoor and Outdoor:** $(23,100,000 \text{ gal} + 10,100,000 \text{ gal} + 800,000 \text{ gal})(1 \text{ ac-ft}/325,851 \text{ gal}) = 104.0 \text{ ac-ft}$ (given)
- 4. Commercial Indoor and Outdoor:** 21.5 ac-ft (given)
- 5. Industrial/Stockwater Indoor and Outdoor:** 5.5 ac-ft (given)

C. Secondary Water Use

- 1. Residential:** None
- 2. Institutional:** None
- 3. Commercial:** None
- 4. Industrial/Stockwater:** None

SILVER REEF (to join Leeds Domestic in 2004)

Population = 90

Total number of connections = 38

Residential connections = 35

Commercial connections = 3

Institutional connections = 0

Industrial/Stockwater connections = 0

Average number of people per residential connection = 2.57

Average lot size = 0.125 acre (1997 report)

Percent lot irrigated = 25% (1997 report)

Domestic Waste Water = Septic tanks

A. Water Supply

1. **Source Capacity:** Springs = 256.0 ac-ft/yr
Wells = None
Surface = None
2. **Water Rights:** Springs = 18.9 ac-ft/yr
Wells = 12.8 ac-ft/yr
Surface = None
3. **Maximum Potable Water Supply:** 18.9 ac-ft/yr (Springs)
4. **Reliable Potable Water Supply:** 18.9 ac-ft/yr (Springs)

B. Primary Water Use

1. **Residential Indoor:** $(90 \text{ people})(72.7 \text{ gpcd})(365 \text{ days/yr})(1 \text{ ac-ft}/325,851 \text{ gal}) = 7.3 \text{ ac-ft}$ (estimate)
2. **Residential Outdoor:** Total residential = 8,388,000 gal = 25.7 ac-ft. Residential outdoor = 25.7 ac-ft (total res.) – 7.3 ac-ft (res. in.) – 1.0 ac-ft (inst.) – 0.4 ac-ft (comm.) = 17.0 ac-ft (estimate)
3. **Institutional Indoor and Outdoor:** 1.0 ac-ft (estimate)
4. **Commercial Indoor and Outdoor:** 0.4 ac-ft (given)
5. **Industrial/Stockwater Indoor and Outdoor:** None

C. Secondary Water Use

1. **Residential:** None
2. **Institutional:** None
3. **Commercial:** None
4. **Industrial/Stockwater:** None

SPRINGDALE

Population = 510

Total number of connections = 320

Residential connections = 210

Commercial connections = 81

Institutional connections = 6

Industrial/Stockwater connections = 0

Average number of people per residential connection = 2.43

Average lot size = 0.6 acres (from Craig)

Percent lot irrigated = 25% (from 1997 Rockville calculations)

Domestic Waste Water = Ponds – 25 acres (shares with Rockville and Zion's Canyon);
95% - sewer system; 5% - septic tanks

A. Water Supply

- 1. Source Capacity:** Springs = 204.8 ac-ft/yr
Wells = 258.0 ac-ft/yr
Surface = 963.0 ac-ft/yr
- 2. Water Rights:** Springs = 472.8 ac-ft/yr
Wells = 343.9 ac-ft/yr
Surface = 498.0 ac-ft/yr
- 3. Maximum Potable Water Supply:** 204.8 ac-ft/yr (Springs) + 258.0 ac-ft/yr (Wells) + 498.0 ac-ft/yr (Surface) = 960.8 ac-ft/yr
- 4. Reliable Potable Water Supply:** 204.8 ac-ft/yr (Springs) + 129.0 ac-ft/yr (Wells) + 498.0 ac-ft/yr (Surface) = 831.8 ac-ft/yr

B. Primary Water Use

- 1. Residential Indoor:** Total residential = 12,204,902 gal = 37.5 ac-ft (given); 37.5 ac-ft (total res.) – 1.6 ac-ft (res. out) = 35.9 ac-ft (estimate)
- 2. Residential Outdoor:** (4 conn)(0.1 ac/conn)(4.0 ac-ft/ac) = 1.6 ac-ft (estimate)
- 3. Institutional Indoor and Outdoor:** 187.7 ac-ft (total supply) – 37.5 ac-ft (res. in.) – 93.2 ac-ft (comm.) = 57.0 ac-ft (estimate)
- 4. Commercial Indoor and Outdoor:** 93.2 ac-ft (given)
- 5. Industrial/Stockwater Indoor and Outdoor:** None

C. Secondary Water Use

- 1. Residential:** From 1997 report: Given 84.7 ac-ft: $84.7 \text{ ac-ft} / 193 \text{ conn} / (4.0 \text{ ac-ft/ac}) = 0.1 \text{ ac/conn}$ Using 2002 numbers: $(206 \text{ conn})(0.1 \text{ ac-ft/conn})(4.0 \text{ ac-ft/ac}) = 82.4 \text{ ac-ft}$ (estimate)
- 2. Institutional:** Parks and ballfield = (5.0 acres)(4.0 ac-ft/ac) = 20.0 ac-ft (estimate)
- 3. Commercial:** None
- 4. Industrial/Stockwater:** None

ST. GEORGE CITY

Population = 55,500

Total number of connections = 14,160 (DWI)

Residential connections = 10,560 (DWI)

Commercial connections = 3,200 (1997 % of remainder)

Institutional connections = 320 (1997 % of remainder)

Industrial/Stockwater connections = 80 (1997 % of remainder)

