

2021 Update
City of Rio Rancho
Source Water Protection Plan
Public Water System # NM3537326

Prepared for

City of Rio Rancho, New Mexico

April 2, 2021



Daniel B. Stephens & Associates, Inc.

6020 Academy NE, Suite 100 • Albuquerque, New Mexico 87109



Table of Contents

Section	Page
1. Introduction	1
1.1 City of Rio Rancho Source Water Protection Program Vision	2
1.2 Purpose	2
1.3 Source Water Protection Program Background	2
2. Source Water Protection Team	3
3. Water System Information	3
3.1 Water Rights	4
3.2 City Infrastructure	4
4. Hydrogeology	7
4.1 Structural Setting	7
4.2 Regional Stratigraphy	8
4.3 Santa Fe Group Stratigraphy	8
5. Source Water Quality	9
6. Water Production Rates	9
7. Water Supply Changes and Impacts	11
7.1 Historical Change and Impacts	11
7.2 Need for Future Water Sources	11
8. Source Water Protection Area	14
9. Potential and Known Sources of Contamination	14
9.1 Natural Sources of Contamination	15
9.2 Human Sources of Contamination	15
10. Susceptibility Analysis	18
10.1 Sensitivity Rankings	18
10.1.1 Well Integrity	18
10.1.2 Well Depth	19
10.1.3 Aquifer Sensitivity	20
10.1.4 Calculating the Sensitivity Ranking	22
10.2 Vulnerability Rankings	23
10.2.1 Severity Score	23
10.2.2 Count Score	24
10.2.3 Vulnerability Ranking	25
10.3 Overall Susceptibility	34
11. Source Water Monitoring Plan	35



Table of Contents (Continued)

Section	Page
12. PSOC Monitoring and Control Plan	36
13. Public Involvement.....	37
14. Conclusions and Recommendations.....	37
References.....	39

List of Figures

Figure

- 1 Vicinity Map
- 2 Water System
- 3 Total Production, 2003–2020
- 4a Historical Population Growth
- 4b Historical Per Capita Water Use
- 5 Water Use Projections Based on Population Growth Scenarios, 2020–2045
- 6 Potential Sources of Contamination
- 7 Septic Systems
- 8 Aquifer Sensitivity



List of Tables

Table	Page
1 Source Water Protection Team.....	3
2 City Well Information.....	6
3 Annual Production by Well, 2003–2020.....	10
4 Annual Population Projections and Water Use, 2019-2045.....	12
5 PSOC and SOC Types Present in Rio Rancho SWPAs.....	16
6 Well Integrity Analysis.....	19
7 Well Depth Analysis.....	20
8 Color Coding for Lee Wilson Aquifer Sensitivity Maps.....	20
9 Aquifer Sensitivity by Well.....	22
10 Sensitivity Ranking by Well.....	23
11 Severity Scores by PSOC/SOC Type.....	24
12 PSOC Count Scores.....	25
13 Vulnerability Ranking Decision Matrix.....	25
14 Vulnerability Analysis.....	26
15 Susceptibility Ranking Description.....	34
16 Sensitivity, Vulnerability, and Susceptibility Rankings.....	34



List of Appendices

Appendix

- A NMED Source Water Assessment
- B Consumer Confidence Reports
- C PSOC Table for City Monitor Wells and Off-Line Wells
- D NMED Lists of Potential Sources of Contamination and Contaminants of Concern
- E Sampling Schedules
- F Public Involvement
- G Common Ground Rising Report and WM Response



2021 Update

City of Rio Rancho Source Water Protection Plan

Public Water System #NM3509623

1. Introduction

The New Mexico Environment Department (NMED) Drinking Water Bureau (DWB) encourages communities in the protection of their drinking water system through the Source Water Protection Program. By participating in the program, communities can assess a water system to identify and manage actual or potential sources of contamination to the drinking water supply. The program consists of a two-step process; the first step involves identifying the area(s) to be protected, identifying actual and potential contamination sources, and evaluating the susceptibility of the drinking water source area to contamination.

NMED encourages communities to then complete the second step of the planning process by developing and implementing a Source Water Protection Plan (SWPP). The SWPP benefits the public water system by providing management and implementation strategies to ensure the security of the drinking water supply. Preventing contamination is much less expensive and easier than cleaning up a contaminated source or finding a new source.

This SWPP for the City of Rio Rancho (the City), New Mexico was developed by Daniel B. Stephens & Associates, Inc. (DBS&A) using the *New Mexico Source Water and Wellhead Protection Toolkit* (NMED DWB, 2013). The original plan was issued in 2017 and was updated in 2019. This is the second update to the plan, and includes changes to members of the Community Planning Team, which has the responsibility of program development and implementation, thereby providing the community with the tools needed to prevent contamination of the City's source water.



1.1 City of Rio Rancho Source Water Protection Program Vision

Through leadership, dedication, and integrity, we are committed to providing utility and environmental services of superior quality. We remain constantly focused on the value of our associates, the well-being of our community and the preservation of our environment.

This formalized vision statement is the declaration and call to action of the City's Utilities Operations Division.

The mission statement for the City of Rio Rancho is as follows:

The City of Rio Rancho's mission is to ensure the health, safety and welfare of the community by providing excellent service to achieve a high quality of life for residents, businesses, and visitors.

1.2 Purpose

The purpose of the Source Water Protection Program is to protect drinking water sources before they become contaminated. The SWPP provides the management tool for current and future approaches to prevent source water contamination, thereby protecting the drinking water system and customer health.

1.3 Source Water Protection Program Background

U.S. Congress amended the Safe Drinking Water Act in 1996 to provide for the assessment and protection of sources of public water supply. The U.S. Environmental Protection Agency (EPA) provides information and encourages partnerships for source water protection planning. States completed source water assessments between 2002 and 2006 for all public water systems. The City's source water assessment was completed in 2003, and is provided as Appendix A. States are now implementing strategies to help local communities use the information obtained from these assessments. States also may provide resources to help fund local protection activities, such as wellhead protection programs for groundwater and watershed management programs for surface water.



2. Source Water Protection Team

Table 1 lists the members of the City of Rio Rancho source water protection team. The City's water system is operated by a contract operator, Jacobs Engineering Group.

Table 1. Source Water Protection Team

Name	Affiliation	E-mail
Marian Wrage	City of Rio Rancho Utilities Department	mwrage@rrnm.gov
Steve Gallegos	City of Rio Rancho Utilities Department	sgallegos@rrnm.gov
James Chiasson	City of Rio Rancho Utilities Department	jchiasson@rrnm.gov
Pat Gallegos	Jacobs Engineering Group	pat.gallegos@jacobs.com
David Peterson	Jacobs Engineering Group	david.peterson@jacobs.com
Elaine Cimino	City of Rio Rancho Resident/Common Ground Rising	ecimino10@gmail.com
Carrie Weitz	Intel	carrie.a.weitz@intel.com
Xavier Pettes	City of Rio Rancho Engineering Development Department	xpettes@rrnm.gov
Charles Fernandez	City of Rio Rancho Parks Department	cfernandez@rrnm.gov
Koryn Misbach	City of Rio Rancho Parks Department	kmisbach@rrnm.gov
David Gatterman	Southern Sandoval County Arroyo Flood Control Authority	dgatterman@sscafca.com
Laurie Stout	Village of Corrales	lstout@corrales-nm.org
TBD	Town of Bernalillo	
Dan Darnell	Waste Management Corporation	ddarnell@wm.com
TBD	Sandoval County	

TBD = To be determined

3. Water System Information

Rio Rancho is the third largest city in the State of New Mexico, and is located adjacent to the Albuquerque metropolitan area within the Middle Rio Grande Basin (Figure 1). Rio Rancho has a current land area of approximately 105 square miles, of which approximately one-third has



been developed. Single-family housing predominates in Rio Rancho, and consequently single-family residential accounts are the major water user classification. The City's oldest subdivisions were built in the 1970s, with a majority of growth in the 1980s and 1990s. During 2005 to 2007, Rio Rancho was the fastest growing city in the state. In 2020, the City's population was approximately 100,000. Commercial businesses are a smaller component of the water accounts, as many of the local residents shop in Albuquerque. The City has one single industrial customer. The City is relatively young, as it was incorporated in 1981.

The City water supply consists entirely of groundwater withdrawn from the Santa Fe Group aquifer. The City has 13 active production wells. The City used 11 wells in 2020 and diverted just over 11,000 acre-feet (ac-ft); annual production has remained relatively consistent since 2014 (see Section 6).

Because the City pumps water from deep wells, the supply is not as susceptible to climate change or drought as a surface water supply. The City has an emergency water shortage ordinance for times of drought or limited supply. The ordinance was invoked in 2008 due to equipment issues on two of three wells that supplied water to one area of the City. The City can store up to 44 million gallons of water.

3.1 Water Rights

The City has a 26,039 acre-feet water rights diversion permit (Permit No. RG-6745 et.al., and Declaration No. RG26259). As part of the pumping permit, the City is required to purchase 728 acre-feet of water rights per 5-year period. To date, the City has purchased more water rights than required for the current time frame.

3.2 City Infrastructure

The City water system consists of the following infrastructure:

- 13 active production wells, 7 monitor wells, 3 off-line wells, 1 plugged well
- 10 booster pump stations



- 19 storage tanks (total capacity of 44 million gallons)
- 10 pressure zones for water distribution
- 1 reverse osmosis system
- 10 arsenic treatment facilities
- 560 miles of water distribution lines (ranging from 6 inches to 24 inches in diameter)

City production wells are located within the Rio Rancho and Rio Rancho Estates limits (Figure 2). Table 2 summarizes well construction information for all City wells.

Well 3 was rehabilitated in 2017. Well 13R was redrilled in March 2019, and is expected to be brought online in 2021. Well 13 is now used as a monitor well. The City's active wells are the only wells included in the susceptibility analysis.



Table 2. City Well Information

Well No.	Date Drilled	Capacity (gpm)	Well Elevation (feet msl)	Total Well Depth (feet bgs)	Screened Interval (feet bgs)	
					Top	Bottom
1 (monitor well)	1962	85	5,244	350	297	339
2 (monitor well)	1963	510	5,260	813	570	813
3	1966	640	5,370	828	584	820
4 (monitor well)	1969	1,400	5,415	990	685	990
5 (plugged)	1969	—	5,416	980	380	975
6A	1991	1,240	5,602	1,476	810	1,450
7	1975	840	5,650	1,197	898	1,182
8 (off-line)	1978	840	5,827	1,618	982	1,599
9 (off-line)	1984	840	6,054	1,540	1,220	1,520
10A	2003	2,250	5,504	2,495	1,212	2,454
11 (monitor well)	1985	—	5,131	350	257	315
12	1987	2,250	5,240	1,459	564	1,439
13 (monitor well)	1989	600	6,055	1,747	1,342	1,721
13R	2017	—	—	—	—	—
14 (off-line)	1991	1,400	5,770	1,740	1,035	1,710
15	1993	512	5,794	1,310	820	1,290
16	1994	2,020	5,536	2,010	820	1,990
17	1994	3,000	5,308	1,710	510	1,690
18 (monitor well)	1994	—	5,535	2,070	562	2,050
19	1995	1,500	5,676	2,070	800	2,050
20 (monitor well)	1997	—	5,812	970	850	980
21	1999	1,982	5,306	1,970	470	1,857
22	2005	2,365	—	2,988	1,444	2,968
23 (off line)	2008	—	—	2,020	777	1,999

Source: DBS&A, 2015; BHI, 2011; City of Rio Rancho, 2019

gpm = Gallons per minute

msl = Above mean sea level

bgs = Below ground surface



4. Hydrogeology

This description of regional hydrology is adopted from the report *Evaluation of Future Production Well Locations, Well Replacement Needs, and Future Water Sources, City of Rio Rancho, NM* (GGI, 2008).

4.1 Structural Setting

The City of Rio Rancho lies within the Albuquerque Basin section of the Rio Grande Rift tectonic province (Keller and Cather, 1994). The rift is characterized by a well-defined series of asymmetrical fault-block (half-graben) basins and ranges that extend from Colorado to Mexico for a distance of more than 600 miles (Hawley, 1978; Chapin and Cather, 1994).

Throughout Rio Rancho, stratigraphic units are offset by numerous north-south and northwest-southeast trending normal faults that have been mapped at the surface (e.g., Kelley, 1977; Personius et al., 2000) and identified in gravity and aeromagnetic surveys of the area (e.g., Grauch, 1999; Grauch et al., 1999). Some of these faults are observed in pumping tests as barriers to groundwater flow (e.g., Riesterer et al., 2003, 2004, 2005; Riesterer and Drakos, 2008). The most important structural feature in the northern Albuquerque basin, with respect to its influence on groundwater production and quality, is the Ziana structure (Ziana anticline of Black and Hiss, 1974; Kelley, 1977; Ziana horst of Connell, 2001). The Ziana structure plunges gently to the south, with beds dipping to the east and west of the structural axis. As a result, older stratigraphic units are closer to the surface farther north in the basin along the structural axis, and younger units are thin or missing. These relationships are important factors controlling the production and quality of groundwater in the area. Cementation along faults bounding the Ziana structure and/or juxtaposition of higher and lower permeability sediments across these faults appears to limit movement of groundwater across some of the Ziana bounding faults (Heywood et al., 2002).



4.2 Regional Stratigraphy

The Albuquerque Basin contains up to 14,000 feet of Tertiary age (Miocene to Pliocene), syn-rift sediments of the Santa Fe Group. In the northern Albuquerque Basin, deposits of the Santa Fe Group thin to the west and north; a thickness of approximately 3,000 feet is present beneath the Shell Santa Fe #1 oil test well. In the northern Albuquerque Basin, the Santa Fe Group is underlain by volcanoclastic rocks of the Espinazo Formation (Oligocene age) and sedimentary rocks of the Galisteo Formation (Eocene age) (May and Russell, 1994). The Tertiary section is underlain by Mesozoic and Paleozoic sedimentary units that were deposited on Pre-Cambrian crystalline basement rocks (Kelley, 1977; Russell and Snelson, 1994). Basin-bounding and intrabasin faults in the Albuquerque Basin offset all of the Santa Fe Group sediments, and some faults also offset the overlying Quaternary deposits (Kelley, 1977; Machette et al., 1998).

4.3 Santa Fe Group Stratigraphy

The nomenclature assigned to the Santa Fe Group in the Calabacillas subbasin of the Albuquerque Basin has evolved significantly since the early portion of the 20th century (e.g., Bryan and McCann, 1937; Galusha, 1966; Kelley, 1977; Manley, 1978; Gawne, 1981; Tedford and Barghoorn, 1997, 1999; Connell et al., 1999; Personius et al., 2000; Connell, 2001, 2004, 2006, 2008). The Glorieta Geoscience, Inc. (GGI) study uses the formation and member names assigned to the Santa Fe Group by Connell (2008) based on his work in the northern Albuquerque Basin.

In the northern Albuquerque Basin, the Santa Fe Group is subdivided, from oldest to youngest, into the Zia Formation, the Cerro Conejo Formation, the Arroyo Ojito Formation, and the Ceja Formation (Connell, 2008). The Zia Formation is further subdivided into, from oldest to youngest, the Piedra Parada, Chamisa Mesa, and Cañada Pilares Members. The Arroyo Ojito Formation is subdivided into (from oldest to youngest) the Navajo Draw, Loma Barbon, and Picuda Peak Members (Connell, 2008, Figure 1-6). The Arroyo Ojito Formation is separated from the overlying Ceja Formation by the Rincones paleosurface, which is defined by a well-developed carbonate paleosol (Connell, 2008). The Ceja Formation is subdivided into (from oldest to youngest) the Santa Ana Mesa, Atrisco, and Rio Puerco Members (Connell, 2008).



Most of the City's wells are deep and well-protected from human-caused contamination. Protection from human-caused contamination generally increases with depth. The likelihood of being exposed to naturally occurring contaminants also increases with increasing well depth.

5. Source Water Quality

The City's wells have occurrences of arsenic, chromium, sodium, total dissolved solids (TDS), sulfate, and gross alpha. The main concern in the City's water quality is arsenic, and the City has installed 10 arsenic treatment facilities to treat water from 12 wells (3, 6, 7, 9, 10A, 13, 14, 15, 16, 17, 21, and 22) to meet the arsenic maximum contaminant level (MCL) of 10 micrograms per liter ($\mu\text{g/L}$).

According to the City's 2017 consumer confidence report (CCR), from January 3, 2013 to July 10, 2017, the City's contractor did not properly monitor and/or complete all required testing for total coliform and chlorine residuals at certain areas within the distribution system, resulting in reported violations for 2016 and 2017. No violations were reported for 2018, 2019, or 2020. The City's CCRs for 2017 through 2019 are provided in Appendix B.

Levels of uranium above the MCL have been detected in Well 23; consequently, this well has not been placed into service.

6. Water Production Rates

Table 3 and Figure 3 show annual total production by well for 2003 to 2020. Pumping rates are provided in Table 2. For the 13 active wells, pumping rates range from 512 gallons per minute (gpm) (Well 15) to 3,000 gpm (Well 17). Of the 13 active wells, 5 have pumping rates lower than 1,000 gpm, 3 have pumping rates between 1,000 and 2,000 gpm, and 5 have pumping rates over 2,000 gpm.

In 2020, only 11 of the 13 currently active wells were used. The total 2020 annual diversion was 11,032 ac-ft, which is 42.4 percent of the allowable diversion under existing water right permits. The highest producing well was 10A at 1,659 ac-ft, followed by wells 12 and 16 with 1,470 and



Table 3. Annual Production by Well, 2003–2020

Well ID	Annual Diversion (acre-feet)																	
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2	1	343	10	225	130	126	237	0	0	149	226	224	283	358	241	55	—	—
3	88	368	239	375	309	325	0	0	676	924	686	660	679	184	119	609	478	531
4	33	510	648	270	269	0	0	0	0	0	0	0	0	—	—	—	—	—
5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6A	635	463	576	846	426	768	1,258	1,514	1,602	1,802	1,344	640	1,105	1,311	753	1,467	1,503	1,273
7	297	545	602	616	568	408	279	0	156	298	0	0	0	98	1,072	958	1,043	932
8	1,199	1,365	1,202	901	1,321	277	9	0	0	0	0	0	381	—	—	—	—	—
9	1,239	1,006	258	293	375	289	909	974	760	83	1,319	779	334	821	753	367	71	—
10A	—	—	—	1,364	2,775	987	1,517	1,273	1,385	1,286	324	769	678	671	1,436	1,515	1,569	1,659
11	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
12	862	661	966	1,056	449	1,414	1,871	1,173	1,395	1,694	1,768	1,854	1,760	1,641	1,396	86	623	1,470
13	26	0	0	0	36	645	688	461	627	457	0	0	0	—	—	—	—	—
14	225	301	1,691	1,414	1,272	1,237	909	1,452	332	860	0	1,068	314	—	—	—	—	—
15	15	15	140	121	183	56	22	226	651	558	516	333	359	419	472	539	363	418
16	2,087	1,351	1,266	1,554	1,606	1,888	1,672	1,225	1,208	168	1,405	1,496	1,226	1,298	605	1,440	1,316	1,434
17	952	776	846	691	521	822	978	1,939	1,698	1,694	544	249	30	72	196	307	412	418
18	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
19	1,651	1,569	1,431	1,588	1,366	1,456	1,752	2,037	1,886	1710	1,599	1,980	1,933	2,164	1,996	1,481	1,093	1,374
20	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
21	1,841	1,988	1,712	791	1,221	1,239	172	0	0	801	1,333	360	567	852	666	1,287	1,109	489
22	—	—	—	—	—	1,158	272	1,288	1,241	2,191	1,675	1,216	958	1,165	1,175	694	885	1,036
23	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total diversion	11,149	11,259	11,587	12,105	12,826	13,095	12,545	13,563	13,617	14,675	12,739	11,628	10,608	11,054	10,879	10,804	10,465	11,032

Source: DBS&A, 2015; City of Rio Rancho, 2019



1,434 ac-ft, respectively. The production from these 3 wells accounted for 41.4 percent of the total annual production in 2020.

7. Water Supply Changes and Impacts

7.1 Historical Change and Impacts

The City obtains 100 percent of its municipal water supply from groundwater produced from wells completed in the regional aquifer within and west of the City limits. The City is growing steadily, which resulted in steady growth of groundwater diversion in the past. In recent years, however, despite the City's growing population, implementation of conservation measures and the declining demand by the City's largest industrial user (Intel) have resulted in an overall decrease in water use. In 2019, the City submitted a 40-year water plan progress report to the Office of the State Engineer (OSE) in which the City projected low, medium, and high population growth scenarios and the associated water demand for each scenario. Table 4 shows these projections. Figure 4a shows the City's historical growth, Figure 4b shows historical daily per capita water use, and Figure 5 shows the three water demand scenarios and how they relate to the City's permitted diversion.