Average number of people per residential connection = 5.26

Average lot size = 0.25 acre

Percent lot irrigated = 50%

Domestic Waste Water = Treatment plant

A. Water Supply

- 1. Source Capacity:** Springs = 1,200.0 ac-ft/yr
Wells = 26,885.0 ac-ft/yr
Surface = None
- 2. Water Rights:** Springs = 304.8 ac-ft/yr
Wells = N/A
Surface = None
- 3. Maximum Potable Water Supply:** 304.8 ac-ft/yr (Springs) + 26,885.0 ac-ft/yr (Wells) = 27,189.8 ac-ft/yr
- 4. Reliable Potable Water Supply:** 304.8 ac-ft/yr (Springs) + 13,442.5 ac-ft/yr (Wells) = 13,747.3 ac-ft/yr

B. Primary Water Use

Using percentages of total for distribution from 1997 M&I report: Total Residential = 55.2 %; Institutional = 5.3%; Commercial = 37.5%; Industrial/Stockwater = 2.0%. Total delivered given by St. George = 19,304.2 ac-ft.

- 1. Residential Indoor:** $(55,500 \text{ people})(72.7 \text{ gpcd})(365 \text{ days})(1 \text{ ac-ft}/325,851 \text{ gal}) = 4,519.6 \text{ ac-ft (estimate)}$
- 2. Residential Outdoor:** $0.552(19,304.2 \text{ ac-ft}) - 4,519.6 \text{ ac-ft (res in.)} = 6,136.4 \text{ ac-ft (estimate)}$
- 3. Institutional Indoor and Outdoor:** $0.053(19,304.2 \text{ ac-ft}) = 1,023.1 \text{ ac-ft (estimate)}$
- 4. Commercial Indoor and Outdoor:** $0.368(19,304.2 \text{ ac-ft}) = 7,239.1 \text{ ac-ft (estimate)}$
- 5. Industrial/Stockwater Indoor and Outdoor:** $0.020(19,304.2 \text{ ac-ft}) = 386.1 \text{ ac-ft (estimate)}$

ST. GEORGE CITY (continued)

C. Secondary Water Use

1. **Residential:** $(10,560 \text{ conn} - \text{given by Greg})(10\% \text{ use sec})(0.333 \text{ acre/conn})(50\% \text{ irr ac/ac})(4.0 \text{ ac-ft/ac}) = 704.0 \text{ ac-ft (estimate)}$
2. **Institutional:**
 - Golf courses: Sunbrook (800.0 ac-ft – given by St. George); St. George (150.0 acres – given by St. George); Dixie Red Hills (40 acres – given by St. George); Southgate (125.0 acres – given by St. George) = $(150.0 \text{ acres} + 40.0 \text{ acres} + 125.0 \text{ acres})(4.0 \text{ ac-ft/ac}) + 800.0 \text{ ac-ft} = 2,060.0 \text{ ac-ft (estimate)}$
 - Cemeteries: 2 locations at 10.0 acres each (given by St. George) = $(20.0 \text{ acres})(4.0 \text{ ac-ft/ac}) = 80.0 \text{ ac-ft (estimate)}$
 - Parks: (given by St. George) Bloomington (3.0 acres); Vernon (2.0 acres); Mathis (2.0 acres) = $(7.0 \text{ acres})(4.0 \text{ ac-ft/ac}) = 28.0 \text{ ac-ft (estimate)}$
 - Schools: (metered, given by St. George) 575.0 ac-ft (estimate)
 - Total: $2,060.0 \text{ ac-ft} + 80.0 \text{ ac-ft} + 28.0 \text{ ac-ft} + 575.0 \text{ ac-ft} = 2,743.0 \text{ ac-ft (estimate)}$
3. **Commercial:** Bloomington Golf Course – 175.0 acres (given by St. George); Entrada Golf Course – 75.0 acres (given by Greg). $(175.0 \text{ acres} + 75.0 \text{ acres})(4.0 \text{ ac-ft/ac}) = 1,000 \text{ ac-ft (estimate)}$
4. **Industrial/Stockwater:** None

TOQUERVILLE

Population = 1,000

Total number of connections = 360

Residential connections = 355

Commercial connections = 3

Institutional connections = 2

Industrial/Stockwater connections = 0

Average number of people per residential connection = 2.82

Average lot size = 0.5 acre (1997 report)

Percent lot irrigated = 40% (1997 report)

Domestic Waste Water = Ponds (61 acres – Ash Creek – shares with Hurricane and La Verkin)

A. Water Supply

- 1. Source Capacity:** Springs = 362.9 ac-ft/yr (Greg)
Wells = 300.0 ac-ft/yr (Cottam Well – 1997 report)
Surface = None
- 2. Water Rights:** Springs = 380.6 ac-ft/yr
Wells = None
Surface = None
- 3. Maximum Potable Water Supply:** 362.9 ac-ft/yr (Springs)
- 4. Reliable Potable Water Supply:** 362.9 ac-ft/yr (Springs)

B. Primary Water Use

- 1. Residential Indoor:** $(1,000 \text{ people})(72.7 \text{ gpcd})(365 \text{ days})(1 \text{ ac-ft}/325,851 \text{ gal}) = 81.4 \text{ ac-ft}$
- 2. Residential Outdoor:** Total delivered (given) = 190.2 ac-ft. Residential outdoor = 190.2 ac-ft (total del.) – 81.4 ac-ft (res. in) – 2.0 ac-ft (inst.) – 1.0 ac-ft (comm.) = 105.8 ac-ft (estimate)
- 3. Institutional Indoor and Outdoor:** $(0.5 \text{ acre})(4.0 \text{ ac-ft}/\text{ac}) = 2.0 \text{ ac-ft}$ (estimate)
- 4. Commercial Indoor and Outdoor:** 1.0 ac-ft (estimate)
- 5. Industrial/Stockwater Indoor and Outdoor:** None

C. Secondary Water Use

- 1. Residential:** $(252 \text{ conn})(0.5 \text{ ac}/\text{conn})(33\% \text{ irr-ac}/\text{ac})(4.0 \text{ ac-ft}/\text{ac}) = 166.3 \text{ ac-ft}$ (estimate)
- 2. Institutional:** $(0.75 \text{ acre})(4.0 \text{ ac-ft}/\text{ac}) = 3.0 \text{ ac-ft}$ (estimate)
- 3. Commercial:** None
- 4. Industrial/Stockwater:** None

VEYO CULINARY WATER ASSOCIATION

Population = 680

Total number of connections = 291

Residential connections = 255

Commercial connections = 12

Institutional connections = 9

Industrial/Stockwater connections = 15

Average number of people per residential connection = 2.67

Average lot size = 0.75 acre

Percent lot irrigated = 50%

Domestic Waste Water = Septic tanks

A. Water Supply

- 1. Source Capacity:** Springs = 435.5 ac-ft/yr
Wells = 725.9 ac-ft/yr
Surface = None
- 2. Water Rights:** Springs = 239.5 ac-ft/yr
Wells = 81.5 ac-ft/yr
Surface = None
- 3. Maximum Potable Water Supply:** 239.5 ac-ft/yr (Springs) + 81.5 ac-ft/yr (Wells) = 321.0 ac-ft/yr
- 4. Reliable Potable Water Supply:** 239.5 ac-ft/yr (Springs) + 40.8 ac-ft/yr (Wells) = 280.3 ac-ft/yr

B. Primary Water Use

- 1. Residential Indoor:** (680 people)(72.7 gpcd)(365 days/yr)(1 ac-ft/325,851 gal) = 55.4 ac-ft (estimate)
- 2. Residential Outdoor:** (255 conn)(94% use sec)(0.33 ac/conn)(50% irr-ac/ac)(4 ac-ft/ac) = 159.8 ac-ft/yr (estimate)
- 3. Institutional Indoor and Outdoor:** (20 acres)(4.0 ac-ft/ac) = 80.0 ac-ft (estimate)
- 4. Commercial Indoor and Outdoor:** 36.8 ac-ft (given)
- 5. Industrial/Stockwater Indoor and Outdoor:** 49.1 ac-ft (given)

C. Secondary Water Use

- 1. Residential:** (255 conn)(6% use sec)(0.75 ac/conn)(50% irr ac/ac)(4.0 ac-ft/ac) = 23.0 ac-ft (estimate)
- 2. Institutional:** None
- 3. Commercial:** None
- 4. Industrial/Stockwater:** None

VIRGIN

Population = 440

Total number of connections = 185

Residential connections = 178

Commercial connections = 7

Institutional connections = 0

Industrial/Stockwater connections = 0

Average number of people per residential connection = 2.47

Average lot size = 1.0 acre

Percent lot irrigated = 10%

Domestic Waste Water = Septic tanks

A. Water Supply

- 1. Source Capacity:** Springs = 12.9 ac-ft/yr
Wells = 48.4 ac-ft/yr
Surface = 225.8 ac-ft/yr
- 2. Water Rights:** Springs = None
Wells = None
Surface = None
- 3. Maximum Potable Water Supply:** None
- 4. Reliable Potable Water Supply:** None

B. Primary Water Use

- 1. Residential Indoor:** $(440 \text{ people})(72.7 \text{ gpcd})(365 \text{ day/yr})(1 \text{ ac-ft}/325,851 \text{ gal}) = 35.8 \text{ ac-ft}$ (estimate)
- 2. Residential Outdoor:** Total delivered (given) = 95.0 ac-ft. Residential outdoor = 95.0 ac-ft (total del.) – 35.8 ac-ft (res. in) – 0.5 ac-ft (inst.) – 5.9 ac-ft (comm.) = 52.8 ac-ft (estimate)
- 3. Institutional Indoor and Outdoor:** 120,000 gal (chapel) + 18,250 gal (town office) + 18,250 gal (park) = (156,500 gal)(1 ac-ft/325,851 gal) = 0.5 ac-ft (estimate)
- 4. Commercial Indoor and Outdoor:** (4 businesses)(15,000 gal/mon/bus.)(12 mon/yr) + (100,000 gal/month – RV park)(12 mon/yr) = (1,920,000 gal)(1 ac-ft/325,851 gal) = 5.9 ac-ft (estimate)
- 5. Industrial/Stockwater Indoor and Outdoor:** None

C. Secondary Water Use

- 1. Residential:** $(178 \text{ conn})(25\% \text{ use sec})(0.70 \text{ ac}/\text{conn})(30\% \text{ irr ac}/\text{ac})(4.0 \text{ ac-ft}/\text{ac}) = 37.4 \text{ ac-ft}$ (estimate)
- 2. Institutional:** $(0.5 \text{ acre})(4.0 \text{ ac-ft}/\text{ac}) = 2.0 \text{ ac-ft}$ (estimate)
- 3. Commercial:** None
- 4. Industrial/Stockwater:** None

WASHINGTON COUNTY WCD – HURVAL (SKY RANCH SUBDIVISION)