7.2 Need for Future Water Sources

Bohannon Huston, Inc. (BHI) developed projected water demands based on land use categories, and identified changing development patterns from almost exclusively residential to mixed residential and commercial use (BHI, 2011). The BHI study estimated water demand approaching 54,000 ac-ft/yr once the land within City limits is fully developed. The City plans to meet this demand by acquisition of the amount of water rights required by Permit RG-6745 et al. (i.e., minimum of 728 acre-feet every 5 years).



Table 4. Annual Population Projections and Water Use, 2019–2045
Page 1 of 2

Year	Population			Water Use (acre-feet)		
	Probable Growth (2%)	Low Growth (1%)	High Growth (3%)	Probable Growth (2%)	Low Growth (1%)	High Growth (3%)
2019	98,023	98,023	98,023	10,465	10,465	10,465
2020	99,983	99,003	100,964	10,674	10,570	10,779
2021	101,983	99,993	103,993	10,888	10,675	11,102
2022	104,023	100,993	107,112	11,106	10,782	11,435
2023	106,103	102,003	110,326	11,328	10,890	11,778
2024	108,225	103,023	113,636	11,554	10,999	12,132
2025	110,390	104,053	117,045	11,785	11,109	12,496
2026	112,598	105,094	120,556	12,021	11,220	12,891
2027	114,850	106,145	124,173	12,261	11,332	13,257
2028	117,147	107,206	127,898	12,507	11,445	13,654
2029	119,489	108,278	131,735	12,757	11,560	14,064
2030	121,879	109,361	135,687	13,012	11,675	14,486
2031	124,317	110,455	139,757	13,272	11,792	14,921
2032	126,803	111,559	143,950	13,538	11,910	15,368
2033	129,339	112,675	148,269	13,808	12,029	15,839
2034	131,926	113,802	152,717	14,085	12,150	16,304
2035	134,565	114,940	157,298	14,366	12,271	16,793
2036	137,256	116,089	162,017	14,654	12,394	17,297
2037	140,001	117,250	166,878	14,947	12,518	17,816
2038	142,801	118,422	171,884	15,246	12,643	18,350
2039	145,657	119,607	177,040	15,550	12,769	18,901
2040	148,570	120,803	182,352	15,861	12,897	19,468

12

Source: City of Rio Rancho 40-year plan 2014-2019 update

Note: Water data from 2019 were used as baseline for all calculations. U.S. Census population for July 1, 2019 was used as 2019 population.



Table 4. Annual Population Projections and Water Use, 2019–2045
Page 2 of 2

Year	Population			Water Use (acre-feet)		
	Probable Growth (2%)	Low Growth (1%)	High Growth (3%)	Probable Growth (2%)	Low Growth (1%)	High Growth (3%)
2041	151,542	122,011	187,822	16,176	13,026	20,052
2042	154,572	123,231	193,457	16,502	13,156	20,654
2043	157,664	124,463	199,261	16,832	13,288	21,273
2044	160,817	125,708	205,238	17,169	13,421	21,911
2045	164,033	126,965	211,396	17,512	13,555	22,569

Source: City of Rio Rancho 40-year plan 2014-2019 update

Note: Water data from 2019 were used as baseline for all calculations. U.S. Census population for July 1, 2019 was used as 2019 population.



8. Source Water Protection Area

Per NMED recommendations in the *New Mexico Source Water and Wellhead Protection Toolkit* (NMED DWB, 2013), the source water protection area (SWPA) is defined as the area within a 1-mile radius of each groundwater well. In this plan, the delineated source area is further subdivided into four buffer zones:

- Zone A: radius of 0 to 200 feet from the water source
- Zone B: radius of 201 to 500 feet from the water source
- Zone C: radius of 501 to 1,000 feet from the water source
- Zone D: radius of 1,001 to 5,280 feet (1-mile) from the water source

As noted in Section 3.1.2, only the City's active wells are included in the susceptibility analysis. A potential source of contamination (PSOC) table including monitor wells 2, 4, and 18 are included for reference in Appendix C, as the City has indicated there is a possibility of redrilling these wells at some point in the future. The Appendix C PSOC table also includes the City's off-line wells.

9. Potential and Known Sources of Contamination

PSOCs are defined as any possible site or event that could, under any circumstance and time frame, lead to contamination of a water system's sources. Not all sites identified as PSOCs pose the same level of risk. Due to type of PSOC, some sites may pose little to no contamination risk, while others may pose an imminent threat. There may also be known sources of contamination (SOCs) within a well's SWPA.

Several different resources were used to compile a list of all possible PSOCs and SOCs within the City's SWPAs. The NMED maintains an interactive web map called "EnviroMap," which provides information on sites that are registered with the state, such as wastewater discharge permits and fuel storage tanks, as well as federal sites such as Superfund sites and National Pollutant Discharge Elimination System (NPDES) permits. The geographic information system (GIS) data underlying the web-based map were provided to DBS&A by NMED, and were used



to map the PSOCs in the study area. Additionally, while not all inclusive, NMED has compiled an extensive list of PSOC types that may be found within a water source's SWPA (Appendix D1). In Appendix D1, the highlighted categories signify the sources that are not included in Enviromap. The highlighted PSOCs include commercial uses such as auto salvage, as well as municipal/residential uses such as drainage features and detention/retention ponds. Appendix D2 lists the contaminants of concern (COCs) associated with each of the PSOC types in NMED's list. The assessment also includes input and information provided by the City, the Source Water Protection Team, and reports by others.

PSOCs and SOCs can be either human-caused or naturally occurring. Both types are found within the City's SWPAs. All PSOCs and SOCs identified in the City's SWPAs are listed in Table 5; they are listed by the three-letter code assigned by NMED, when possible. Figure 6 shows the City's wells with their SWPAs and PSOCs and SOCs by zone.

9.1 Natural Sources of Contamination

Natural sources of contamination within the City's SWPAs include arroyos and naturally occurring contaminants. Arroyos are not PSOCs in themselves, but can convey pollutants.

The main naturally occurring concern in the City wells is arsenic. The City has installed 10 arsenic treatment facilities to treat water from 12 wells (3, 6, 7, 9, 10A, 13R, 14, 15, 16, 17, 21, and 22). Arsenic does not appear on the PSOC maps. Because the City is treating for arsenic, it is not included in the vulnerability analysis (similar to other contaminants addressed in the water treatment process).

Naturally occurring uranium was detected in Well 23. This SOC is not shown on the PSOC map, but it is included in the susceptibility analysis.

9.2 Human Sources of Contamination

The most prolific human-caused PSOC type is septic systems; most of these septic systems are located in areas where sewer service is not available; however, some are located in areas



Table 5. PSOC and SOC Types Present in Rio Rancho SWPAs

PSOC/SOC Code	Description	Present in SWPA of Active Wells	Present in SWPA of Off-Line or Monitor Wells
PSOCs			
AHD	Park	X	X
CFA	Aboveground storage tank facility	X	X
CFB	Underground storage tank facility	X	X
CGC	Golf course	X	X
IGO	Oil and gas exploration	X	
IOG	Gas pipeline	X	X
MLF	Waste Management/Rio Rancho Landfill	X	
MPS	Lift station	X	X
MRP	Primary road, highway, or arterial	X	X
MWP	Bernalillo Well # 4	X	
—	Arroyo	X	X
—	Fire Department	X	
—	Fleet Department	X	
—	Groundwater permit (active): City of Rio Rancho - Direct Injection Recharge Demonstration Project (DP-1650)	X	
—	Groundwater permit (active): Club Rio Rancho (DP-1629)	X	X
—	Groundwater permit (ceased): Intel Corporation (DP-225 and DP-400)		X
—	Groundwater permit (ceased): Martin Luther King Elementary (DP-445)	X	X
—	Groundwater permit (terminated): City of Rio Rancho Reuse Project (DP-179)	X	X
—	Irrigation ditch		X
—	Private well: OSE database	X	X
—	Rio Rancho Public Safety Department	X	
—	Rio Rancho Public School Transportation	X	
—	Septic tank	X	X
SOCs			
CFB/LUST	Leaking underground storage tank facility - Rio Rancho Shell		X
IUD	Illegal dump	X	X
—	Brownfield: Del Norte Gun Club	X	
—	Uranium		X
—	Voluntary remediation site: Price's Valley Gold North Dairy - North Area	X	



where sewer service is provided but homeowners have not opted to connect. The threat from septic systems to the public water supply in Rio Rancho is likely low due to the deep well depths; however, the threat is increased in areas where private wells exist, particularly if those wells are not properly abandoned or properly sealed. The locations of sewers, aerial imagery, and the locations of private wells were used to map septic systems in the City's service area (Figure 7).

On March 30, 2020, there was a confirmed release from a petroleum storage tank at the Shell gas station located at 4001 Sara Road, in Zone D of the SWPA of monitor wells 1 and 2. This release is being monitored by NMED's Petroleum Storage Tank Bureau (PSTB). The consultant, CDM Smith, has submitted a work plan to perform the minimum site assessment (MSA); it is awaiting approval from the PSTB. Because this site is not located in the SWPA of supply wells for the City, it is not included in the susceptibility analysis of this plan.

The source water protection atlas shows four groundwater discharge permits within the City's SWPAs. Two of these—Club Rio Rancho Golf Course (DP 1629) and Rio Rancho direct injection recharge permit demonstration project (DP-1650)—are active. The Martin Luther King Elementary groundwater discharge permit (DP-445) is ceased. The Rio Rancho City of Rio Rancho Reuse Project groundwater discharge permit (DP-179) is terminated. The City has an active groundwater discharge permit for the Mariposa Wastewater Treatment Plant, but this discharge permit is not shown in the susceptibility analysis because it is located outside of the SWPAs for the City's wells.

The former Price's Dairy North site has undergone voluntary remediation, and is a closed site (Zone D of Well 12). Abatement was completed at a separate location within Price's Dairy, and was approved by the NMED Ground Water Quality Bureau in May 2013. The abatement site is within a mile of Well 11, a monitor well for the City (therefore not included in the susceptibility analysis). Regionally, groundwater gradient flow would be toward the river; however, near the well, the gradient could be reversed due to the typical drawdown of the operating well. The former dairy could therefore be upgradient of Well 12. While the current status of the dairy is closed, it remains a possible PSOC out of an abundance of caution.



The Del Norte Gun Club is shown as a brownfield site within the SWPA for Well 12.

Illegal dumping is known to occur in the area. The SWP team delineated illegal dumping areas based on local knowledge. It is known that household hazardous waste is dumped in these locations.

Other land uses that represent PSOCs include a landfill, primary roads and fleet sites that can lead to contaminant spills, sewage lift stations, oil/gas pipelines, large areas of fertilized turf, such as parks, and fuel storage tanks.

10. Susceptibility Analysis

The susceptibility analysis ranks the risk of contamination to each well. A susceptibility ranking of low, moderately low, moderate, moderately high, or high is assigned based on the well's vulnerability and sensitivity rankings. These rankings are meant to serve only as a method to identify and prioritize risks to a system's water sources for planning purposes.

10.1 Sensitivity Rankings

Sensitivity is an evaluation of three components: a well's infrastructure, a well's depth, and the aquifer sensitivity within a well's SWPA. Each well is assigned a ranking of low, moderate, or high for each component. These rankings will correspond to a score as follows: low = 1, moderate = 3, and high = 5. The scores for all three components will be averaged to determine the overall sensitivity ranking for the well.

10.1.1 Well Integrity

The well integrity analysis consists of eight yes/no well integrity questions completed by City staff. The questions and corresponding responses for each well are shown in Table 6. In all cases, the ideal response is "yes." If any information was unavailable, it was noted as such, but was considered a "no" in the ranking process. Six to eight "yes" responses ranked low (score of 1), three to five ranked moderate (score of 3), and zero to two ranked high (score of 5). All of



the wells included in the susceptibility analysis had eight “yes” responses and therefore ranked low.

Table 6. Well Integrity Analysis

Well Integrity Information	Well												
	3	6A	7	9	10A	12	13R	15	16	17	19	21	22
Is the well located outside of an area susceptible to flooding?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Does well casing terminate at least 18 inches above floor or ground level?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Is annular space pressure-grouted to depth of at least 20 feet?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Is the wellhead properly sealed?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Is there a concrete pad around the wellhead that slopes away from the casing?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Does the well vent terminate at least 18 inches above floor or ground level, and is the vent screened and oriented to open downward?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Are the check valves, blow-off valves and flow meters properly maintained and operated?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Is the wellhead fenced, housed or properly protected?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Number of "yes" responses	8	8	8	8	8	8	8	8	8	8	8	8	8
Ranking	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Score	1	1	1	1	1	1	1	1	1	1	1	1	1

10.1.2 Well Depth

A well depth of over 500 feet is ranked low, while a well depth of 201 to 500 feet is ranked moderate, and a well depth of 0 to 200 feet is ranked high. As shown in Table 7, all of the active Rio Rancho wells have well depths greater than 500 feet (ranking low). The depths of City wells included in this analysis range from 828 feet below ground surface (bgs) (Well 3) to 2,988 feet bgs (Well 22).



Table 7. Well Depth Analysis

Well	Status	Total Well Depth (feet bgs)	Ranking	Score
3	Active	828	Low	1
6A	Active	1,476	Low	1
7	Active	1,197	Low	1
9	Active	1,540	Low	1
10A	Active	2,495	Low	1
12	Active	1,459	Low	1
13R	Active	1,910	Low	1
15	Active	1,310	Low	1
16	Active	2,010	Low	1
17	Active	1,710	Low	1
19	Active	2,070	Low	1
21	Active	1,970	Low	1
22	Active	2,988	Low	1

10.1.3 Aquifer Sensitivity

Aquifer sensitivity is defined as the likelihood that an aquifer will remain isolated from contaminants due to intrinsic physical attributes of the geologic setting or geomorphology. Aquifer sensitivity is determined through looking at the depth to groundwater and the hydrogeology of the aquifer at that location. Specifically, the designation used to factor in the hydrogeology component of the sensitivity ranking is total dissolved solids (TDS) concentration. The quantifiable increments used for the depth to water and hydrogeologic sensitivity factors are shown in Table 8.

Table 8. Color Coding for Lee Wilson Aquifer Sensitivity Maps

Depth to Groundwater	TDS Concentration (mg/L)		
	2,000 or less	2,000 to 10,000	greater than 10,000
Less than 100 feet	Highly sensitive	Moderately sensitive	Moderately sensitive
100 to 300 feet	Moderately sensitive	Moderately sensitive	Less sensitive
Greater than 300 feet	Less sensitive	Less sensitive	Less sensitive

Source: NMED, 2005



This table was created by Lee Wilson and Associates in 1989 to color code a New Mexico statewide aquifer sensitivity map for NMED, and is used to sort the aquifer into “highly sensitive,” “moderately sensitive,” and “less sensitive” categories throughout this analysis. Higher TDS concentrations result in a lower aquifer sensitivity ranking. Similarly, greater depths to water result in a lower aquifer sensitivity ranking. Therefore, a low sensitivity ranking reflects a greater depth to water that is less prone to contamination, with a higher TDS concentration to counteract potential contamination. Moderate sensitivity reflects a mid-to-low water depth with varying TDS concentrations. A high sensitivity ranking reflects a well with a depth to water of less than 100 feet and a TDS concentration less than 2,000 milligrams per liter (mg/L).

Sometimes the SWPA of a well includes land area with different aquifer sensitivity levels. The percentage of each aquifer sensitivity level present within a well’s SWPA is calculated via GIS and an aquifer sensitivity score of 1 to 5 is calculated as the weighted average of this percentage using the following equation and rounding up to the next integer:

$$\text{Aquifer sensitivity} = \frac{5 \times (\% \text{high}) + 3 \times (\% \text{moderate}) + (\% \text{less})}{100\%} \quad (1)$$

Multipliers of 5 and 3 are used for high and moderate rankings, respectively, to obtain a representative value on a five-point scale. Figure 8 shows the SWPAs of the Rio Rancho wells overlaid on the Lee Wilson and Associates aquifer sensitivity findings. The rankings (and associated scores) for each well are shown in Table 9. While the majority of the City’s wells ranked low in this category, three wells (3, 10A, and 21) ranked moderately low and two wells (12 and 22) ranked moderate.



Table 9. Aquifer Sensitivity by Well

Well	Land Area Percentages Associated with Aquifer Sensitivity Levels			Aquifer Sensitivity	
	High	Moderate	Less	Score	Ranking
3	0%	18%	82%	2	Moderately low
6A	0%	0%	100%	1	Low
7	0%	0%	100%	1	Low
9	0%	0%	100%	1	Low
10A	0%	19%	81%	2	Moderately low
12	7%	83%	10%	3	Moderate
13	0%	0%	100%	1	Low
15	0%	0%	100%	1	Low
16	0%	0%	100%	1	Low
17	0%	0%	100%	1	Low
19	0%	0%	100%	1	Low
21	0%	23%	77%	2	Moderately low
22	0%	68%	32%	3	Moderate

10.1.4 Calculating the Sensitivity Ranking

A well's overall sensitivity ranking is calculated by averaging the well infrastructure, well depth, and aquifer sensitivity scores and rounding the result up to the next integer, as shown in Table 10. All of the City's wells ranked low for overall sensitivity except for wells 12 and 22, which ranked moderately low. These two wells had moderate aquifer sensitivity rankings, causing the increase in their overall sensitivity score and ranking.



Table 10. Sensitivity Ranking by Well

Well	Well Integrity		Well Depth		Aquifer Sensitivity		Sensitivity	
	Score	Ranking	Score	Ranking	Score	Ranking	Average Score	Overall Ranking
3	1	Low	1	Low	2	Moderately low	1	Low
6A	1	Low	1	Low	1	Low	1	Low
7	1	Low	1	Low	1	Low	1	Low
9	1	Low	1	Low	1	Low	1	Low
10A	1	Low	1	Low	2	Moderately low	1	Low
12	1	Low	1	Low	3	Moderate	2	Moderately low
13R	1	Low	1	Low	1	Low	1	Low
15	1	Low	1	Low	1	Low	1	Low
16	1	Low	1	Low	1	Low	1	Low
17	1	Low	1	Low	1	Low	1	Low
19	1	Low	1	Low	1	Low	1	Low
21	1	Low	1	Low	2	Moderately low	1	Low
22	1	Low	1	Low	3	Moderate	2	Moderately low

10.2 Vulnerability Rankings

The vulnerability ranking is based on the type (severity score) and number (count score) of PSOCs and SOC types present within a well's SWPA.

10.2.1 Severity Score

The severity score considers both the likelihood of a contamination event due to the PSOC or SOC type in question, as well as the contaminant that might impact or has impacted the water source. The ranges of assigned scores differ for PSOCs and SOC types; severity scores of 0 to 1 are assigned for PSOCs and severity scores of 2 to 5 are assigned for SOC types. Table 11 shows the severity score associated with each PSOC and SOC type identified within the City's SWPAs.



Table 11. Severity Scores by PSOC/SOC Type

PSOC/SOC Code	Description	Severity Score
<i>PSOCs (Severity Scores: 0 to 1)</i>		
AHD	Park	0.1
CFA	Aboveground storage tank facility	0.5
CFB	Underground storage tank facility	0.8
CGC	Golf course	0.1
IGO	Oil and gas exploration	0.8
IOG	Gas pipeline	0.2
MLF	Landfill	0.5
MPS	Lift station	0.2
MRP	Primary road, highway, or arterial	0.1
MWP	Bernalillo Well # 4	0.1
—	Arroyo	0.3
—	Fire Station	0.1
—	Fleet Maintenance	0.2
—	Groundwater permit (active): City of Rio Rancho - Direct Injection Recharge Demonstration Project (DP-1650)	0.1
—	Groundwater permit (active): Club Rio Rancho (DP-1629)	0.2
—	Groundwater permit (ceased): Martin Luther King Elementary (DP-445)	0.1
—	Groundwater permit (terminated): City of Rio Rancho Reuse Project (DP-179)	0.1
—	Private well: OSE database	0.2
—	Rio Rancho Public Safety Department	0.1
—	Rio Rancho Public School Transportation	0.1
—	Septic tank	0.3
<i>SOCs (Severity Scores: 2 to 5)</i>		
IUD	Illegal dump	3.0
—	Brownfield: Del Norte Gun Club	2.0
—	Voluntary remediation site: Price's Valley Gold North Dairy - North Area	2.0

10.2.2 Count Score

A count score from 1 to 10 was assigned based on the PSOC count per zone, as shown in Table 12.