Population = 130 (estimate)

Total number of connections = 73

Residential connections = 60

Commercial connections = 2

Institutional connections = 6

Industrial/Stockwater connections = 5

Average number of people per residential connection = 2.17

Average lot size = N/A

Percent lot irrigated = N/A

Domestic Waste Water = Septic tanks

A. Water Supply

- 1. Source Capacity:** Springs = None
Wells = 11,059.0 ac-ft/yr
Surface = 30,000.0 ac-ft/yr
- 2. Water Rights:** Springs = None
Wells = 11,059.0 ac-ft/yr
Surface = 30,000.0 ac-ft/yr
- 3. Maximum Potable Water Supply:** 11,059 ac-ft/yr (Wells) + 30,000 ac-ft/yr (Surface) = 41,059 ac-ft/yr
- 4. Reliable Potable Water Supply:** 5,529.5 ac-ft/yr (Wells) + 30,000 ac-ft/yr (Surface) = 35,529.5 ac-ft/yr

B. Primary Water Use

- 1. Residential Indoor:** (130 people)(72.7 gpcd)(365 days/yr)(1 ac-ft/325,851 gal) = 10.6 ac-ft (estimate)
- 2. Residential Outdoor:** Total residential use = 23.2 ac-ft (given). Residential outdoor = 23.2 ac-ft (total res.) – 10.6 ac-ft (res. in) = 12.6 ac-ft (estimate)
- 3. Institutional Indoor and Outdoor:** Total delivered to Sky Ranch Subdivision “Hurricane Valley” (given by WCWCD) = 33.7 ac-ft. Institutional use estimated as 33.7 ac-ft (total use) – 15.0 ac-ft (res. in.) – 8.2 ac-ft (res. out.) – 3.0 ac-ft (comm.) – 3.2 ac-ft (ind/stock) = 4.3 ac-ft (estimate)
- 4. Commercial Indoor and Outdoor:** 3.0 ac-ft (given)
- 5. Industrial/Stockwater Indoor and Outdoor:** 3.2 ac-ft (given)

C. Secondary Water Use

- 1. Residential:** None
- 2. Institutional:** None
- 3. Commercial:** None
- 4. Industrial/Stockwater:** None

WASHINGTON MUNICIPAL WATER SYSTEM

Population = 10,930

Total number of connections = 3,545

Residential connections = 3,325

Commercial connections = 137

Institutional connections = 52

Industrial/Stockwater connections = 31

Average number of people per residential connection = 3.29

Average lot size = 0.33 acre (1997 report)

Percent lot irrigated = 50% (1997 report)

Domestic Waste Water = Treatment plant

A. Water Supply

- 1. Source Capacity:** Springs = None
Wells = 4,380.9 ac-ft/yr
Surface = None
- 2. Water Rights:** Springs = 137.4 ac-ft/yr
Wells = 3,796.0 ac-ft/yr
Surface = None
- 3. Maximum Potable Water Supply:** 3,796.0 ac-ft/yr (Wells)
- 4. Reliable Potable Water Supply:** 1,898.0 ac-ft/yr (Wells)

B. Primary Water Use

- 1. Residential Indoor:** $(10,930 \text{ people})(72.7 \text{ gpcd})(365 \text{ days/yr})(1 \text{ ac-ft}/325,851 \text{ gal}) = 890.1 \text{ ac-ft}$ (estimate)
- 2. Residential Outdoor:** Total residential (given) = 2,349.5 ac-ft. Residential outdoor = $2,349.5 \text{ ac-ft}$ (total res.) – 890.1 ac-ft (res. in) = 1,459.4 ac-ft (estimate)
- 3. Institutional Indoor and Outdoor:** $3,118.2 \text{ ac-ft}$ (total supply) – 2,349.5 ac-ft (total res.) – 708.2 ac-ft (comm.) – 17.4 ac-ft (ind/stock) = 43.1 ac-ft (estimated)
- 4. Commercial Indoor and Outdoor:** 708.2 ac-ft (given)
- 5. Industrial/Stockwater Indoor and Outdoor:** $(2,785,000 \text{ gal} + 2,897,000 \text{ gal})(1 \text{ ac-ft}/325,851 \text{ gal}) = 17.4 \text{ ac-ft}$ (given)

C. Secondary Water Use

- 1. Residential:** $(5,500 \text{ sq.ft}/\text{conn})(1 \text{ ac}/43,560 \text{ sq.ft})(3,325 \text{ conn})(5\% \text{ use sec.})(4.0 \text{ ac-ft}/\text{ac}) = 84.0 \text{ ac-ft}$; use 100.0 ac-ft (estimate)
- 2. Institutional:** 207.1 MG (Sullivan Well - given) + 20 MG (swimming pool - given) = $(227.1 \text{ MG})(1 \text{ ac-ft}/325,851 \text{ gal}) = 696.9 \text{ ac-ft}$
- 3. Commercial:** 483.4 ac-ft (given by WCWCD)
- 4. Industrial/Stockwater:** None

WINCHESTER HILLS

Population = 1,060

Total number of connections = 339

Residential connections = 338

Commercial connections = 0

Institutional connections = 1

Industrial/Stockwater connections = 0

Average number of people per residential connection = 3.13

Average lot size = N/A

Percent lot irrigated = N/A

Domestic Waste Water = Septic tanks

A. Water Supply

- 1. Source Capacity:** Springs = None
Wells = 548.4 ac-ft/yr
Surface = None
- 2. Water Rights:** Springs = None
Wells = 473.6 ac-ft/yr
Surface = None
- 3. Maximum Potable Water Supply:** 473.6 ac-ft/yr (Wells)
- 4. Reliable Potable Water Supply:** 267.0 ac-ft/yr (Wells)

B. Primary Water Use

- 1. Residential Indoor:** $(1,060 \text{ people})(72.7 \text{ gpcd})(365 \text{ days/yr})(1 \text{ ac-ft}/325,851 \text{ gal}) = 86.3 \text{ ac-ft}$ (estimate)
- 2. Residential Outdoor:** Total delivered (given) = 266.9 ac-ft. Residential outdoor = 266.9 ac-ft (total del.) – 86.3 ac-ft (res. in) – 0.8 ac-ft (inst.) = 179.8 ac-ft (estimate)
- 3. Institutional Indoor and Outdoor:** $(5,000 \text{ ft}^2)(1 \text{ ac}/43,560.2 \text{ ft}^2)(4.0 \text{ ac-ft/ac}) = 0.5 \text{ ac-ft}$ (estimate outdoor) + 0.3 (estimate indoor) = 0.8 ac-ft (estimate)
- 4. Commercial Indoor and Outdoor:** None
- 5. Industrial/Stockwater Indoor and Outdoor:** None

C. Secondary Water Use

- 1. Residential:** None
- 2. Institutional:** None
- 3. Commercial:** None
- 4. Industrial/Stockwater:** None

ZION CANYON WATER SYSTEM

Population = 130

Total number of connections = 51

Residential connections = 40

Commercial connections = 7

Institutional connections = 4

Industrial/Stockwater connections = 0

Average number of people per residential connection = 3.25

Average lot size = N/A

Percent lot irrigated = N/A

Domestic Waste Water = Septic tanks (4 total, the Grotto, Temple of Sinawava, Entrance station, and houses on east side of Zion Canyon Road, rest of Park on Rockville/Springdale system)

A. Water Supply

- 1. Source Capacity:** Springs = 540.4 ac-ft/yr
Wells = 67.7 ac-ft/yr
Surface = 1650.7 ac-ft/yr
- 2. Water Rights:** Springs = 1,650.7 ac-ft/yr
Wells = 66.0 ac-ft/yr
Surface = None
- 3. Maximum Potable Water Supply:** 540.4 ac-ft/yr + 66.0 ac-ft/yr (Wells) = 606.4 ac-ft/yr
- 4. Reliable Potable Water Supply:** 540.4 ac-ft/yr + 33.0 ac-ft/yr (Wells) = 573.4 ac-ft/yr

B. Primary Water Use

- 1. Residential Indoor:** (130 people)(72.7 gpcd)(365 days/yr)(1 ac-ft/325,851 gal) = 10.6 ac-ft (estimate)
- 2. Residential Outdoor:** Total residential (given) = 29.5 ac-ft. Residential outdoor = 29.5 ac-ft (total res.) – 10.6 ac-ft (res. in.) = 18.9 ac-ft (estimate)
- 3. Institutional Indoor and Outdoor:** 35.5 ac-ft (given)
- 4. Commercial Indoor and Outdoor:** 67.6 ac-ft (given)
- 5. Industrial/Stockwater Indoor and Outdoor:** None

C. Secondary Water Use

- 1. Residential:** None
- 2. Institutional:** 10.0 ac-ft (estimate per 1997 report)
- 3. Commercial:** None
- 4. Industrial/Stockwater:** None

APPENDIX D
LA VERKIN WATER USE
DATA FORM

UTAH WATER USE DATA FORM DATA FOR 2002

Information jointly requested by:
 Utah Division of Water Resources, 538-7264
 Utah Division of Drinking Water, 536-4200; and
 Utah Division of Water Rights, 538-7392.

Return completed form to:
 Utah Division of Water Rights
 PO Box 146300
 Salt Lake City, UT 84114-6300

System Name: LaVerkin City
 Address: 111 South Main
 LaVerkin, UT 84745

Population Served: 3,400 DEC#: 27009
 County: Washington
 E-Mail Address:

Contact Person: Doug Gubler
 Form filled out by: June Jeffery, Deputy Recorder

Phone Number: (435) 635-2581
 Phone Number:

I. STORAGE INVENTORY: Total treated storage capacity: 2.5 million in gallons. Number of Tanks: 2.

II. SOURCE INVENTORY:

1 Source Name: Ash Creek Spring Area Type: Spring Location: Sec 11, T41S, R13W, SL&M WR Number: 81-687 81-1602
 Method of Measurement: Master Meter, Estimate, Other
 Units of Measurement: X 1,000
 Are there any spills/overflow? Yes, No If yes, estimate annual quantity _____ Where is source measured? Before overflow, After overflow
 When do spills/overflow occur? _____ Are spills/overflow included in the quantities reported? Yes No

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
8,872	11,189	12,772	22,259	13,270	21,739	21,740	16,021	19,997	17,121	13,693	10,960	189,633	

2 Source Name: Toquerville Springs Type: Spring Location: Sec 11, T41S, R13W, SL&M WR Number: 81-2287
 Method of Measurement: Master Meter, Estimate, Other
 Units of Measurement:
 Are there any spills/overflow? Yes, No If yes, estimate annual quantity _____ Where is source measured? Before overflow, After overflow
 When do spills/overflow occur? _____ Are spills/overflow included in the quantities reported? Yes No