Table 12. PSOC Count Scores

PSOC Count per Buffer Zone	Count Score
1	1
2 to 5	2
6 to 10	3
11 to 20	4
21 to 40	5
41 to 60	6
61 to 80	7
81 to 100	8
101 to 150	9
150+	10

10.2.3 Vulnerability Ranking

For each PSOC type per zone, the severity score was multiplied by the count score to obtain a PSOC vulnerability score, as shown in Table 13. The PSOC vulnerability scores for each zone were then totaled and a vulnerability ranking of low, moderately low, moderate, moderately high, or high was assigned to each zone based on the breakdown of vulnerability scores. The well was assigned the vulnerability ranking of the highest of its four zones (i.e., if zones A through C ranked moderate, but Zone D ranked high, the well would be assigned a vulnerability ranking of high). Table 14 summarizes the vulnerability analysis for the City’s active wells.

Table 13. Vulnerability Ranking Decision Matrix

Vulnerability Score				Vulnerability Ranking
Zone A (0 to 200 feet)	Zone B (200 to 500 feet)	Zone C (500 to 1,000 feet)	Zone D (1,000 to 5280 feet)	
1+	1+	5+	8+	High
0.8 to 0.9	0.8 to 0.9	3.0 to 4.9	6.0 to 7.9	Moderately high
0.5 to 0.7	0.5 to 0.7	1.0 to 2.9	4.0 to 5.9	Moderate
0.3 to 0.4	0.3 to 0.4	0.5 to 0.9	2.0 to 3.9	Moderately low
0 to 0.2	0 to 0.2	0 to 0.4	0 to 1.9	Low



Table 14. Vulnerability Analysis
Page 1 of 8

Buffer Zone	PSOC Code	Description	Count	Count Score	Severity Score	Vulnerability Score	Buffer Zone Total	Buffer Zone Ranking	Well Ranking
Well 3									
A	IOG	Gas pipeline	1	1	0.2	0.2	0.4	Moderately low	Moderately high
	—	Fleet maintenance	1	1	0.2	0.2			
B	IOG	Gas pipeline	1	1	0.2	0.2	0.6	Moderate	
	MRP	Primary road, highway, or arterial	1	1	0.1	0.1			
	—	Septic tank	1	1	0.3	0.3			
C	CFB	Underground storage tank facility	1	1	0.8	0.8	2.5	Moderate	
	CGC	Golf course	1	1	0.1	0.1			
	IOG	Gas pipeline	1	1	0.2	0.2			
	MRP	Primary road, highway, or arterial	1	1	0.1	0.1			
	—	Fire station (Station 1)	1	1	0.1	0.1			
	—	Septic tank	20	4	0.3	1.2			
D	AHD	Park	7	3	0.1	0.3	6.7	Moderately high	
	CFB	Underground storage tank facility	4	2	0.8	1.6			
	IOG	Gas pipeline	1	1	0.2	0.2			
	MPS	Lift station	1	1	0.2	0.2			
	MRP	Primary road, highway, or arterial	5	2	0.1	0.2			
	—	Arroyo	1	1	0.3	0.3			
	—	Groundwater permit (ceased): Martin Luther King Elementary (DP-445)	1	1	0.1	0.1			
	—	Private well: OSE database	16	4	0.2	0.8			
	—	Septic tank	805	10	0.3	3.0			



Table 14. Vulnerability Analysis
Page 2 of 8

Buffer Zone	PSOC Code	Description	Count	Count Score	Severity Score	Vulnerability Score	Buffer Zone Total	Buffer Zone Ranking	Well Ranking
Well 6A									
A	IOG	Gas pipeline	1	1	0.2	0.2	0.3	Moderately low	Moderately high
	MRP	Primary road, highway, or arterial	1	1	0.1	0.1			
B	IOG	Gas pipeline	1	1	0.2	0.2	1.5	High	
	MRP	Primary road, highway, or arterial	1	1	0.1	0.1			
	—	Septic tank	17	4	0.3	1.2			
C	IOG	Gas pipeline	1	1	0.2	0.2	2.0	Moderate	
	MRP	Primary road, highway, or arterial	1	1	0.1	0.1			
	—	Private well: OSE database	1	1	0.2	0.2			
	—	Septic tank	40	5	0.3	1.5			
D	AHD	Park	2	2	0.1	0.2	6.2	Moderately high	
	CFB	Underground storage tank facility	1	1	0.8	0.8			
	IOG	Gas pipeline	1	1	0.2	0.2			
	MRP	Primary road, highway, or arterial	7	3	0.1	0.3			
	—	Arroyo	3	2	0.3	0.6			
	—	Private well: OSE database	26	5	0.2	1.0			
	—	Rio Rancho Public School Transportation	1	1	0.1	0.1			
	—	Septic tank	627	10	0.3	3.0			
Well 7									
B	IOG	Gas pipeline	1	1	0.2	0.2	0.9	Moderately high	Moderately high
	MRP	Primary road, highway, or arterial	1	1	0.1	0.1			
	—	Septic tank	4	2	0.3	0.6			
C	IOG	Gas pipeline	1	1	0.2	0.2	1.3	Moderate	
	—	Private well: OSE database	1	1	0.2	0.2			
	—	Septic tank	9	3	0.3	0.9			



Table 14. Vulnerability Analysis
Page 3 of 8

Buffer Zone	PSOC Code	Description	Count	Count Score	Severity Score	Vulnerability Score	Buffer Zone Total	Buffer Zone Ranking	Well Ranking
<i>Well 7 (cont.)</i>									
D	AHD	Park	4	2	0.1	0.2	6.1	Moderately high	Moderately high
	CFB	Underground storage tank facility	1	1	0.8	0.8			
	IOG	Gas pipeline	1	1	0.2	0.2			
	MRP	Primary road, highway, or arterial	8	3	0.1	0.3			
	—	Arroyo	3	2	0.3	0.6			
	—	Fire station (Station 2)	1	1	0.1	0.1			
	—	Private well: OSE database	20	4	0.2	0.8			
	—	Rio Rancho Public School Transportation	1	1	0.1	0.1			
—	Septic tank	647	10	0.3	3.0				
<i>Well 9</i>									
D	IGO	Oil & gas exploration	1	1	0.8	0.8	2.2	Moderately low	Moderately low
	—	Arroyo	4	2	0.3	0.6			
	—	Private well: OSE database	1	1	0.2	0.2			
	—	Septic tank	3	2	0.3	0.6			
<i>Well 10A</i>									
B	IOG	Gas pipeline	1	1	0.2	0.2	0.6	Moderate	Moderately high
	MRP	Primary road, highway, or arterial	1	1	0.1	0.1			
	—	Arroyo	1	1	0.3	0.3			
C	IOG	Gas pipeline	1	1	0.2	0.2	0.2	Low	
D	AHD	Park	1	1	0.1	0.1	6.2	Moderately high	
	CFA	Aboveground storage tank facility	3	2	0.5	1.0			
	CFB	Underground storage tank facility	1	1	0.8	0.8			
	IOG	Gas pipeline	1	1	0.2	0.2			



Table 14. Vulnerability Analysis
Page 4 of 8

Buffer Zone	PSOC Code	Description	Count	Count Score	Severity Score	Vulnerability Score	Buffer Zone Total	Buffer Zone Ranking	Well Ranking
<i>Well 10A (cont.)</i>									
D	MLF	Rio Rancho Waste Management Landfill	1	1	0.5	0.5	6.2	Moderately high	Moderately high
	MRP	Primary road, highway, or arterial	5	2	0.1	0.2			
	—	Arroyo	4	2	0.3	0.6			
	—	Groundwater permit (active): City of Rio Rancho - Direct Injection Recharge Demonstration Project (DP-1650)	1	1	0.1	0.1			
	—	Private well: OSE database	46	6	0.2	1.2			
	—	Septic tank	29	5	0.3	1.5			
<i>Well 12</i>									
B	IOG	Gas pipeline	1	1	0.2	0.2	0.2	Low	High
C	IOG	Gas pipeline	1	1	0.2	0.2	0.5	Moderately low	
	—	Arroyo	1	1	0.3	0.3			
D	AHD	Park	2	2	0.1	0.2	14.6	High	
	CFB	Underground storage tank facility	2	2	0.8	1.6			
	IOG	Gas pipeline	1	1	0.2	0.2			
	IUD	Illegal dump	1	1	3	3.0			
	MPS	Lift station	2	2	0.2	0.4			
	MRP	Primary road, highway, or arterial	3	2	0.1	0.2			
	MWP	Bernalillo Well # 4	1	1	0.1	0.1			
	—	Arroyo	2	2	0.3	0.6			
	—	Brownfield - Del Norte Gun Club	1	1	2	2.0			
	—	Private well: OSE database	100	8	0.2	1.6			
	—	Septic tank	116	9	0.3	2.7			
—	Voluntary remediation site - Price's Valley Gold North Dairy - North Area	1	1	2	2.0				



Table 14. Vulnerability Analysis
Page 5 of 8

Buffer Zone	PSOC Code	Description	Count	Count Score	Severity Score	Vulnerability Score	Buffer Zone Total	Buffer Zone Ranking	Well Ranking
Well 13									
B	—	Arroyo	1	1	0.3	0.3	0.6	Moderate	Moderate
	—	Septic tank	1	1	0.3	0.3			
C	—	Arroyo	4	2	0.3	0.6	1.2	Moderate	
	—	Septic tank	3	2	0.3	0.6			
D	IGO	Oil and gas exploration	1	1	0.8	0.8	3.4	Moderately low	
	—	Arroyo	3	2	0.3	0.6			
	—	Private well: OSE database	1	1	0.2	0.2			
	—	Septic tank	49	6	0.3	1.8			
Well 15									
A	—	Private well: OSE database	1	1	0.2	0.2	0.2	Low	Moderately low
C	IOG	Gas pipeline	1	1	0.2	0.2	0.7	Moderately low	
	—	Arroyo	1	1	0.3	0.3			
	—	Private well: OSE database	1	1	0.2	0.2			
D	IOG	Gas pipeline	1	1	0.2	0.2	1.4	Low	
	MRP	Primary road, highway, or arterial	1	1	0.1	0.1			
	—	Arroyo	4	2	0.3	0.6			
	—	Fire station (Station 6)	1	1	0.1	0.1			
	—	Private well: OSE database	4	2	0.2	0.4			
Well 16									
B	—	Arroyo	1	1	0.3	0.3	0.3	Moderately low	Moderately low
D	AHD	Park	4	2	0.1	0.2	2.3	Moderately low	
	IOG	Gas pipeline	1	1	0.2	0.2			
	MRP	Primary road, highway, or arterial	3	2	0.1	0.2			
	—	Arroyo	3	2	0.3	0.6			
	—	Fire station (Station 2)	1	1	0.1	0.1			



Table 14. Vulnerability Analysis
Page 6 of 8

Buffer Zone	PSOC Code	Description	Count	Count Score	Severity Score	Vulnerability Score	Buffer Zone Total	Buffer Zone Ranking	Well Ranking
<i>Well 16 (cont.)</i>									
D	—	Private well: OSE database	5	2	0.2	0.4	2.3	Moderately low	Moderately low
	—	Septic tank	3	2	0.3	0.6			
<i>Well 17</i>									
A	—	Private well: OSE database	1	1	0.2	0.2	0.5	Moderate	High
	—	Septic tank	1	1	0.3	0.3			
B	—	Arroyo	1	1	0.3	0.3	1.5	High	
	—	Private well: OSE database	6	3	0.2	0.6			
	—	Septic tank	4	2	0.3	0.6			
C	MRP	Primary road, highway, or arterial	1	1	0.1	0.1	1.9	Moderate	
	—	Arroyo	1	1	0.3	0.3			
	—	Private well: OSE database	10	3	0.2	0.6			
	—	Septic tank	7	3	0.3	0.9			
D	AHD	Park	3	2	0.1	0.2	7.6	Moderately high	
	CFB	Underground storage tank facility	3	2	0.8	1.6			
	IOG	Gas pipeline	1	1	0.2	0.2			
	MRP	Primary road, highway, or arterial	4	2	0.1	0.2			
	—	Arroyo	1	1	0.3	0.3			
	—	Groundwater permit (ceased): Martin Luther King Elementary (DP-445)	1	1	0.1	0.1			
	—	Private well: OSE database	302	10	0.2	2.0			
	—	Septic tank	322	10	0.3	3.0			
<i>Well 19</i>									
C	IOG	Gas pipeline	1	1	0.2	0.2	1.4	Moderate	High
	—	Septic tank	13	4	0.3	1.2			



Table 14. Vulnerability Analysis
Page 7 of 8

Buffer Zone	PSOC Code	Description	Count	Count Score	Severity Score	Vulnerability Score	Buffer Zone Total	Buffer Zone Ranking	Well Ranking
<i>Well 19 (cont.)</i>									
D	AHD	Park	2	2	0.1	0.2	8.2	High	High
	IOG	Gas pipeline	1	1	0.2	0.2			
	IUD	Illegal dump	1	1	3	3.0			
	MPS	Lift station	3	2	0.2	0.4			
	MRP	Primary road, highway, or arterial	4	2	0.1	0.2			
	—	Arroyo	4	2	0.3	0.6			
	—	Private well: OSE database	8	3	0.2	0.6			
	—	Septic tank	436	10	0.3	3.0			
<i>Well 21</i>									
B	IOG	Gas pipeline	1	1	0.2	0.2	0.6	Moderate	Moderate
	MRP	Primary road, highway, or arterial	1	1	0.1	0.1			
	—	Arroyo	1	1	0.3	0.3			
C	IOG	Gas pipeline	1	1	0.2	0.2	0.2	Low	
D	AHD	Park	3	2	0.1	0.2	3.1	Moderately low	
	CFA	Aboveground storage tank facility	1	1	0.5	0.5			
	CGC	Golf course	1	1	0.1	0.1			
	IOG	Gas pipeline	1	1	0.2	0.2			
	MRP	Primary road, highway, or arterial	8	3	0.1	0.3			
	—	Arroyo	2	2	0.3	0.6			
	—	Groundwater permit (active): City of Rio Rancho - Direct Injection Recharge Demonstration Project (DP-1650)	1	1	0.1	0.1			
	—	Groundwater permit (active): Club Rio Rancho (DP-1629)	1	1	0.2	0.2			



Table 14. Vulnerability Analysis
Page 8 of 8

Buffer Zone	PSOC Code	Description	Count	Count Score	Severity Score	Vulnerability Score	Buffer Zone Total	Buffer Zone Ranking	Well Ranking
<i>Well 21 (cont.)</i>									
D	—	Groundwater permit (terminated): City of Rio Rancho Reuse Project (DP-179)	1	1	0.1	0.1	3.1	Moderately low	Moderate
	—	Private well: OSE database	12	4	0.2	0.8			
<i>Well 22</i>									
A	IOG	Gas pipeline	1	1	0.2	0.2	0.2	Low	High
B	IOG	Gas pipeline	1	1	0.2	0.2	2.0	High	
	—	Arroyo	1	1	0.3	0.3			
	—	Private well: OSE database	8	3	0.2	0.6			
—	Septic tank	6	3	0.3	0.9				
C	IOG	Gas pipeline	1	1	0.2	0.2	2.3	Moderate	
	—	Private well: OSE database	8	3	0.2	0.6			
	—	Septic tank	24	5	0.3	1.5			
D	AHD	Park	2	2	0.1	0.2	6.4	Moderately high	
	IOG	Gas pipeline	1	1	0.2	0.2			
	MRP	Primary road, highway, or arterial	5	2	0.1	0.2			
	—	Arroyo	5	2	0.3	0.6			
	—	Fire Station (Station 7)	1	1	0.1	0.1			
	—	Private well: OSE database	387	10	0.2	2.0			
	—	Rio Rancho Public Safety Department	1	1	0.1	0.1			
—	Septic tank	560	10	0.3	3.0				



10.3 Overall Susceptibility

A well's susceptibility is determined by the intersection of its sensitivity and vulnerability rankings as shown on Table 15. Table 16 lists the susceptibility rankings of each City well.

Table 15. Susceptibility Ranking Description

		Sensitivity Ranking				
		High	Moderately High	Moderate	Moderately Low	Low
Vulnerability Ranking	High	High	High	Moderately high	Moderately high	Moderate
	Moderately high	High	Moderately high	Moderately high	Moderate	Moderate
	Moderate	Moderately high	Moderately high	Moderate	Moderate	Moderately low
	Moderately low	Moderately high	Moderate	Moderate	Moderately low	Moderately low
	Low	Moderate	Moderate	Moderately low	Moderately low	Low

Table 16. Sensitivity, Vulnerability, and Susceptibility Rankings

Well	Sensitivity Ranking	Vulnerability Ranking	Susceptibility Ranking
3	Low	Moderately high	Moderate
6A	Low	Moderately high	Moderate
7	Low	Moderately high	Moderate
9	Low	Moderately low	Moderately low
10A	Low	Moderately high	Moderate
12	Moderately low	High	Moderately high
13R	Low	Moderate	Moderately low
15	Low	Moderately low	Moderately low
16	Low	Moderately low	Moderately low
17	Low	High	Moderate
19	Low	High	Moderate
21	Low	Moderate	Moderately low
22	Moderately low	High	Moderately high



Wells 12 and 22 ranked the highest of all the City's active wells, with an overall susceptibility ranking of moderately high. Both of these wells ranked moderate in aquifer sensitivity; they are the two active wells located closest to the Rio Grande. The higher aquifer sensitivity score gave them a moderately low overall sensitivity score (while all of the City's other active wells had a low overall sensitivity score). Wells 12 and 22 were two of four wells that scored high in vulnerability. Well 12 ranked high in vulnerability because of the number and type of PSOCs in Zone D of its SWPA. Several PSOCs with high severity scores are located in Zone D of Well 12 (specifically, an illegal dump area, Del Norte Gun Club brownfield site, and Price's Valley Gold North Dairy [North Area] voluntary remediation site), as well as PSOCs with high count scores (septic tanks and private wells). Well 22 ranked high in vulnerability because of the variety and number of PSOCs in Zone B of its SWPA (200 to 500 feet from the wellhead). The sums of the severity scores of the four different PSOC types in this zone alone add up to 1.0, which would score as high for Zone B; when multiplying the severity scores by the >1 count scores for private wells and septic tanks, the buffer zone total rises even higher to 2.0.

Well 17 ranked high because of the number of PSOCs in Zone B of its SWPA. There is an arroyo, 6 private wells, and 4 septic tanks that have been identified in this zone. Well 19 scored high in vulnerability due to the presence of an illegal dump area (high severity score) and the high number of septic tanks (436 tanks; high count score) in Zone D of its SWPA. Interestingly, Well 19 had no PSOCs identified in Zones A or B of its SWPA.

It is noteworthy that all of the City's active wells scored low in well integrity (indicating that they were drilled properly and are well maintained) and scored low in well depth (all wells are over 500 feet deep).

11. Source Water Monitoring Plan

The City currently conducts water monitoring at the entry points of the system for heavy metals, radionuclides, synthetic organic compounds, and volatile organic compounds (VOCs). Appendix E provides the sampling schedule as shown on the NMED Drinking Water Watch (NMED DWW, 2016).



12. PSOC Monitoring and Control Plan

The City monitors water quality in accordance with state and federal requirements. The City also tests and monitors for secondary contaminants in the source water.

The City should review the monitoring data from the NMED PSTB for compliance of the gasoline service stations in the City. The Source Water Protection Atlas should also be reviewed on an annual basis to identify future PSOCs within the SWPAs. As described previously, the Shell Station at 4001 Sara Rd received a confirmed release letter from NMED and a work plan has been submitted to the PSTB to perform the MSA, which will determine the extents of contamination.

The City of Rio Rancho Source Water Protection Team should do the following:

- Participate as necessary in regulatory meetings and hearings on facilities within the SWPAs.
- Determine the extent and location of illegal dumping areas within the City's jurisdiction and act to reduce the use of these areas through education and enforcement.
- Review proposed future development within the SWPAs, including exploratory oil and gas drilling, and exercise the City's land use controls as needed.
- Encourage the City's facilities (e.g., Fleet, the Sports Complex, parks, and transportation department) to minimize fertilizer and other chemical use within the SWPAs. If chemical use is necessary, maintain best management practices.



13. Public Involvement

A virtual workshop with the SWP team was held on December 16, 2020 for the purpose of updating the SWPP. The PSOC map was updated with the latest NMED database and was provided to SWP Team members prior to the meeting. A comment period was established ending December 31, 2020, after which the plan document was updated and distributed to SWP team members. The sign in sheet and meeting notes are included in Appendix F. The SWP team members reviewed the updated text and had the opportunity to provide feedback and comments. Common Ground Rising submitted comments. The group's comments and the corresponding responses from the City are provided in Appendix F.

Common Ground Rising provided a report prior to the December 2020 meeting concerning dumping of salt from brine wells drilled near the Rio Puerco at the Rio Rancho landfill that is owned and operated by Waste Management in Rio Rancho (Appendix G). According to this report, brine water was also dumped into the sewer system in 2019. Reportedly, 51 loads of this waste were received by the landfill in 2017. Waste Management's response to the report is also provided in Appendix G. Waste Management disputes some of the facts of that report, but agrees that ongoing monitoring is needed. However, this landfill is lined and the liner, which protects against groundwater contamination, is in good condition. The landfill is nearing the end of its permit (2028). Waste Management will be required to continue to monitor that site for 30 years after permit expiration.

The finalized plan update will be made available on the City's website.

14. Conclusions and Recommendations

Threats to the City of Rio Rancho water supply are naturally occurring arsenic, septic systems (particularly in the vicinity of private wells), illegal dumping, and the growing population.

The City has installed 10 arsenic treatment facilities to treat water from 12 wells (3, 6, 7, 9, 10A, 13, 14, 15, 16, 17, 21, and 22). In doing this, the City has addressed this risk.



While much of the City is on municipal wastewater service, there are numerous residents who do not have wastewater service available and are still using septic systems. While the septic systems do not pose a significant threat to the deep City wells, they are PSOCs for much shallower private wells.

Where wastewater service is available, the City should consider incentives to homeowners to connect to the City sewer system and to properly abandon septic systems. Where water service is available, the City should consider incentives for homeowners to connect to the public water system and disconnect from their private wells. There may be homeowners connected to both the public water system and a private well, which represents a potential for cross-contamination of the public water system.

The City continues to grow on a steady basis. The growing regional population will drive the need to continue implementing water conservation measures. Water infrastructure improvements, such as connecting all the residents to the City sewer system, will provide the assurance of a protected water system in the future. Water sampling for constituents such as arsenic will need to continue as part of a regular monitoring program.

The City should monitor the progress of the minimum site assessment (overseen by NMED's Petroleum Storage Tank Bureau) of the confirmed release from a petroleum storage tank at the Shell gas station located at 4001 Sara Road. This event did not occur within any SWPAs of any City supply wells, but it is located in Zone D of monitor wells 1 and 2.

The City is aware of illegal dumping (including household hazardous waste) in the vicinity of several of its active production wells. The City should continue determining the extent and locations of all illegal dumping areas within the City's jurisdiction and should continue acting to reduce the use of these areas through education and enforcement. No additional major threats were determined. There are 13 underground storage tank (UST) sites located within the City's SWPAs that have had no recorded releases and undergo routine inspections. No major industries or mines that could present a potential for impacting the water system are located within the region. The one large industrial customer does not present a threat to the water supply.



DBS&A makes the following recommendations for the City's implementation of the Source Water Protection Program:

- The SWP team should meet biennially to review the PSOCs and any changes to the system's sources.
- This SWPP and the map of PSOCs should be updated on a biennial basis.
- The SWP team should participate as necessary in regulatory meetings and hearings on facilities within the SWPAs.
- The members of the SWP team may change over time. Representation on the team should be considered to inform the plan and implement recommended actions. For example, continue to invite and include someone from the local soil and water conservation district.
- A public information program should be developed related to source water protection. This program would educate the public about the City's water sources, potential threats to those sources, and measures that the public can take to protect water sources, and would encourage the public to report PSOCs to the Source Water Protection Team. Options for communicating with the public include meetings, advertisements, flyers, brochures, posters, questionnaires, and community and school events.

References

Black, B.A. and W.L. Hiss. 1974. Structure and stratigraphy in the vicinity of the Shell Oil Co. Santa Fe Pacific No. 1 test well, Southern Sandoval County, New Mexico. p. 365-370 *in* Siemers, C.T., L.A. Woodward, and J.F. Callender (Eds.), *Ghost Ranch, Central-Northern New Mexico*. New Mexico Geological Society Twenty-Fifth Annual Field Conference.

Bohannon Huston, Inc. (BHI). 2011. *City limits ultimate development water system master plan, City of Rio Rancho comprehensive water master plan* [Draft]. Prepared for City of Rio Rancho. December 2011.



Bryan, K. and F.T. McCann. 1937. The Ceja del Rio Puerco - A border feature of the Basin and Range Province in New Mexico, Part II, Geomorphology. *Journal of Geology* 45:1-16.

Chapin, C.E. and S.M. Cather. 1994. Tectonic setting of the axial basins of the northern and central Rio Grande Rift. p. 5-26 in Keller, G.R. and S.M. Cather (Eds.), *Basins of the Rio Grande Rift: Structure, stratigraphy, and tectonic setting*. Geological Society of America Special Paper 291.

City of Rio Rancho. 2019. Data provided to Daniel B. Stephens & Associates, Inc. in February 2019.

Connell, S.D. 2001. Stratigraphy of the Albuquerque Basin, Rio Grande Rift, New Mexico: A progress report. p. A1-A24 in Connell, S.D., S.G. Lucas, and D.W. Love (Eds.), *Geological Society of America Rocky Mountain-South Central Section Meeting, Albuquerque, NM*. New Mexico Bureau of Mines and Mineral Resources Open-File Report 454 A.

Connell, S.D. 2004. Geology of the Albuquerque Basin and tectonic development of the Rio Grande Rift in north-central New Mexico. p. 359-388 in Mack, G.H. and K.J. Giles (Eds.), *The geology of New Mexico: A geologic history*. New Mexico Geological Society Special Publication 11.

Connell, S.D. 2006. *Preliminary geologic map of the Albuquerque-Rio Rancho metropolitan area and vicinity, Bernalillo and Sandoval Counties, New Mexico*. New Mexico Bureau of Geology and Mineral Resources Open-File Report 496.

Connell, S.D. 2008. Refinements to the stratigraphic nomenclature of the Santa Fe Group, northwestern Albuquerque Basin, New Mexico. *New Mexico Geology* 30(1): 14-35.

Connell, S.D., D.J. Koning, and S.M. Cather. 1999. Revisions to the stratigraphic nomenclature of the Santa Fe Group, northwestern Albuquerque Basin, New Mexico. p. 337-354 in Pazzaglia, F.J. and S.G. Lucas (Eds.), *Albuquerque geology*. New Mexico Geological Society Fiftieth Annual Field Conference.



- Daniel B. Stephens & Associates, Inc. (DBS&A). 2015. *[Draft] City of Rio Rancho 40-year water development plan, update and progress report*. Prepared for the City of Rio Rancho, New Mexico. May 29, 2015.
- Galusha, T. 1966. *The Zia sand formation, New early to medial Miocene beds in New Mexico*. American Museum Novitates No. 2271.
- Gawne, C. 1981. Sedimentology and stratigraphy of the Miocene Zia sand of New Mexico, Summary. *Geological Society of America Bulletin, Part I* 92: 999-1007.
- Glorieta Geoscience, Inc. (GGI). 2008. *Evaluation of future production well locations, well replacement needs, and future water sources, City of Rio Rancho, NM*. Prepared for the City of Rio Rancho. November 2008.
- Grauch, V.J.S. 1999. Principal features of high-resolution aeromagnetic data collected near Albuquerque, New Mexico. p. 115-118 *in* Pazzaglia, F.J. and S.G. Lucas (Eds.), *Albuquerque geology*. New Mexico Geological Society Fiftieth Annual Field Conference.
- Grauch, V.J.S., C.L. Gillespie, and G.R. Keller. 1999. Discussion of new gravity maps for the Albuquerque basin area. p. 199-124 *in* Pazzaglia, F.J. and S.G. Lucas (Eds.), *Albuquerque geology*. New Mexico Geological Society Fiftieth Annual Field Conference.
- Hawley, J.W. (Ed.). 1978. *Guidebook to Rio Grande Rift in New Mexico and Colorado*. New Mexico Bureau of Mines and Mineral Resources Circular 163.
- Heywood, C.E., D.L. Galloway, and S.V. Stork. 2002. *Ground displacements caused by aquifer-system water-level variations observed using interferometric synthetic aperture radar near Albuquerque, New Mexico*. U.S. Geological Survey (USGS) Water-Resources Investigations Report 02-4235.

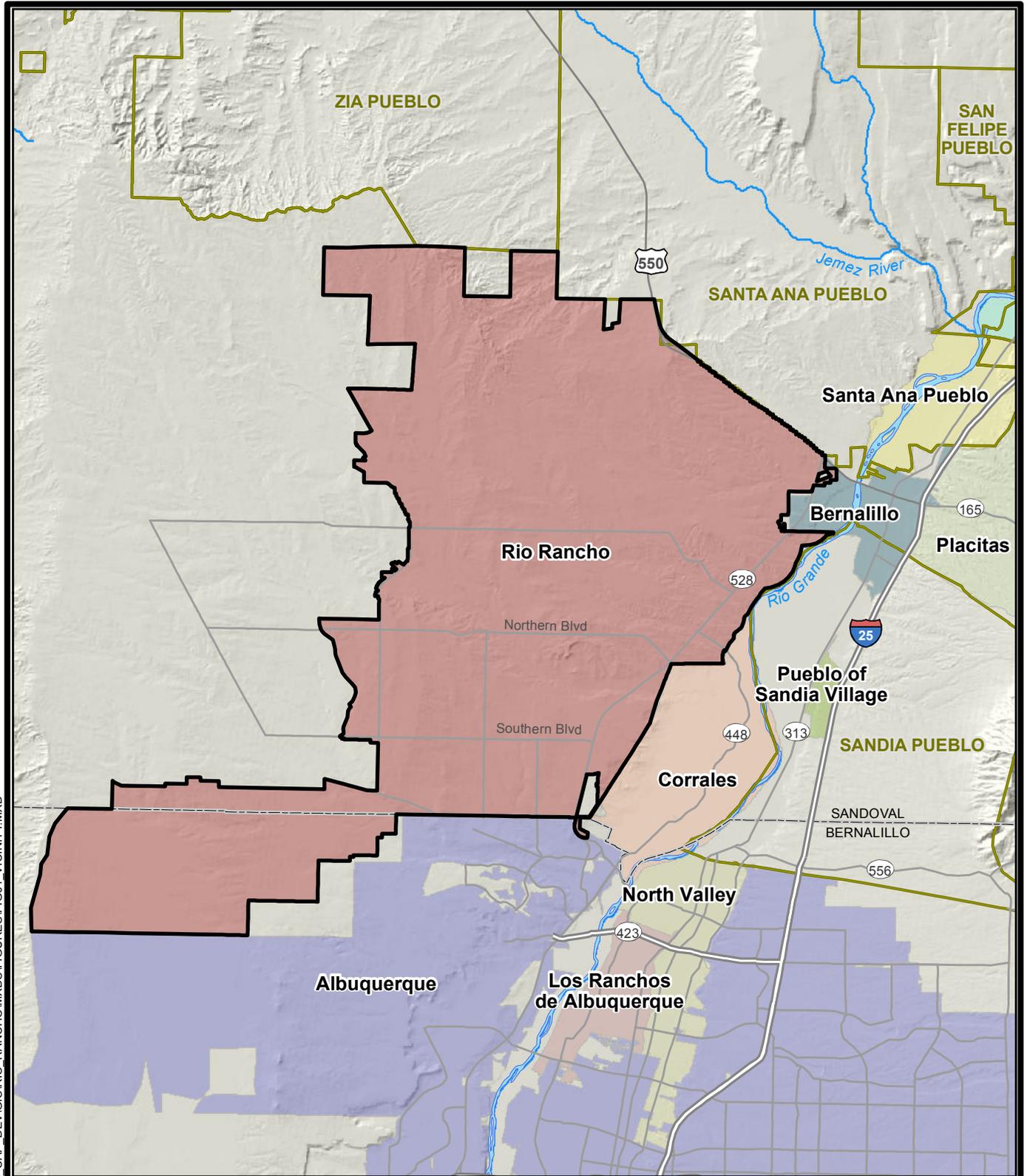


- Keller, G.R. and S.M. Cather. 1994. Introduction. p. 1-4 in Keller, G.R. and S.M. Cather (Eds.), *Basins of the Rio Grande Rift: Structure, stratigraphy, and tectonic setting*. Geological Society of America Special Paper 291.
- Kelley, V.C. 1977. *Geology of the Albuquerque Basin, New Mexico*. New Mexico Bureau of Mines and Mineral Resources Memoir 33.
- Machette, M.M., S.F. Personius, K.I. Kelson, K.M. Haller, and R.L. Dart. 1998. *Map and data for Quaternary faults and folds in New Mexico*. USGS Open-File Report 98-251.
- Manley, K. 1978. *Geologic map of Bernalillo NW quadrangle, Sandoval County, New Mexico*. USGS Geologic Quadrangle Map GQ 1446. Scale 1:24,000.
- May, S.J. and L.R. Russell. 1994. Thickness of the syn-rift Santa Fe Group in the Albuquerque Basin and its relation to structural style. p. 113-123 in Keller, G.R. and S.M. Cather (Eds.), *Basins of the Rio Grande Rift: Structure, stratigraphy, and tectonic setting*. Geological Society of America Special Paper 291.
- New Mexico Environment Department (NMED) Drinking Water Bureau (DWB). 2013. *New Mexico source water and wellhead protection toolkit*. November 27, 2013.
- NMED DWB. 2016. *Source Water Protection Atlas (SWPA) Mapper*. Accessed October 2016. <<https://gis.web.env.nm.gov/SWPA/>>.
- NMED Drinking Water Watch (DWW). 2016. Data for Rio Rancho system. Accessed October 2016 at <<https://dww.water.net.env.nm.gov/DWW/>>.
- Personius, S.F., M.N. Machette, and B.D. Stone. 2000. *Preliminary geologic map of the Loma Machete quadrangle, Sandoval County, New Mexico*. U.S. Geological Survey Miscellaneous Field Studies Map MF-2334.

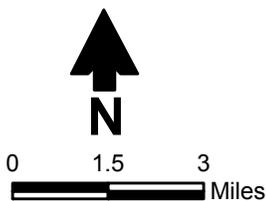


- Riesterer, J., P. Drakos, J. Lazarus, J. Vaughn, and J. Hawley. 2003. *Drilling and testing report, City of Rio Rancho well 10A, RG-6475-S-16-CLW, Rio Rancho, NM*. Prepared for City of Rio Rancho.
- Riesterer, J., J. Hawley, P. Drakos, J. Lazarus, M. Lesh, and M. Chudnoff. 2004. *City of Rio Rancho ground water exploration program - Results of Phase one study*. Prepared for City of Rio Rancho.
- Riesterer, J., P. Drakos, J. Lazarus, M. Chudnoff, and J. Hawley. 2005. *Well drilling, completion, and testing report, City of Rio Rancho well 22 (RG-6745-S-19)*. Prepared for City of Rio Rancho.
- Riesterer, J. and P. Drakos. 2008. *Well drilling, completion, and testing report, City of Rio Rancho well 23 (RG-6745-S-27)*. Prepared for City of Rio Rancho.
- Russell, L.R. and S. Snelson. 1994. Structure and tectonics of the Albuquerque Basin segment of the Rio Grande Rift: Insights from reflection seismic data. p. 83-112 in Keller, G.R. and S.M. Cather (Eds.), *Basins of the Rio Grande Rift: Structure, stratigraphy, and tectonic setting*. Geological Society of America Special Paper 291.
- Tedford, R.H. and S. Barghoorn. 1997. Miocene mammals of the Española and Albuquerque Basins, North-Central New Mexico. p. 77-95 in Lucas, S.G., J.W. Estep, G.S. Williamson, and G.S. Morgan (Eds.), *New Mexico's Fossil Record 1*. New Mexico Museum of Natural History and Science Bulletin 11.
- Tedford, R.H. and S. Barghoorn. 1999. Santa Fe Group (Neogene), Ceja Del Rio Puerco, northwestern Albuquerque Basin, Sandoval County, New Mexico. p. 327-335 in Pazzaglia, F.J. and S.G. Lucas (Eds.), *Albuquerque geology*. New Mexico Geological Society Fiftieth Annual Field Conference.
- U.S. Environmental Protection Agency (U.S. EPA). 2016. *EnviroMapper for Envirofacts*. Accessed October 2016. <<http://www.epa.gov/emefdata/em4ef.home>>.

Figures



S:\PROJECTS\NM15.0090_NMED_DWB_CAP_DEVGIS\RIO_RANCHO\MXD\FIGURES\FIG01_VICINITY.MXD



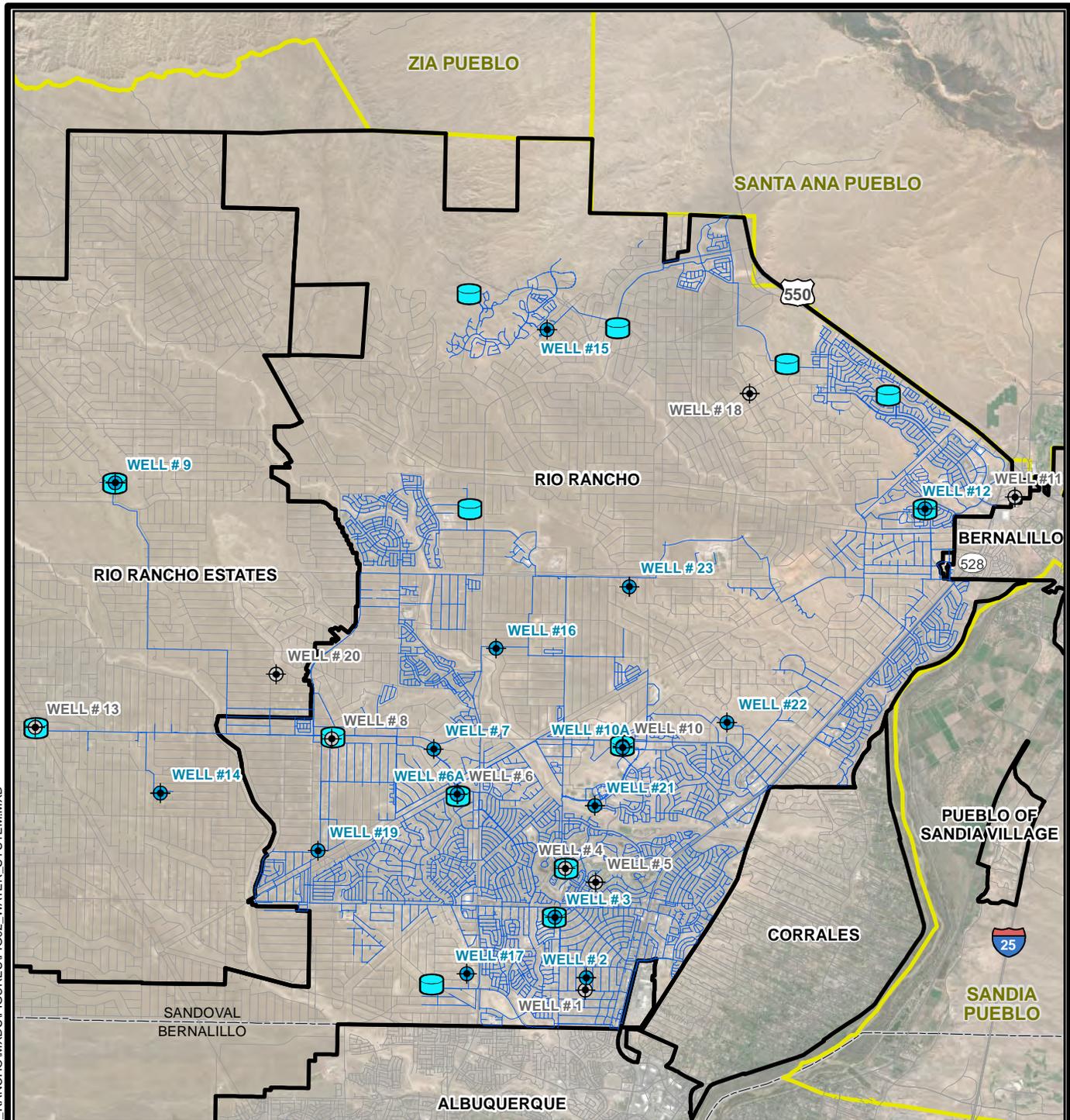
Explanation
 [Yellow outline] Pueblo
 [Dashed line] County