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL

3 Source Name: Upper Ash Creek Springs Type: Spring Location: Sec 11, T41S, R13W, SL&M WR Number: 81-1073 81-1602
 Method of Measurement: Master Meter, Estimate, Other
 Units of Measurement:
 Are there any spills/overflow? Yes, No If yes, estimate annual quantity _____ Where is source measured? Before overflow, After overflow
 When do spills/overflow occur? _____ Are spills/overflow included in the quantities reported? Yes No

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL

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WATER RIGHTS
 SALT LAKE

** If you are using other sources which are not shown above, please enter the appropriate data in the space provided below. **

4 Source Name: _____ Type: _____ Location: _____
 Method of Measurement: [] Master Meter, [] Estimate, [] Other _____
 Units of Measurement: _____
 WR Number: _____

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL

5 Source Name: _____ Type: _____ Location: _____
 Method of Measurement: [] Master Meter, [] Estimate, [] Other _____
 Units of Measurement: _____
 WR Number: _____

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL

6 Source Name: _____ Type: _____ Location: _____
 Method of Measurement: [] Master Meter, [] Estimate, [] Other _____
 Units of Measurement: _____
 WR Number: _____

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL

SOURCE COMMENTS: Water supply conditions were: [] Above normal, [] Below normal

III. WATER USE BREAKDOWN: (Please use sum of the readings from individual meters, not master meter readings at source. If quantities are not known, please estimate. See instructions for definition of uses shown in bold).
 Units of Measurement: 1,000 gallons

Residential: Annual quantity of water delivered for residential purposes 147,317. Total number of residential connections 1,026.
 Meter readings at individual connections [] or Estimated []
 Number of connections serving multiple units (apartments) from a single connection 50. Units per connection (avg) 2
Commercial: Annual quantity of water delivered for commercial purposes 28,669. Total number of commercial connections 88.
 Meter readings at individual connections [] or Estimated []
Industrial: Annual quantity of water delivered for industrial purposes 1,286. Total number of industrial connections 10.
 Meter readings at individual connections [] or Estimated []
Institutional: Annual quantity of water delivered for institutional purposes 12,361. Total number of institutional connections 12.
 Meter readings at individual connections [] or Estimated []
Stockwatering: Annual quantity of water delivered for stockwatering purposes _____ . Total number of stockwatering connections _____ .
 Meter readings at individual connections [] or Estimated []
Wholesale: Annual quantity of water delivered for wholesale purposes _____ . Please attach a listing of those supplied.
 Meter readings at individual connections [] or Estimated []
Other Uses: Annual quantity of water delivered for other purposes _____ . Total number of other connections _____ .
 Meter readings at individual connections [] or Estimated []
 Describe other uses _____ .
Unmetered: Annual estimate of water delivered by unmetered connections _____ . Total number of unmetered connections _____ .
 Unmetered connections used for _____ .

Total annual quantity of water delivered for all purposes 189,633. Total number of all connections 1,136.
 Of this total, how many connections are active? 1,069

IV. IRRIGATION SYSTEM (Separate lawn and garden irrigation system, whether controlled by the drinking water supplier or not)
 Is any of your area served by a separate ditch or pipe fed irrigation water system? Yes, No If yes, please provide the following information:
 What percent of your customers are served by a separate irrigation system? 50 %
 Of these customers, what percent are served by ditch? 0 %
 What percent are served by pressurized-pipe? 100 %
 Do you operate and maintain the separate lawn and garden irrigation water system? Yes, No
 If the separate irrigation system is operated by other entities, please give name of companies, contact person & phone number:
Dan Howard, President Laverkin Bench Canal Company 435-635-4848

APPENDIX E
2002 KCVR BASIN
DEPLETIONS

KANAB CREEK/VIRGIN RIVER BASIN MUNICIPAL AND INDUSTRIAL DEPLETION TABLE

(Acre-Feet/Year)

WATER SUPPLIER	Potable Residential Indoor Use	Potable Residential Outdoor Use	Potable Commercial Use	Potable Institutional Use	Potable Industrial/Stockwater Use	Potable Self-Supplied Industries Use	Total Potable Use	Total Secondary Water Use	Total Indoor Use	Total Outdoor Use	Residential Indoor Return Flow	Commercial Indoor Return Flow	Institutional Indoor Return Flow	Industrial/Stockwater Indoor Return Flow	Total Indoor Return Flow to Treatment Facility	Pond Evaporation	Treatment Facility Outflow (Indoor Return Flow)	Outdoor Return Flow	Total Return Flow	Total Diversions	Total Depletions
Iron County																					
Kanaraville	25.6	77.5	2.7	8.6	0.0	0.0	114.4	58.8	29.5	143.7	25.1	2.1	1.7	0.0	28.9	0.0	27.4	47.9	75.4	173.2	97.8
TOTAL COMMUNITY SYSTEMS	25.6	77.5	2.7	8.6	0.0	0.0	114.4	58.8	29.5	143.7	25.1	2.1	1.7	0.0	28.9	0.0	27.4	47.9	75.4	173.2	97.8
Non-community systems	3.2	6.5	0.0	29.7	0.0	0.0	39.4	0.0	9.1	30.3	3.1	0.0	5.8	0.0	9.0	0.0	8.5	10.1	18.6	39.4	20.8
COUNTY TOTALS	28.8	84.0	2.7	38.3	0.0	0.0	153.8	58.8	38.6	174.0	28.2	2.1	7.5	0.0	37.8	0.0	36.0	58.0	93.9	212.6	118.7