**CITY OF RIO RANCHO
 SOURCE WATER PROTECTION PLAN
 Vicinity Map**

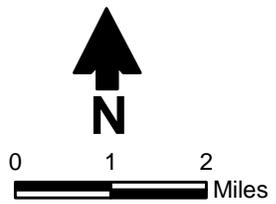


Daniel B. Stephens & Associates, Inc.
 2/1/2017 JN NM15.0090

Figure 1



2015 aerial imagery from Google Earth



Explanation

- City
- Pueblo
- County
- Road
- City well
- Active
- Inactive
- Water main
- Tank

**CITY OF RIO RANCHO
SOURCE WATER PROTECTION PLAN
Water System**

Figure 2

S:\PROJECTS\NM15.0090_NMED_DWB_CAP_DE\GIS\RIO_RANCHO\XDS\FIGURES\FIG02_WATER_SYSTEM.MXD

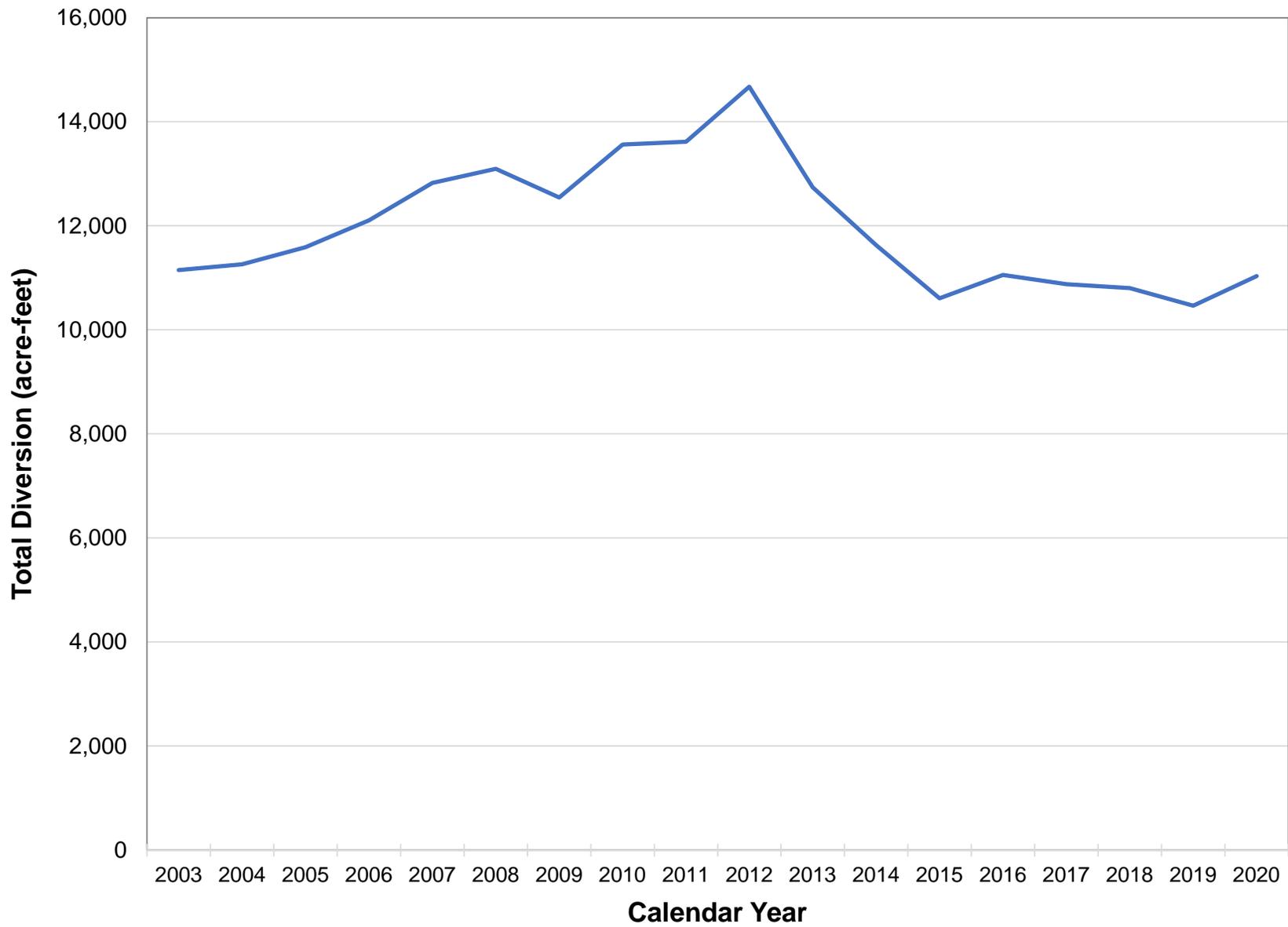


Figure 3



Daniel B. Stephens & Associates, Inc.

2/1/21

CITY OF RIO RANCHO
SOURCE WATER PROTECTION PLAN
Total Production, 2003–2020

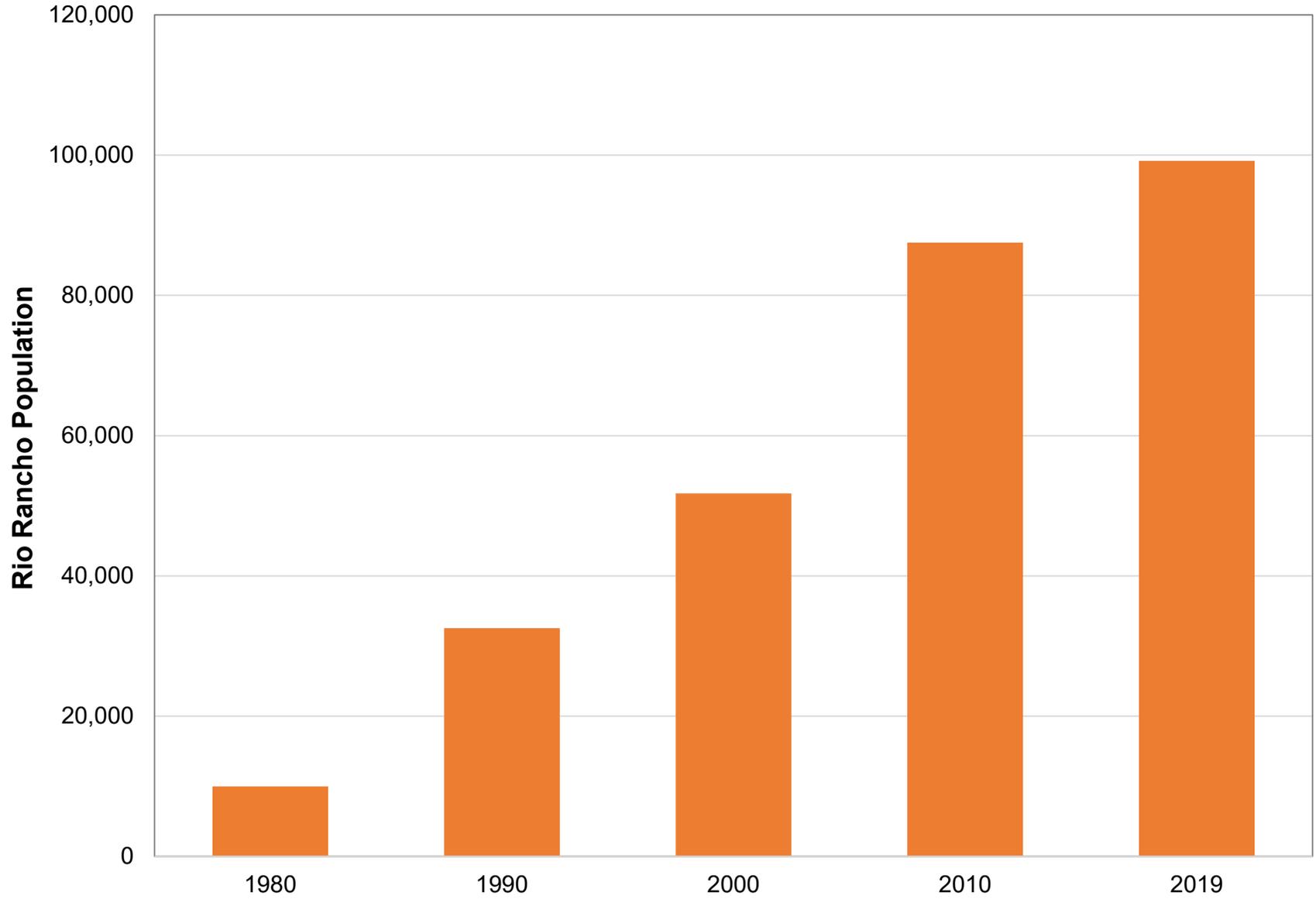


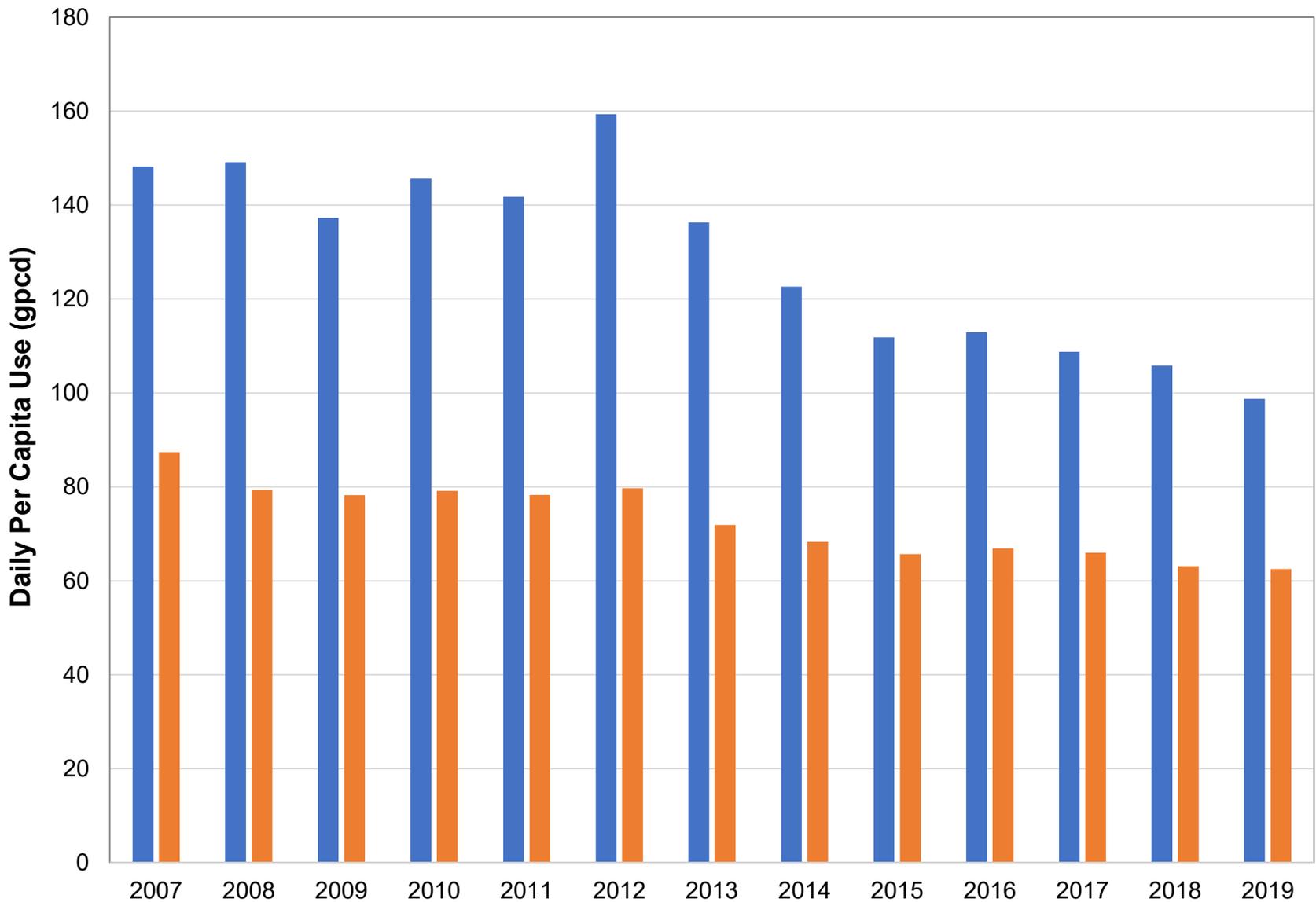
Figure 4a



Daniel B. Stephens & Associates, Inc.

2/18/21

CITY OF RIO RANCHO
SOURCE WATER PROTECTION PLAN
Historical Population Growth



■ Total system ■ Single family residential

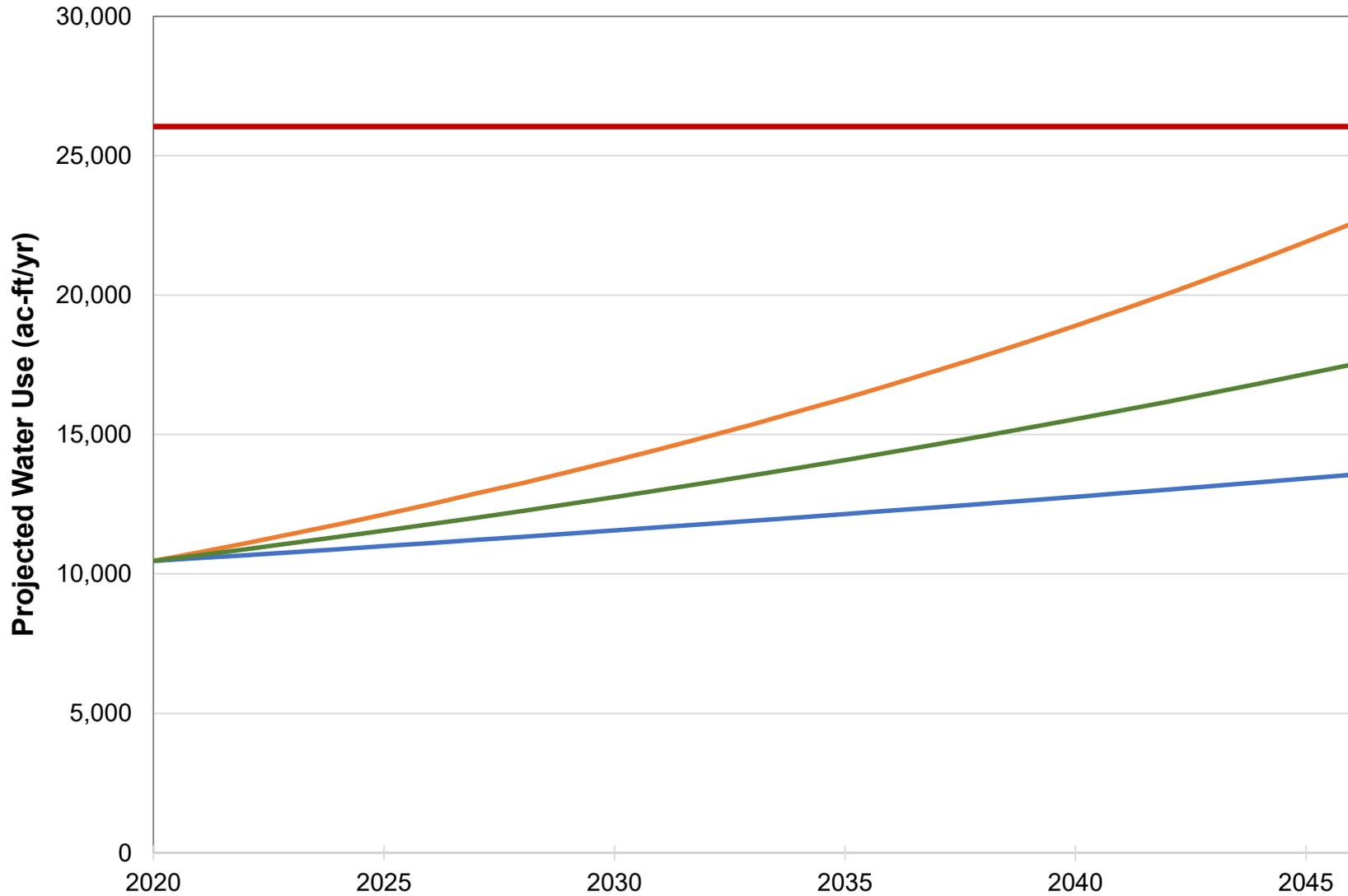
CITY OF RIO RANCHO
SOURCE WATER PROTECTION PLAN
Historical Per Capita Water Use

Figure 4b



Daniel B. Stephens & Associates, Inc.

2/18/21



— Low growth (1%) — High growth (3%)
— Probable growth (2%) — Permitted amount (26,039 ac-ft/yr)

CITY OF RIO RANCHO
SOURCE WATER PROTECTION PLAN
**Water Use Projections Based on
Population Growth Scenarios, 2020–2045**

Figure 5

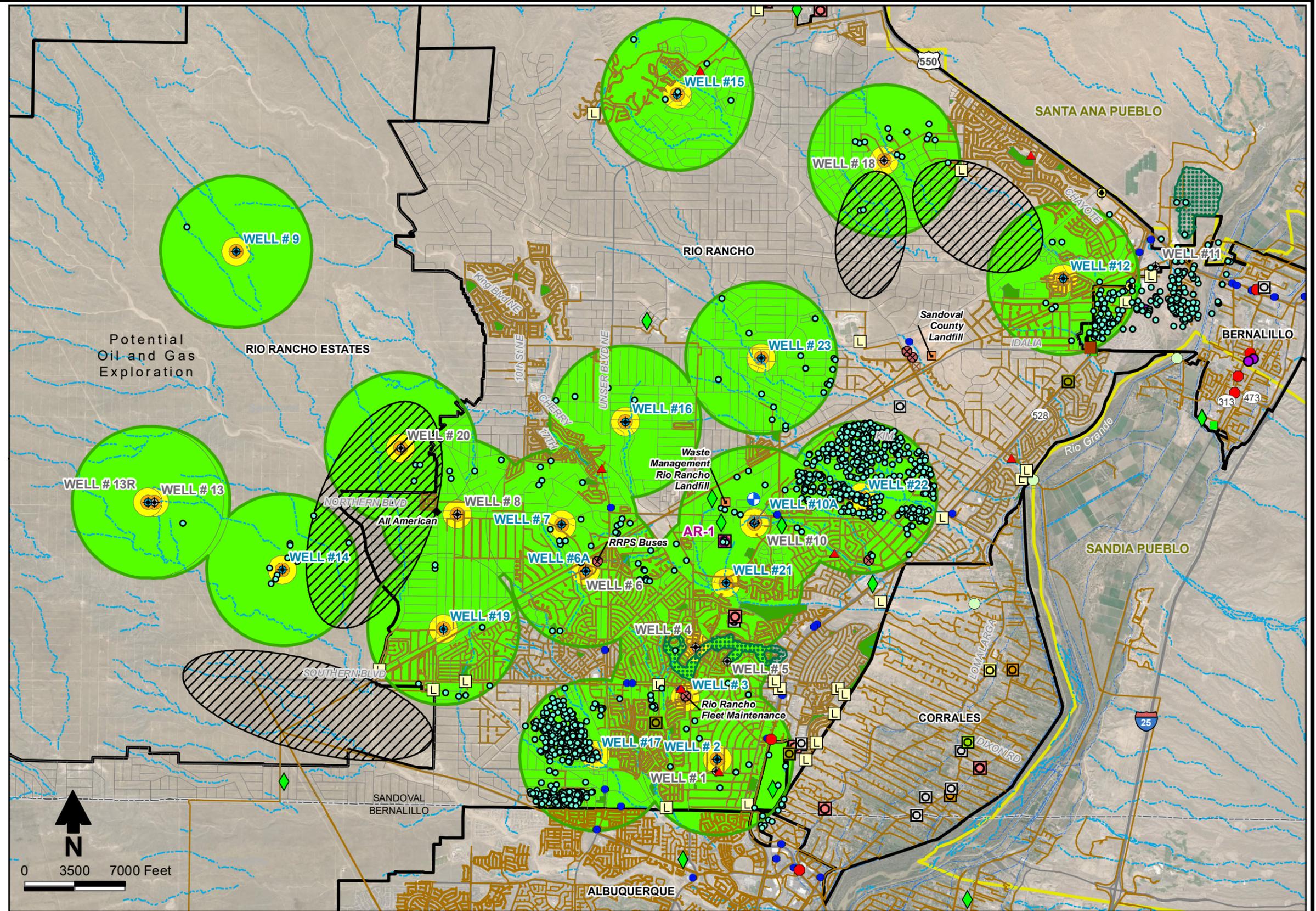


Daniel B. Stephens & Associates, Inc.

2/18/21

\\SS6ABQ\DATA\PROJECTS\WR_CITY_OF_RIO_RANCHO\018.1297_ON-CALL_HYDROGEOLOGICAL_SERVICES\GIS\MXD\SISWPP_UPDATE_2021\POTENTIAL_CONTAM_SOURCES_202101.MXD

- City well
 - Active
 - Inactive
 - Existing direct injection well
- Bernalillo well
 - Bernalillo well
- City
- Pueblo
- County
- Road
- Gas pipeline
- Park or sports complex
- Golf course
- Illegal dump area (household hazardous waste)
- Irrigation conveyance
- Arroyo
- Source water protection area
- Buffer zone
 - A (0-200 ft)
 - B (201-500 ft)
 - C (501-1,000 ft)
 - D (1,001-5,280 ft)
- Lift station
- Government facility with chemicals
- Fire station
- Abatement site
- Brownfield
- Leaking underground storage tank site
- Underground storage tank facility
- AST facility
- Landfill
- Landfill monitor well
- NPDES permit
- Solid Waste Facilities
- Voluntary remediation site
- OSE well in source water protection area
- Groundwater permit
 - Active
 - Ceased
 - Inactive
 - Terminated
 - Transferred to LWP
 - Withdrawn

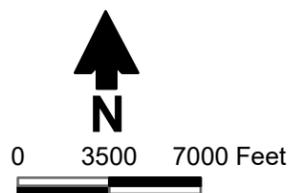


2015 aerial imagery from Google Earth

CITY OF RIO RANCHO
 SOURCE WATER PROTECTION PLAN
 Potential Sources of Contamination

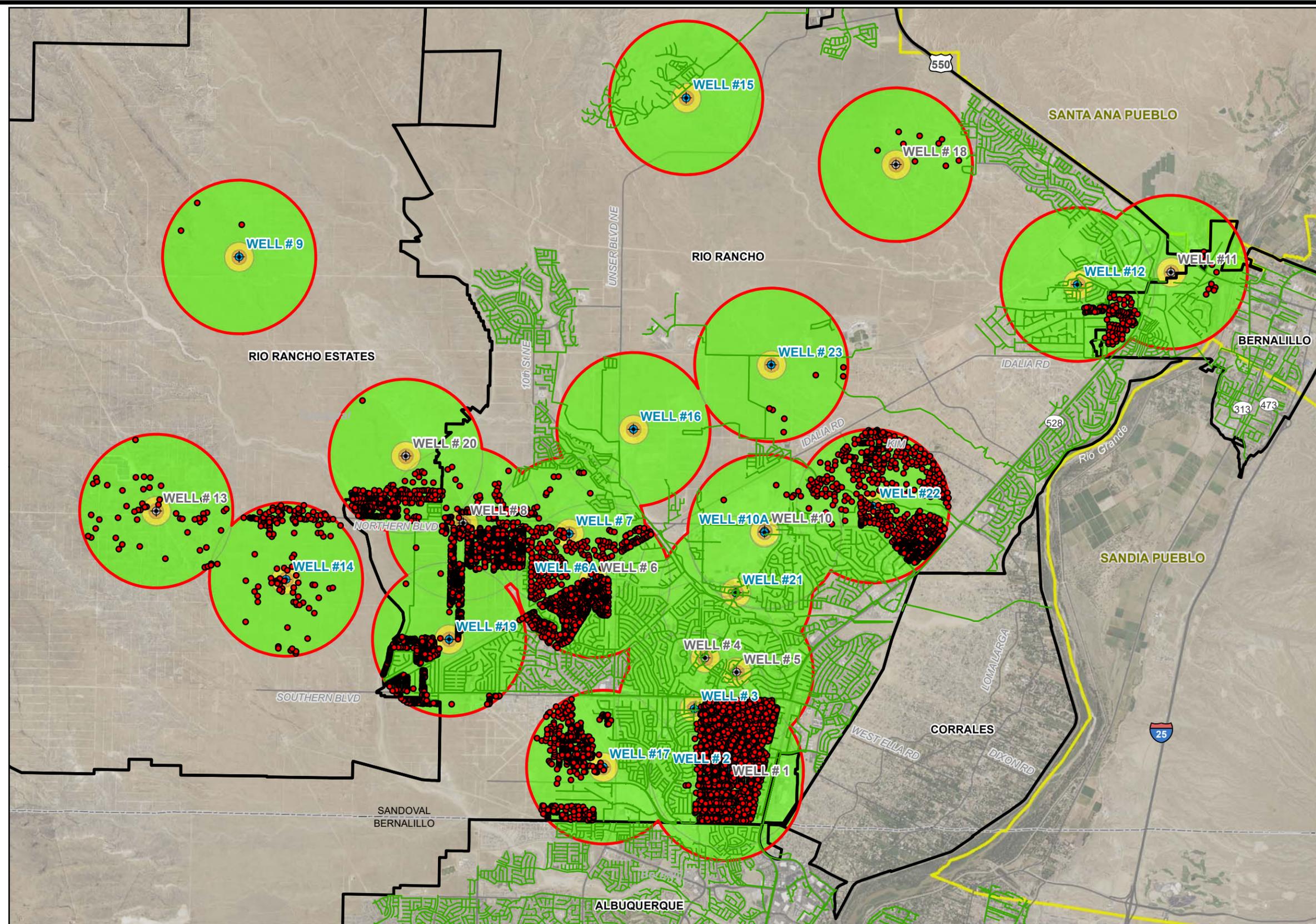
Figure 6

S:\PROJECTS\WR_CITY_OF_RIO_RANCHO\B18.1297_ON-CALL_HYDROGEOLOGICAL_SERVICES\GIS\MSIS\SWPP_UPDATE_2020\SEPTICS.MXD



Explanation

- Septic system
- Sewer line
- City well
 - ⊕ Active
 - ⊖ Inactive
- ▭ City
- ▭ Pueblo
- Road
- Source water protection area
- Buffer zone
 - A (0-200 ft)
 - B (201-500 ft)
 - C (501-1,000 ft)
 - D (1,001-5280 ft)



USDA NAIP 2016 aerial imagery

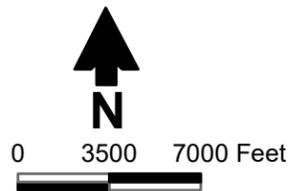


Daniel B. Stephens & Associates, Inc.
12/14/2020 JN DB18.1297

**CITY OF RIO RANCHO
SOURCE WATER PROTECTION PLAN
Septic Systems**

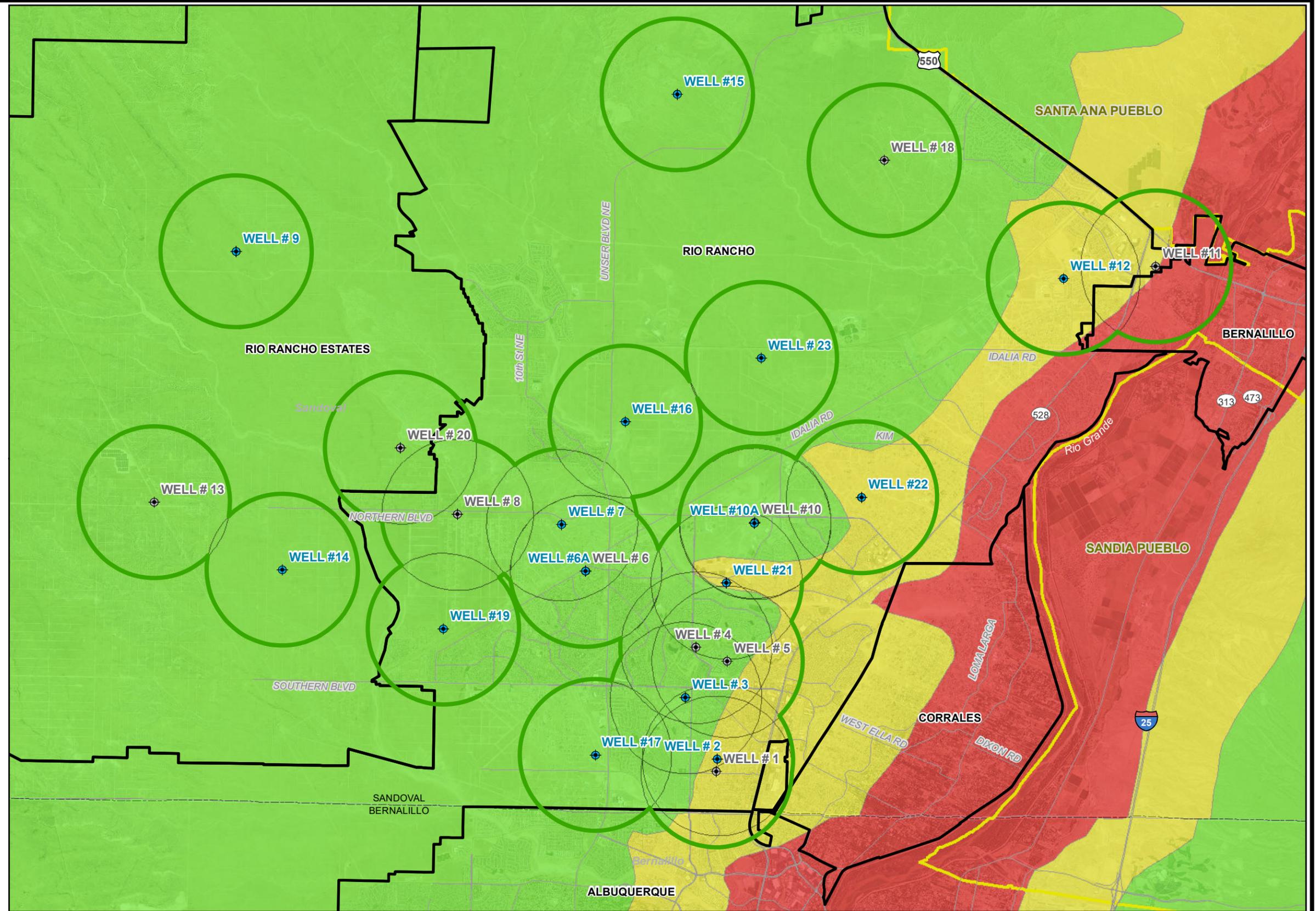
Figure 7

S:\PROJECTS\WR_CITY_OF RIO RANCHO\B18.1297_ON-CALL_HYDROGEOLOGICAL_SERVICES\GIS\MSISWPP_UPDATE_2020\AQIFER_SENSITIVITY.MXD



Explanation

- City well
 - Active
 - Inactive
- Road
- City
- Pueblo
- Source water protection area
- Aquifer sensitivity
 - High
 - Moderate
 - Less



USDA NAIP 2016 aerial imagery



Daniel B. Stephens & Associates, Inc.
12/16/2020 JN DB18.1297

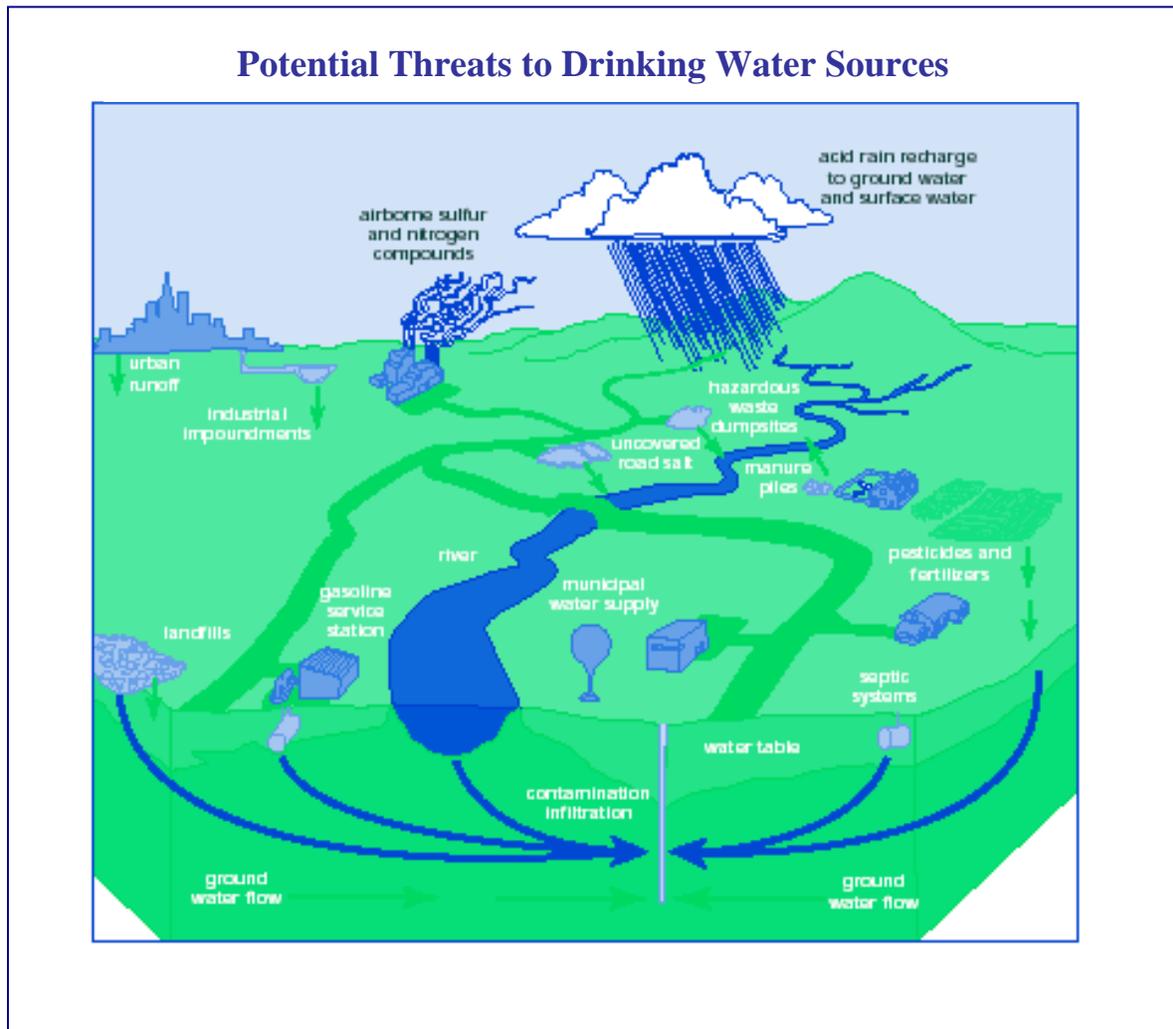
CITY OF RIO RANCHO
SOURCE WATER PROTECTION PLAN
Aquifer Sensitivity

Figure 8

Appendix A
NMED Source Water
Assessment

*Source Water Assessment & Protection Program
Report of Rio Rancho Sewer & Wastewater Services Water
Utility*

Public Water System # 096-23



New Mexico Environment Department -
Drinking Water Bureau

August 2003

Funded under *the Federal Safe Drinking Water Act Amendments of 1996*



TABLE OF CONTENTS

ACRONYMS -----3

TABLES

Table 1 Inventory of Actual and Potential Sources of Contamination-----6
Table 2 PSOC Ranking Determination -----7
Table 3 PSOC Vulnerability Inventory and Ranking-----7
Table 4 Sensitivity Analysis Definitions, Explanatory Note, and Information Sources ---7
Table 5 Composite Sensitivity Ranking-----8
Table 6 Composite Sensitivity Rank Assigned-----9
Table 7 Susceptibility Ranking ----- 10
Table 8 Source Susceptibility Ranking----- 10

APPENDICES

Appendix A Examples Source Area Protection Plan Template
Appendix B Susceptibility Analysis
Appendix C Inventory of Actual and Potential Sources of Contamination (Example)
Appendix D Management Strategy and Schedule (Example)
Appendix E Contingency Protocol and Schedule (Example)
Appendix F Media Aid Examples
Appendix G Source Water Protection Categoris: Measures & Tools examples
Appendix H Zoning Ordinance Example
Appendix I Source Water Protection Planning Tasks Exercise
Appendix J Protection Plan Template with Assessment Data
Appendix K Potential Sources of Contamination
Appendix L Contaminants of Concern
Appendix M DRASTIC Conservative Value Calculations
Appendix N U.S. Geological Survey Topographic Map Legend

ACRONYMS

ARCGIS	ArcView Geographic Information System
BMP	Best Management Practices
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
DWB	Drinking Water Bureau
EPA	Environmental Protection Agency
GGAP	Ground-Water Protection Policy and Action Plan
GPAB	Ground Water Protection Advisory Board
GPD/FT ²	Gallons Per Day Per Foot Squared
GPS	Global Positioning System
LU	Land Use
MCL	Maximum Contaminant Level
NMED	New Mexico Environment Department
NMED-DWB	New Mexico Environment Department Drinking Water Bureau
PIC	Policy Implementation Committee
PSOC	Potential Sources of Contamination
RCRA	Resource Conservation and Recovery Act
SDWA	Safe Drinking Water Act
SWA	Source Water Assessment
SWAPP	Source Water Assessment and Protection Program
WSS	Water Supply System



SOURCE WATER ASSESSMENT AND PROTECTION PLAN PROCESS FOR THE RIO RANCHO SEWER & WASTEWATER SERVICES WATER SYSTEM

INTRODUCTION

The New Mexico Environment Department Drinking Water Bureau's (NMED-DWB) *Source Water Assessment and Protection Program* (SWAPP)¹ is a federally funded national program. The program is part of a national effort to prevent adverse effects to human health and the environment and to manage and protect the environmental integrity of states' ground water resources.

The SWAPP is intended to be an information-gathering tool that identifies, evaluates, and prevents contaminants² from polluting public drinking water systems. As the lead agency under SWAPP responsible for source water protection of public drinking water supplies, NMED-DWB is attaching this *Request for Participation in the New Mexico Source Water Protection Plan Process* to your completed Source Water Assessment Report, and hopes that your water utility will join the Source Water Protection Plan (SWAPP) portion of this program.

Your choice to continue with SWAPP is voluntary, however, your participation will be a valuable contribution to both your community and the state. Source water protection benefits all of New Mexico and may be measured in many ways.³ In recognition of the importance of this program toward the protection of the state's water resources, the executive branch agency will give special recognition and commendation to water utilities with approved source water protection plans that are also in compliance with the Safe Drinking Water Act. **Plan approval is conducted by NMED-DWB and is based on the satisfactory completion of all steps outlined in the Source Water Protection Plan Template** (see Appendix J).

SOURCE WATER PROTECTION PLAN PROCESS

A SWAPP incorporates six steps. Steps 2-4 have been completed for your water utility by NMED-DWB, and are incorporated in this addendum. NMED-DWB will continue to work with you toward the development, adoption, and management of an approved SWAPP, should you choose to proceed. The remainder of this report describes the six steps for developing a SWAPP, incorporates the findings of the assessments conducted by NMED-DWB, and gives examples of SWAPP tools and documents. The six steps of the SWAPP are as follows:

1. Formation of a Community Planning team
2. Delineation of Source Water Protection Areas (*completed by NMED-DWB under SWA*)
3. Inventory of Actual and Potential Sources of Contamination (*completed by NMED-DWB under SWA*)
4. Completion of a Susceptibility Analysis (*completed by NMED-DWB under SWA*)
5. Management of Source Water Protection Areas
6. Planning for Existing and Future Events / Contingency Protocol

¹ SWAPP incorporates the goals and mandates of the *Safe Drinking Water Act* such as the *Source Water Assessment Program* and the *Wellhead Protection Program* described in Sections 1453 and 1428 of the *Federal Safe Drinking Water Act Amendments of 1996*, respectively. The general goals of SWAPP are the identification and management of existing and potential sources of pollution as they may impact public drinking water sources.

² The Contaminants of Concern (COC) (refer to your utility's Source Water Assessment) are defined as broad land-use categories, facilities, or activities that store, use, or produce as a product or by-product any contaminants regulated under the federal *Safe Drinking Water Act*, including microbiological contaminants *giardia lamblia*, *cryptosporidium*, and total coliform bacteria, and synthetic organic contaminants included in the New Mexico *Pesticide Management Plan*.