Kane County																					
Alton	11.9	3.3	0.0	0.3	0.0	0.0	15.5	169.1	12.0	172.6	11.7	0.0	0.1	0.0	11.7	0.0	11.1	57.5	68.7	184.6	115.9
East Kanab Water Co.	11.1	5.5	0.0	2.5	0.0	0.0	19.1	0.0	11.6	7.5	10.9	0.0	0.5	0.0	11.4	0.0	10.8	2.5	13.3	19.1	5.8
Glendale	29.8	78.0	1.3	5.2	0.4	0.0	114.7	89.0	32.3	171.4	29.2	1.0	1.0	0.2	31.4	7.7	23.2	57.1	80.3	203.7	123.4
Kanab	305.6	459.2	196.9	529.2	8.9	0.0	1499.8	132.9	577.9	1054.8	299.5	154.4	103.7	4.5	562.0	266.8	284.0	351.6	635.6	1632.7	997.1
Johnson Canyon Area (KCWCD)	6.8	16.8	0.0	1.0	0.0	0.0	24.6	0.0	7.0	17.6	6.7	0.0	0.2	0.0	6.9	0.0	6.5	5.9	12.4	24.6	12.2
Orderville	51.1	48.2	33.2	92.7	2.0	0.0	227.2	173.0	98.2	302.0	50.1	26.0	18.2	1.0	95.3	15.5	77.8	100.7	178.5	400.2	221.7
Fredonia (AZ)	86.9	344.9	13.1	45.9	7.9	0.0	498.7	0.0	114.5	384.2	85.2	10.3	9.0	4.0	108.4	26.1	80.1	128.1	208.2	498.7	290.5
TOTAL COMMUNITY SYSTEMS	503.2	955.9	244.5	676.8	19.2	0.0	2399.6	564.0	853.4	2110.2	493.1	191.7	132.7	9.6	827.1	316.1	493.6	703.4	1197.0	2963.6	1766.6
Non-community systems	14.9	19.8	51.5	7.4	1.3	2.0	96.9	82.0	60.9	118.0	14.6	40.4	1.5	0.7	57.1	0.0	54.2	39.3	93.6	178.9	85.3
COUNTY TOTALS	518.1	975.7	296.0	684.2	20.5	2.0	2496.5	646.0	914.2	2228.3	507.7	232.1	134.1	10.3	884.2	316.1	547.8	742.8	1290.5	3142.5	1852.0

Washington County																					
Angell Springs	21.6	8.4	0.0	0.0	0.8	0.0	30.8	0.0	22.4	8.4	21.2	0.0	0.0	0.4	21.6	0.0	20.6	2.8	23.3	30.8	7.5
Casa de Oro	4.9	0.9	0.0	0.0	0.0	0.0	5.8	0.0	4.9	0.9	4.8	0.0	0.0	0.0	4.8	0.0	4.6	0.3	4.9	5.8	0.9
Central	8.1	0.0	0.0	0.0	5.6	0.0	13.7	29.0	13.7	29.0	7.9	0.0	0.0	2.8	10.7	0.0	10.2	9.7	19.9	42.7	22.8
Dammeron Valley	69.2	158.3	0.0	5.0	0.0	0.0	232.5	0.0	70.2	162.3	67.8	0.0	1.0	0.0	68.8	0.0	65.4	54.1	119.5	232.5	113.0
Diamond Ranch Academy	7.3	48.0	9.3	0.0	0.2	0.0	64.8	0.0	14.9	49.9	7.2	7.3	0.0	0.1	14.5	0.0	13.8	16.6	30.4	64.8	34.4
Diamond Valley Acres	81.4	65.1	0.0	15.8	0.0	0.0	162.3	0.0	84.6	77.7	79.8	0.0	3.1	0.0	82.9	0.0	78.7	25.9	104.6	162.3	57.7
Dixie Deer SSD	32.6	57.7	0.3	0.0	0.0	0.0	90.6	0.0	32.8	57.8	31.9	0.2	0.0	0.0	32.2	0.0	30.6	19.3	49.8	90.6	40.8
Gunlock SSD	10.6	8.8	0.0	3.0	1.8	0.0	24.2	15.0	13.0	26.2	10.4	0.0	0.6	0.9	11.9	0.0	11.3	8.7	20.0	39.2	19.2
Harmony Farms Water Users	27.7	27.8	4.1	9.1	0.7	0.0	69.4	0.0	33.5	35.9	27.1	3.2	1.8	0.4	32.5	0.0	30.9	12.0	42.8	69.4	26.6
Harmony Heights	10.6	6.0	0.0	0.0	1.0	0.0	17.6	6.0	11.6	12.0	10.4	0.0	0.0	0.5	10.9	0.0	10.3	4.0	14.3	23.6	9.3
Hildale/Colorado City	478.4	482.1	152.6	62.9	15.1	0.0	1191.1	74.3	628.2	637.2	468.8	119.6	12.3	7.6	608.3	237.9	358.3	212.4	570.7	1265.4	694.7
Homespun Village Water Company	2.4	0.3	0.0	0.0	0.1	0.0	2.8	0.0	2.5	0.3	2.4	0.0	0.0	0.1	2.4	0.0	2.3	0.1	2.4	2.8	0.4
Hurricane	754.9	806.4	382.1	268.8	3.1	0.0	2215.3	1090.7	1117.4	2188.6	739.8	299.6	52.7	1.6	1093.6	207.3	864.5	729.5	1594.0	3306.0	1712.0
Ivins	442.2	675.6	72.2	81.8	6.9	0.0	1278.7	80.7	523.2	836.2	433.4	56.6	16.0	3.5	509.4	0.0	497.0	278.7	775.7	1359.4	583.7
Kayenta Water Users	27.7	46.9	2.3	24.9	0.0	0.0	101.8	0.0	34.5	67.3	27.1	1.8	4.9	0.0	33.8	0.0	32.1	22.4	54.6	101.8	47.2
La Verkin	315.2	136.9	88.0	37.9	3.9	0.0	581.9	253.5	397.1	438.3	308.9	69.0	7.4	2.0	387.3	53.9	325.6	146.1	471.7	835.4	363.7
Leeds Domestic Water Users	53.7	123.1	22.5	8.5	0.0	0.0	207.8	76.6	73.4	211.0	52.6	17.6	1.7	0.0	71.9	0.0	68.3	70.3	138.7	284.4	145.7
Little Plains	29.3	56.3	0.0	0.5	1.0	0.0	87.1	0.0	30.4	56.7	28.7	0.0	0.1	0.5	29.3	0.0	27.8	18.9	46.7	87.1	40.4
Mountain Springs Water Co.	24.4	17.2	0.8	0.0	0.0	0.0	42.4	0.0	25.0	17.4	23.9	0.6	0.0	0.0	24.5	0.0	23.3	5.8	29.1	42.4	13.3
New Harmony Water System	16.3	42.1	0.0	11.2	0.0	0.0	69.6	12.6	18.5	63.7	16.0	0.0	2.2	0.0	18.2	0.0	17.3	21.2	38.5	82.2	43.7
Pine Valley Irrigation Co.	16.8	9.2	0.6	0.3	0.0	0.0	26.9	52.4	17.3	62.0	16.5	0.5	0.1	0.0	17.0	0.0	16.1	20.7	36.8	79.3	42.5
Pine Valley Mt. Farms	13.8	100.8	0.0	0.0	0.0	0.0	114.6	0.0	13.8	100.8	13.5	0.0	0.0	0.0	13.5	0.0	12.8	33.6	46.4	114.6	68.2
Rockville	19.5	17.0	0.0	0.0	6.1	0.0	42.6	56.4	25.6	73.4	19.1	0.0	0.0	3.1	22.2	12.7	8.9	24.5	33.4	99.0	65.6
Santa Clara Municipal Water System	425.1	869.9	21.5	104.0	5.5	0.0	1426.0	0.0	468.6	957.4	416.6	16.9	20.4	2.8	456.6	0.0	447.5	319.1	766.6	1426.0	659.4
Silver Reef SSD	7.3	17.0	0.4	1.0	0.0	0.0	25.7	0.0	7.8	17.9	7.2	0.3	0.2	0.0	7.7	0.0	7.3	6.0	13.2	25.7	12.5
Springdale	35.9	1.6	93.2	57.0	0.0	0.0	187.7	102.4	121.9	168.2	35.2	73.1	11.2	0.0	119.4	38.8	78.1	56.1	134.2	290.1	155.9
St. George City	4519.6	6136.4	7239.1	1023.1	386.1	0.0	19304.3	4447.0	10901.6	12849.7	4429.2	5675.5	200.5	193.1	10498.2	0.0	10288.3	4283.2	14571.5	23751.3	9179.8
Toquerville	81.4	105.8	1.0	2.0	0.0	0.0	190.2	169.3	82.6	276.9	79.8	0.8	0.4	0.0	80.9	22.7	56.6	92.3	148.9	359.5	210.6
Veyo	55.4	159.8	36.8	80.0	49.1	0.0	381.1	23.0	149.9	254.2	54.3	28.9	15.7	24.6	123.4	0.0	117.2	84.7	201.9	404.1	202.2
Virgin	35.8	52.8	5.9	0.5	0.0	0.0	95.0	39.4	40.6	93.8	35.1	4.6	0.1	0.0	39.8	0.0	37.8	31.3	69.1	134.4	65.3
Johnson Canyon (WCWCD)	10.6	12.6	3.0	4.3	3.2	0.0	33.7	0.0	17.1	16.6	10.4	2.4	0.8	1.6	15.2	0.0	14.4	5.5	20.0	33.7	13.7
Washington Municipal Water System	890.1	1459.4	708.2	43.1	17.4	0.0	3118.2	1280.3	1482.7	2915.8	872.3	555.2	8.4	8.7	1444.7	0.0	1415.8	971.9	2387.7	4398.5	2010.8
Winchester Hills Water Co.	86.3	179.8	0.0	0.8	0.0	0.0	266.9	0.0	86.5	180.4	84.6	0.0	0.2	0.0	84.7	0.0	80.5	60.1	140.6	266.9	126.3
Zion National Park	10.6	18.9	67.6	35.5	0.0	0.0	132.6	10.0	71.8	70.8	10.4	53.0	7.0	0.0	70.3	19.0	49.8	23.6	73.4	142.6	69.2
TOTAL COMMUNITY SYSTEMS	8626.7	11908.9	8911.5	1881.0	507.6	0.0	31835.7	7818.6	16639.7	23014.6	8454.2	6986.6	368.7	253.8	16063.3	592.3	15123.8	7671.5	22795.4	39654.3	16858.9
Non-community systems	21.6	29.9	2.0	4.5	0.0	95.0	153.0	0.0	119.1	33.9	21.2	1.6	0.9	0.0	23.6	0.0	22.4	11.3	33.7	153.0	119.3
COUNTY TOTALS	8648.3	11938.8	8913.5	1885.5	507.6																