COC identified in this report have been determined by NMED-DWB as posing a *significant* likelihood of having the potential to impact drinking water sources. For example, COC that were not considered as having the potential to impact drinking water sources are small quantities of highly volatile organic chemicals that would most likely volatilize upon release into the environment.

³ Source water protection is a relatively new and pro-active approach for ensuring safe and reliable sources of drinking water. Benefits range from protecting human health and the quality of life to maintaining tourism and property values. Benefits may also be measured by considering what the costs might be if the water source was to become polluted. Costs incurred from polluted water may include the costs of treatment, land purchase and well drilling (for locating a new water supply) or, in the worst case, the costs of the complete loss of a water supply utility.

Compliance with other programs may also result in savings. For instance, the federal *Safe Drinking Water Act Amendments of 1996* requires treatment under the Disinfection Byproducts Rule, however, systems with cleaner water sources will naturally require less disinfection to begin with. Further, sampling waivers issued because of the SWAP Plan may reduce the frequency of sampling requirements, which would result in the reduction of sampling costs.

STEP 1 FORM A COMMUNITY PLANNING TEAM

Forming a community planning team (team) may be as simple as calling someone who may be interested in participating on the team such as a resident near a public water source(s). The team should include everyone that is interested in and/or may be affected by the SWAPP. Other potential team members may include a utility or public works employee, a geologist, hydrologist, or engineer, a citizen with computer and/or public relations skills, an attorney, and Realtor. In addition, local governments that are not directly involved in your water utility may in fact be the legal authority for authorizing and enforcing protection measures and, thereby, may help with the adoption of a protection plan. Examples of local governmental entities include commissioners, council members, and mayors.

The team determines the goals of the program and the roles and responsibilities of the participants. The team must make every effort to involve the public in plan development and implementation, and to secure the public's support.⁴ Other tasks include the development of protection plan management strategies (refer to Step 5, Manage the Source Water Protection Area), the establishment and continued evaluation of both short- and long-term goals (see Step 6, Planning for Existing and Future Events / Contingency Protocol), record keeping, and ensuring that the public receives proper notification during all of the relevant stages of the process. The team submits the SWAPP⁵ to NMED-DWB for approval (documentation of source water management control tools such as agreements, ordinances, regulations, and public notice(s), etc., should be attached).

STEP 2 DELINEATE SOURCE WATER PROTECTION AREAS (COMPLETED BY NMED-DWB)

The State of New Mexico's *Designated Fixed Radius* method was used to delineate each of the system's water sources. The method utilizes a 1,000-foot radius (72.12 acres) as the delineated source area or *capture zone*, which is further subdivided into three zones. Zone A represents a radius that is from 0 to 200 feet from the wellhead, Zone B 200 to 500 feet from the wellhead, and Zone C is the area between 500 to 1,000 feet of the wellhead. Geographical Information Systems ArcView 8.0 was used to generate the maps (Appendix A). You may decide to customize or use another delineation method to produce the maps or use these to satisfy the requirements for this Step.

The identified contaminants were assembled through database⁶ tables and shapefiles, sanitary surveys, water system and DWB staff review within the context of the limitations of resources, and available information. As shown in Appendix A, PSOC identified from the databases, such as UST facilities are shown as points, while the three-letter text code (ISM in the example) indicates the PSOC was identified during an onsite survey. The map legend remains consistent throughout the SWAPP.

STEP 3 INVENTORY ACTUAL AND POTENTIAL SOURCES OF CONTAMINATION (COMPLETED BY NMED-DWB)

PSOC regulated by the *Safe Drinking Water Act* (SDWA) were inventoried as required under the SWA process. Only facilities and/or land use where potential use of SDWA regulated contaminants may pose a **significant** likelihood of impacting ground water were identified as PSOC. PSOC, along with their associated codes, and Contaminants of Concern generally associated with the PSOC are listed in Appendices C and D, respectively.

The identified contaminants were assembled through database⁷ tables and shape files, sanitary surveys, water system and DWB staff review within the context of the limitations of resources and available information. Table 1 shows PSOC identified from the map example (Appendix A). PSOCs identified from the databases, such as UST facilities are shown as points, while the three-letter text code (RSF) indicates the PSOC was identified during an onsite survey. Water systems, which choose to develop a Source Water Protection Plan, may to be provided with additional information.

STEP 4 CONDUCT A SUSCEPTIBILITY ANALYSIS (COMPLETED BY NMED-DWB)

Susceptibility analyses provide a method to identify and prioritize potential risks to human health and the environment by identifying the water sources most likely to be impacted by a contaminant. Once completed, consideration should be given to

⁴ Keeping records of public participation (i.e., sign-in sheets) is important and may help you to recall public involvement, in addition to serving as a list of possible future team members.

⁵ A cover sheet should be attached and signed by an official of the governing entity when returning the SWAPP. For water utilities helping to develop SWAP Plans on a watershed scale, there may be several governing entities.

⁶ Drinking water supply systems, Federal Toxic Release Inventory, Underground Injection Control (including Monitoring Wells and Impoundments, Federal Permit Facility, Federal Industrial Permit Facilities, Oil Conservation District Wells, Petroleum Storage, Roads (by county), Railroads, State Impaired Waters (303 d List), Land Use/Land Cover (by county), and Hazardous and solid waste facilities. Base maps were produced using *All Topo Maps*. All data was projected to North American Datum 83 /Universal Transverse Mercator Zone 13.

⁷ Drinking water supply systems, Federal Toxic Release Inventory, Underground Injection Control (including Monitoring Wells and Impoundments, Federal Permit Facility, Federal Industrial Permit Facilities, Oil Conservation District Wells, Petroleum Storage, Roads (by county), Railroads, State Impaired Waters (303 d List), Land Use/Land Cover (by county), Hazardous and solid waste facilities. Base maps were produced using *All Topo Maps*. All data was projected to North American Datum 83 /Universal Transverse Mercator Zone 13.

the effects on human health the contaminants may pose, such as *acute* (appearing within hours or days) versus *chronic* (exposure over many years) health effects. Management plans should reflect the findings of the assessments, by directing the development and implementation of the management plan to the sources with the highest susceptible ranking and with the potential for causing acute adverse human health effects.

INVENTORY OF ACTUAL AND POTENTIAL SOURCES OF CONTAMINATION				
Description of Contaminant	Actual Contamination	Potential Contamination	Distance from Wellhead and/or Zone of Influence	Number of Sources of Contamination (may be expressed by a range i.e., 2-4).
Monitoring Well	No	Yes	Zone A	1+
Hazardous/Solid Waste Generator	No	Yes	Zone B	2-4
Petroleum Storage	No	Yes	Zone B	2-4
Primary Highway	No	Yes	Zone B	2-4
Railroad	No	Yes	Zone B	2-4
Single family Residences – Unsewered	No	Yes	Zone B	2-4
Abandoned Well	No	Yes	Zone C	3-4
Arroyo	No	Yes	Zone C	3-4
Federal Toxic Release Inventory Site	No	Yes	Zone C	3-4
Railroad	No	Yes	Zone C	3-4
Secondary Highway	No	Yes	Zone C	3-4

NMED-DWB susceptibility analysis was performed using decision matrices. Susceptibility was defined as a combination of the **vulnerability** of a water source to contamination due to characteristics of the contaminant, and the **sensitivity** of a water source to contamination due to characteristics of the source water area (Appendix B).

Vulnerability Rank

Once identified according to zone of influence, a vulnerability⁸ rank was determined based on the number of PSOC located in a particular zone. The vulnerability rank may have been increased due to one or more of the following:

1. State of New Mexico Environment Department *Drinking Water Regulations* (regulations) for compliance samples were exceeded: 3 or more violations within 12 months, with a set period of review.
2. Three or more categories of PSOC occurred within the same zone of influence.

⁸ This report uses the term *vulnerability* to express the characteristics of contaminants in terms of the likelihood of 1) discharge, 2) spill or accidental release, and 3) the number of potential contaminant sources according to their location to ground water. Although determining vulnerability based on the number and location of the PSOC in relation to the wellhead neglects the basic chemical characteristics of the contaminants such as density and volatility, and the likelihood of accidental spills or releases, the number and location of contaminant sources capable of impairing a supply well are easily counted and provide information relevant to initial protection planning efforts. **Please note that vulnerability is not used to describe hydrogeologic related factors. Hydrogeologic factors are incorporated in the sensitivity analysis using DRASTIC (see footnote 9).**

3. Records maintained for facilities operating under a New Mexico Environment Department (NMED) Ground Water Discharge Plan, Abatement Plan, Solid Waste Facility Permit, or Underground Storage Tank registration, or operating under an United States Environmental Protection Agency National Pollutant Discharge Elimination System permit or any other federal or state permitting system indicate the effectiveness of treatment processes used and the compliance status of the facility with the terms and conditions of its permit. .
4. Land Use and/or land cover in the area of delineation that fell under one or more of the following categories: 1) agricultural, 2) rangeland, 3) commercial, industrial, transportation, and utility, 4) open water and/or irrigation, 5) urban/recreational grass areas.

Tables 2 and 3 show the vulnerability-ranking scheme and an example of a PSOC inventory determined from the map shown in Appendix A. As shown in Table 3, the vulnerability rank that corresponds to the example inventory is “low” as Zone B and C are the zones where the highest Vulnerability Rank (refer to Appendix A).

PSOC RANKING DETERMINATION				
Number of PSOC in Zone	Zone			Ranking
	Zone A	Zone B	Zone C	
	1+	10+	15+	high
	0	8-9	12-14	moderately high
	0	5-7	8-11	moderate
	0	3-4	5-7	moderately low
	0	0-2	0-4	low

Sensitivity Rank

The sensitivity of a water source to contamination was determined from ranks calculated for the following four matrices: 1) depth to groundwater (the upper most screened interval), 2) well construction/integrity information, 3) construction and integrity of the well, and 4) calculated DRASTIC⁹ Index (refer to Appendix B for matrices).

PSOC VULNERABILITY INVENTORY AND RANKING				
Map Reference	Description	Zone of Influence	Number of Type	Vulnerability Rank
Base Map	Primary Highway	B	0-2	Low
Base Map	Secondary Highway	B	0-2	Low
Appendix K	ISM	C	0-4	Low
Map Legend	Petroleum Storage	C	0-4	Low

Table 4 provides definitions, explanatory notes, references, and additional information related to the sensitivity evaluation criteria.

⁹ DRASTIC is a method developed in 1987 by the National Ground Water Association to evaluate the potential for ground water contamination in any hydrogeologic setting in the United States, and is an acronym for: depth to water (D); net recharge (R); aquifer media (A); soil media (S); topography (T); impact of vadose zone media (I); and aquifer hydraulic conductivity (C). The method assigns a relative rank and weight to each of these factors to determine the relative sensitivity (high, moderately high, moderate, moderately low, or low) of a given supply well to surface-derived contamination. The higher the DRASTIC Index, the more sensitive the well is to contamination.

Table 4	
SENSITIVITY ANALYSIS DEFINITIONS, EXPLANATORY NOTE, and INFORMATION SOURCE (S)	
General Information	
Water Supply Source Name	The name of the well assessed.
Source Type	Where the drinking water comes from, i.e. ground water, surface water, or ground water under the direct influence of surface water.
Susceptibility Analysis ate	The date the susceptibility was completed.
Date of PSOC Inventory	The date the onsite inventory was completed.
Hydraulic Conductivity	A description of the rate at which water can move through a permeable medium (vertical movement).
Depth of Screened Interval	The top of the well screen where water is allowed to enter the well casing.
<i>Information Assessment – Administrator and operator knowledge of the water supply system</i>	
Well Casing	Generally determined from well logs.
Location of Screened Interval (s)	Generally determined from well logs.
Total Completion Depth	The depth to water measured from ground surface. Generally determined from well logs.
Pump, Type, Size, and Setting	Generally determined from well logs.
Drilling Log or Equivalent	A log produced by the driller of the well – usually filed at the Office of State Engineer.
<i>DRASTIC Index Parameters</i> (also see footnote 8)	
Depth to Water	The depth to water from ground surface. Generally determined from well logs.
Net Recharge	The amount of annual rainfall.
Aquifer Media	The aquifer’s primary media.
Soil Media	Values generally determined estimated from the Soil Conservation Service’s Soil Surveys.
General Topography	The slope of the ground surface (estimated from U.S. Topographic maps).
Hydraulic Conductivity	A description of the rate at which water can move through a permeable medium (vertical movement).
Impact of Vadose Zone Media	Primary vadose zone material type.
<i>Source Area Delineation Data</i>	
Map Legend	Map legend criteria reflect PSOC such as petroleum storage sites, hazardous and solid waste generator sites, and toxic inventory release facilities. In addition, topography and general land use are shown. The map legend remains constant throughout the assessment (see footnote 6).
Source Area Delineations	The State of New Mexico’s <i>Designated Fixed Radius</i> method for the State Sanitary Survey is a 1,000 feet, and is based on an arbitrarily chosen radius.

Rankings were then entered as shown in Table 5, and a final *point sum* determined. Table 6 shows the final ranking criteria for sensitivity.

COMPOSITE SENSITIVITY RANKING	
Rank for Depth of Screened Interval	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	
Rank for Well Construction Records	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	
Rank for Integrity of Construction	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	
Rank for DRASTIC Index	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	
<i>Point Sum</i>	
<i>Rank Assigned (see Ranking Guide, below)</i>	

COMPOSITE SENSITIVITY RANK ASSIGNED		
Sum of Sensitivity Points	Composite Sensitivity Range	Composite Rank Assigned
90-100	high	
70-85	moderately high	
50-65	moderate	
30-45	moderately low	
20-25	low	

Susceptibility Rank

Together, the rankings determined from the vulnerability and sensitivity analysis were merged as shown in table 7. Susceptibility ranks were increased where professional judgment or extenuating circumstances and/or facts warranted an increased rank such as if a nearby contaminant plume was know to exist but falls outside the delineated areas. Further, ranks were increased where systems were reported on quarterly chemical monitoring and/or NMED-DWB Escalation reports and where land use and/or land cover in the source area of delineation that fell under one or more of the following categories: 1) agricultural, 2) rangeland, 3) commercial, industrial, transportation, and utility, 4) open water and/or irrigation, and 5) urban/recreational grass area.

Table 7

SUSCEPTIBILITY RANKING						
Sensitivity Ranking						
Vulnerability Ranking		High	Moderately High	Moderate	Moderately Low	Low
	High	High	high	moderately high	moderately high	moderate
	Moderately High	High	moderately high	moderately high	moderate	moderate
	Moderate	moderately high	moderately high	moderate	moderate	moderately low
	Moderately Low	moderately high	moderate	moderate	moderately low	moderately low
	Low	Moderate	moderate	moderately low	moderately low	low

Increases in rank are noted in the *Final Rating & Comments* column of Table 8. Ranking of the entire water was determined by using the median of the source ranks (only applicable where water utilities have multiple water sources). The final rank is noted in *Assessment Findings and Summary* (refer to page 11).

Table 8

SOURCE SUSCEPTIBILITY RANKING					
SOURCE NAME	Sensitivity Rank	Vulnerability Rank	Susceptibility Rank	Operational Exceptions	Final Rank
WELL # 1	Moderately Low	High	Moderately High	LU – Mixed Rangeland LU – Residential	High
WELL # 2	Low	High	Moderate	LU – Mixed Rangeland LU – Residential	Moderately High
WELL # 3	Low	High	Moderate	LU – Industrial LU – Mixed Rangeland LU – Residential	Moderately High
WELL # 4	Low	High	Moderate	LU – Urban or Built up Land LU – Mixed Rangeland LU – Residential	Moderately High
WELL # 6A	Low	High	Moderate	LU – Mixed Rangeland LU – Residential	Moderately High
WELL # 7	Low	Low	Low	LU – Mixed Rangeland	Moderately Low
WELL # 8	Low	Low	Low	LU – Mixed Rangeland	Moderately Low
WELL # 9	Low	Low	Low	LU – Mixed Rangeland	Moderately Low
WELL # 10	Low	Low	Low	LU – Mixed Rangeland	Moderately Low
WELL # 11	Moderately Low	High	Moderately High	LU – Mixed Rangeland LU – Commercial & Service >= 3 PSOC in a Zone	High
WELL # 12	Moderately Low	Low	Moderately Low	LU – Mixed Rangeland	Moderate
WELL # 13	Low	Low	Low	LU – Forest Land	Low
WELL # 14	Low	Low	Low	LU – Mixed Rangeland	Moderately Low
WELL # 15	Low	Low	Low	LU – Mixed Rangeland LU – Forest Land	Moderately Low
WELL # 16	Low	Low	Low	LU – Mixed Rangeland	Moderately Low
WELL # 17	Low	Low	Low	LU – Mixed Rangeland >= 3 PSOC in a Zone	Moderately Low
WELL # 19	Low	Low	Low	LU – Mixed Rangeland	Moderately Low

Table 8	SOURCE SUSCEPTIBILITY RANKING				
	SOURCE NAME	Sensitivity Rank	Vulnerability Rank	Susceptibility Rank	Operational Exceptions
WELL # 21	Low	Low	Low	LU – Mixed Rangeland	Moderately Low

STEP 5 MANAGE THE SOURCE WATER PROTECTION AREA

The goals of managing a source water protection area are pollution prevention and management of threats to source water. Management “measures or tools” range from promoting public education through public service radio campaigns where there are little to no associated costs, to developing complex protection plans involving new land acquisitions, where financing may be a considerable factor of the management plan. In addition, management of source water protection areas may involve a variety of strategies each targeted to address a specific goal. It may be most effective to adopt a simple plan and continue to update it; however, efforts should focus on water sources with the highest susceptibility to contamination. Primary categories of protection measures/tools include the following (also refer to Appendix G, Examples of Source Water Protection Planning Categories, Measures and Tools):

- Public education such as giving presentations at schools, business meetings, and government forums, and participation in water-related events sponsored by other groups and organizations;
- Best management practices (BMPs) such as preventing leaks or spills by installation of “secondary containment” equipment;
- *Regulatory controls such as zoning ordinances and subdivision controls, construction and operating standards, health regulations (such as setting setback requirements for septic tanks and/or sewer lines from drinking water wells), and permitting or inspections;*
- Point source pollution restrictions, requirements, and/or controls for fixed PSOC such as waste processing plants and inorganic sources such as salts, nutrients, and heavy metals; and
- Land acquisitions, land leasing, economic incentives such as cost-share programs, and conservation easements.

Implementing protection measures, along with water quality monitoring, capacity¹⁰ building, and treatment can significantly protect a water source.

STEP 6 PLAN FOR EXISTING AND FUTURE EVENTS / CONTINGENCY PROTOCOL

Where the management of source water protection areas may help reduce the likelihood of water pollution and help focus efforts on the successful treatment of contaminated water, planning for future events that are both expected and unexpected is also a necessary part of the SWAPP. Contingency planning provides the information that is helpful during these events. This includes emergency contact information, protocols and strategies, and revenues from budgeting.

Determine if there are local emergency response teams that your water utility could contact for assistance. On the state level, the State of New Mexico Environment Department Office of Emergency Preparedness organizes assistance for damage caused by events such as wildfires, and will provide water utilities with information regarding damage assessments related to drinking water systems. Further, the New Mexico National Guard is the entity responsible for providing public water utilities with a source of water under emergency conditions.¹¹ When water outages may not be classified as “emergency conditions,” water utilities should know and develop their options of supplying their customers with safe drinking water. Categories of contingency planning that should be addressed in your SWAPP include the following:

- Water outages due to contamination, mechanical or physical breakdown of a system, and natural disasters such as floods and drought;
- Water conservation;
- Accidental leaks or spills;

¹⁰ Capacity Development program support services are available on a priority basis to assist eligible public water systems enhance *technical, managerial, and financial* capacities.

¹¹ The State of New Mexico recognizes emergency conditions according to categories Type A and Type B. Type A conditions are major state or county disasters, including nuclear, earthquakes, volcano eruptions, floods, hurricanes, and tornadoes. Type B disasters are water outages due to drought, major contamination of a system’s basic water source, and major destruction or impairment of a system’s physical facilities.

-
- Land acquisition for future water supplies; consider and/or identify where a new well could be drilled should a new water source be required; and
 - Land acquisition as a source water protection measure.

ASSESSMENT FINDINGS AND SUMMARY

The Susceptibility Analysis of the Rio Rancho Sewer & Wastewater Services water utility reveals that the utility is well maintained and operated, and the sources of drinking water are generally protected from potential sources of contamination based on well construction, hydrogeologic settings, and system operations and management. The susceptibility rank of the entire water system is **MODERATELY LOW**.

NMED-DWB staff is available to help your water utility continue with the development of the SWAP Plan, which may include providing additional mapping, (refer to Step 2), evaluation of BMP (refer to Step 5), or providing emergency planning options (refer to Step 6). This SWAPP Report is intended primarily to provide water utilities with information about the susceptibility of their water supplies to contamination, and to help water utilities initiate Source Water Assessment and Protection Plans for the protection of these water resources.

The remainder of this report 1) offers a template and information for developing a source water protection plan for your water utility, 2) provides examples of management categories commonly utilized in protection planning, and 3) includes an exercise (Appendix I) to help illustrate some of the SWAPP steps.

REPORTING:

The report was provided to the Rio Rancho Sewer & Wastewater Services Water Supply System for initial review, and is now available at the State of New Mexico Environment Department Drinking Water Bureau, 525 Camino de Los Marquez, Suite 4, Santa Fe, NM 87505.

Copies may also be requested by emailing the Drinking Water Bureau at SWAPP@nmenv.state.nm.us or by calling (505) 827-7536 (toll free 1-877-654-8720). Please include your name, address, telephone number, and email address, and the name of the water utility. *NMED-DWB may charge a nominal fee for paper copies.*

REFERENCES

American Water Works Association, 2002, *Source Water Protection Reference Manual*. American Water Resource Foundation.

American Water Works Association, 1984. *AWWA Standards for Water Wells*; AWWA A100-84, Denver, Colorado.

Robson, S. G. and E. R. Banta, 1995. *Ground Water Atlas of the United States, Segment 2: Arizona, Colorado, New Mexico, and Utah*; U.S. Geological Survey Hydrologic Investigations Atlas 730-C.

International City/County Management Association, 2003. *Drinking Water Source Awareness Media Campaign Guidelines*. Washington, D.C.

State of New Mexico Environment Department 1999-2003. *Sanitary Survey Report*. Drinking Water Bureau.

State of New Mexico Environment Department, 2000. *State of New Mexico Source Water Assessment and Protection Program*. Drinking Water Bureau. February.

U. S. Environmental Protection Agency, 2002, *Source Water Protection, Best Management Practices and Other Measures for Protecting Drinking Water Supplies*. CD Produced with the Drinking Water Academy.

U. S. Environmental Protection Agency, 1993. *Wellhead Protection: A Guide for Small Communities*; EPA-625/R-93/002. Office of Water / Office of Research and Development. Washington, D.C.

U.S. Environmental Protection Agency, 1997. *State Source Water Assessment and Protection Programs Guidance Final Guidance*, EPA816-R-97-009. Washington, DC.

U.S. Environmental Protection Agency, 1987. *DRASTIC: A Standardized System for Evaluating Ground Water Pollution Potential Using Hydrogeologic Settings*, EPA-600/2-87-035. Washington, DC.

U. S. Environmental Protection Agency, 1975. *Manual of Water Well Construction Practices*; EPA-570/975-001. Office of Water Supply. Washington, D.C.

Databases, Shape files, and Software

Bureau of the Census. Tiger/Line Files Redistricting Census 2000 (Railroads) <http://rgisedac.unm.edu>. US. Department of Commerce. Washington, DC.

Bureau of the Census, 1994-2000. Tiger/Line Files Redistricting Census 2000 (Roads) <http://rgisedac.unm.edu>. US. Department of Commerce. Washington, DC.

Earth Data Analysis Center, 2001. U.S. Geological Survey. *New Mexico Land Cover Data Set Edition 1 Land Use and Land Cover Digital Data from 1:25,000 and 1:100,00 Scale Maps* <http://rgisedac.unm.edu>. University of New Mexico, Albuquerque, New Mexico

Ground Water Quality Bureau, April, 2003. Underground Injection Control Sites. Dataset includes facilities where GPS readings were available. New Mexico Environment Department, Santa Fe, New Mexico. October.

IGage Mapping Corporation, 2001. *All Topo Maps, New Mexico*. Salt Lake City, Utah.

IGage Mapping Corporation, 2001. *All Topo Maps, Big Topo Pro*. Salt Lake City, Utah.

New Mexico Energy, Mineral and Natural Resources Department, 2002. *Basic Well Summary with Lat/Long Information added 10/15/02* <http://www.emnrd.state.nm.us/ocd/data.htm>.

Petroleum Storage Tank Bureau, May, 2003. Dataset includes facilities where GPS readings were available. New Mexico Environment Department. September. Santa Fe, New Mexico. October.

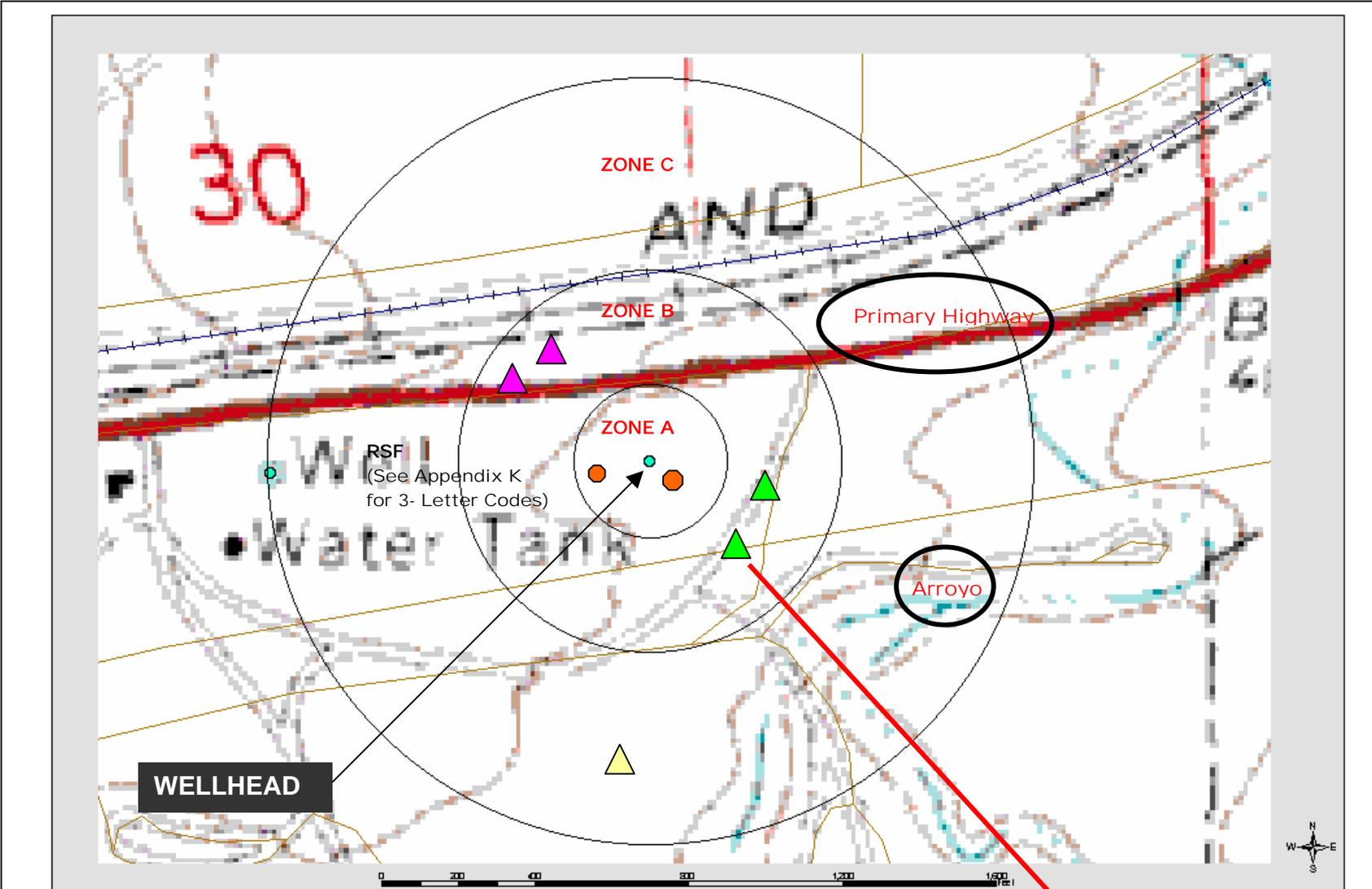
Purdue Research Foundation, 1994. Wellhead Protection Program. West Lafayette, Indiana.

Surface Water Quality Bureau, 2002. 303 (d) Listed Waters of New Mexico (ARCGIS shapefiles). New Mexico Environment Department. Santa Fe, New Mexico. October.

U. S. Environmental Protection Agency, (2001). *Resource Conservation and Recovery Information System: Better Assessment Science Integrating Point and Nonpoint Sources*. Version 3, EPA-823-B-01-001. June.

U. S. Environmental Protection Agency, (2001). *Permit Compliance System (PCS) Sites and Computed Annual Loadings*. Better Assessment Science Integrating Point and Nonpoint Sources. Version 3, EPA-823-B-01-001. June.

U. S. Environmental Protection Agency, (2001). *Toxic Release Inventor (TRI) ,Sites and Pollutant Release Data*. Better Assessment Science Integrating Point and Nonpoint Sources. Version 3, EPA-823-B-01-001. June.



EXAMPLE ONLY

Information depicted characterizes data available from multiple sources, including current Sanitary Surveys and state and federal databases. No assertion of the accuracy of the databases is made by NMED-DWB.

Map Legend		Refer to Appendix C for 3-Letter Source Codes	
Well Head	Hazardous/Solid Waste Facility	Oil Conservation Well	Petroleum Storage
Federal Industrial Permit Facility	Impoundment	Underground Injection Well	Railroad
Federal Permit Facility	Monitoring Well	Roadway	
Federal Toxic Release Inventory	NM Impaired Water		

WELL #1	WSS # 096-23
Source Type	Ground Water
Susceptibility Analysis Date	November 6, 2002
Susceptibility Analysis Completed by	NMED-DWB
Date of PSOC Inventory	May 1, 2002

SENSITIVITY ANALYSIS

1. Depth of Screened Interval

Screened Interval Depth	Sensitivity Range	Rank Assigned
less than 100 feet	High	
100 - 200 feet	Moderately High	
201 - 500 feet	Moderate	Moderate
501 - 700 feet	Moderately Low	
greater than 700 feet	Low	

2. Well Construction Information and Integrity

A) Information Ranking

Construction Information Available	Points Possible	Points Assigned
Casing diameter, casing length and casing materials	2	2
Location of screened interval(s)	3	3
Total completion depth	3	3
Static water level at completion	2	2
Pump type, size and setting	2	2
Drilling log or equivalent	3	2
Total Points	15	14

Information Points	Sensitivity Range	Rank Assigned
0-3	High	
4-6	Moderately High	
7-9	Moderate	
10-12	Moderately Low	
13-15	Low	Low

B) Integrity Ranking

Physical Integrity of Supply Well	Points Possible	Points Assigned
Is the well located outside of an area susceptible to flooding?	2	2
Does well casing terminate at least 18 inches above floor or ground level?	2	2
Is annular space pressure-grouted to depth of at least 20 feet?	3	0
Is the wellhead properly sealed?	3	0
Is there a concrete pad around the wellhead that slopes away from the casing?	1	1
Does the well vent terminate at least 18 inches above floor or ground level, and is the vent screened and oriented to open downward?	1	1
Are check valves, blow-off valves and flow meters properly maintained and operated?	1	1
Is the wellhead fenced, housed or properly protected?	2	2
Total Points	15	9

Integrity Points	Sensitivity Range	Rank Assigned
0-3	High	
4-6	Moderately High	
7-9	Moderate	Moderate
10-12	Moderately Low	
13-15	Low	

3. DRASTIC Index = 89

Depth to Water (ft)	284
Net Recharge (inch/yr (approximated))	<2
Aquifer Media	Sand & Gravel with significant Clay
Soil Media	Sandy Loam
Topography (ground slope) (%)	2
Impacts of Vadose Zone Media	Sand & Gravel with significant Clay
Hydraulic Conductivity (Aquifer) (gpd/ft ²)	30-112

DRASTIC Index	Sensitivity Range	Sensitivity Rank
201 or greater	High	
171-200	Moderately High	
131-170	Moderate	
101-130	Moderately Low	
0-100	Low	Low

Composite Sensitivity Ranking for Ground Water Source (Converted, Uniform Scale) for Well
 Sensitivity Rank = Well Depth Rank (Screen) + Well Construction/Integrity Rank + DRASTIC Index Rank

Rank for Depth of Screened Interval	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	15
Moderately Low (10 points)	
Low (5 point)	
Rank for Well Construction Records	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Rank for Integrity of Construction	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	15
Moderately Low (10 points)	
Low (5 point)	
Rank for DRASTIC Index	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Point Sum	40
Rank Assigned (see Ranking Guide, below)	Moderately Low

APPENDIX B: SUSCEPTIBILITY ANALYSIS

Sum of Sensitivity Points	Composite Sensitivity Range	Well Composite Rank Assigned
90-100	High	
70-85	Moderately High	
50-65	Moderate	
30-45	Moderately Low	Moderately Low
20-25	Low	

Sensitivity Rank = **MODERATELY LOW**

VULNERABILITY ANALYSIS for Well

PSOC Ranking Determination				
Number of PSOC in Zone	Zone			Ranking
	Zone A	Zone B	Zone C	
	1+	10+	15+	High
	0	8-9	12-14	Moderately High
	0	5-7	8-11	Moderate
	0	3-4	5-7	Moderately Low
0	0-2	0-4	Low	

PSOC Vulnerability Inventory and Ranking				
Map Reference	Description	Zone of Influence	Number of Type	Vulnerability Rank
Appendix K	CHG	A	1+	High
Appendix K	IOG	A	1+	High
Appendix K	RSF	A	1+	High
Appendix K	MSD	B	0-2	Low
Appendix K	IOG	B	0-2	Low
Appendix K	RSF	B	10+	High
Appendix K	IOG	C	0-4	Low
Appendix K	MWP	C	0-4	Low
Appendix K	RSF	C	15+	High
Map Legend	Federal Industrial Permit Facility	C	0-4	Low

Vulnerability Rank = **HIGH**

Susceptibility Ranking						
	Sensitivity Ranking					
			High	Moderately High	Moderate	Moderately Low
Vulnerability Ranking	High	High	High	Moderately High	Moderately High	Moderate
	Moderately High	High	Moderately High	Moderately High	Moderate	Moderate
	Moderate	Moderately High	Moderately High	Moderate	Moderate	Moderately Low
	Moderately Low	Moderately High	Moderate	Moderate	Moderately Low	Moderately Low
	Low	Moderate	Moderate	Moderately Low	Moderately Low	Low

WELL #2	WSS # 096-23
Source Type	Ground Water
Susceptibility Analysis Date	November 6, 2002
Susceptibility Analysis Completed by	NMED-DWB
Date of PSOC Inventory	February, 2002

SENSITIVITY ANALYSIS

1. Depth of Screened Interval

Screened Interval Depth	Sensitivity Range	Rank Assigned
less than 100 feet	High	
100 - 200 feet	Moderately High	
201 - 500 feet	Moderate	
501 - 700 feet	Moderately Low	Moderately Low
greater than 700 feet	Low	

2. Well Construction Information and Integrity

A) Information Ranking

Construction Information Available	Points Possible	Points Assigned
Casing diameter, casing length and casing materials	2	2
Location of screened interval(s)	3	3
Total completion depth	3	3
Static water level at completion	2	2
Pump type, size and setting	2	2
Drilling log or equivalent	3	3
Total Points	15	15

Information Points	Sensitivity Range	Rank Assigned
0-3	High	
4-6	Moderately High	
7-9	Moderate	
10-12	Moderately Low	
13-15	Low	Low

B) Integrity Ranking

Physical Integrity of Supply Well	Points Possible	Points Assigned
Is the well located outside of an area susceptible to flooding?	2	2
Does well casing terminate at least 18 inches above floor or ground level?	2	2
Is annular space pressure-grouted to depth of at least 20 feet?	3	3
Is the wellhead properly sealed?	3	3
Is there a concrete pad around the wellhead that slopes away from the casing?	1	1
Does the well vent terminate at least 18 inches above floor or ground level, and is the vent screened and oriented to open downward?	1	1
Are check valves, blow-off valves and flow meters properly maintained and operated?	1	1
Is the wellhead fenced, housed or properly protected?	2	2
Total Points	15	15

Integrity Points	Sensitivity Range	Rank Assigned
0-3	High	
4-6	Moderately High	
7-9	Moderate	
10-12	Moderately Low	
13-15	Low	Low

3. DRASTIC Index = **84**

Depth to Water (ft)	322
Net Recharge (inch/yr (approximated))	<2
Aquifer Media	Sand & Gravel with significant Clay
Soil Media	Sandy Loam
Topography (ground slope) (%)	2
Impacts of Vadose Zone Media	Sand & Gravel with significant Clay
Hydraulic Conductivity (Aquifer) (gpd/ft ²)	64.6

DRASTIC Index	Sensitivity Range	Sensitivity Rank
201 or greater	High	
171-200	Moderately High	
131-170	Moderate	
101-130	Moderately Low	
0-100	Low	Low

Composite Sensitivity Ranking for Ground Water Source (Converted, Uniform Scale) for Well
 Sensitivity Rank = Well Depth Rank (Screen) + Well Construction/Integrity Rank + DRASTIC Index Rank

Rank for Depth of Screened Interval	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	10
Low (5 point)	
Rank for Well Construction Records	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Rank for Integrity of Construction	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Rank for DRASTIC Index	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Point Sum	25
Rank Assigned (see Ranking Guide, below)	Low

APPENDIX B: SUSCEPTIBILITY ANALYSIS

Sum of Sensitivity Points	Composite Sensitivity Range	Well Composite Rank Assigned
90-100	High	
70-85	Moderately High	
50-65	Moderate	
30-45	Moderately Low	
20-25	Low	Low

Sensitivity Rank = **LOW**

VULNERABILITY ANALYSIS for Well

PSOC Ranking Determination				
Number of PSOC in Zone	Zone			Ranking
	Zone A	Zone B	Zone C	
	1+	10+	15+	High
	0	8-9	12-14	Moderately High
	0	5-7	8-11	Moderate
	0	3-4	5-7	Moderately Low
0	0-2	0-4	Low	

PSOC Vulnerability Inventory and Ranking				
Map Reference	Description	Zone of Influence	Number of Type	Vulnerability Rank
Appendix K	MSD	B	0-2	Low
Appendix K	IOG	B	0-2	Low
Appendix K	RSF	B	10+	High
Appendix K	CHG	C	0-4	Low
Appendix K	IOG	C	0-4	Low
Appendix K	MWP	C	0-4	Low
Appendix K	RSF	C	15+	High
Map Legend	Federal Industrial Permit Facility	C	0-4	Low

Vulnerability Rank = **HIGH**

Susceptibility Ranking						
	Sensitivity Ranking					
			High	Moderately High	Moderate	Moderately Low
Vulnerability Ranking	High	High	High	Moderately High	Moderately High	Moderate
	Moderately High	High	Moderately High	Moderately High	Moderate	Moderate
	Moderate	Moderately High	Moderately High	Moderate	Moderate	Moderately Low
	Moderately Low	Moderately High	Moderate	Moderate	Moderately Low	Moderately Low
	Low	Moderate	Moderate	Moderately Low	Moderately Low	Low

WELL #3	WSS # 096-23
Source Type	Ground Water
Susceptibility Analysis Date	November 6, 2002
Susceptibility Analysis Completed by	NMED-DWB
Date of PSOC Inventory	February, 2002

SENSITIVITY ANALYSIS

1. Depth of Screened Interval

Screened Interval Depth	Sensitivity Range	Rank Assigned
less than 100 feet	High	
100 - 200 feet	Moderately High	
201 - 500 feet	Moderate	
501 - 700 feet	Moderately Low	Moderately Low
greater than 700 feet	Low	

2. Well Construction Information and Integrity

A) Information Ranking

Construction Information Available	Points Possible	Points Assigned
Casing diameter, casing length and casing materials	2	2
Location of screened interval(s)	3	3
Total completion depth	3	3
Static water level at completion	2	2
Pump type, size and setting	2	2
Drilling log or equivalent	3	3
Total Points	15	15

Information Points	Sensitivity Range	Rank Assigned
0-3	High	
4-6	Moderately High	
7-9	Moderate	
10-12	Moderately Low	
13-15	Low	Low

B) Integrity Ranking

Physical Integrity of Supply Well	Points Possible	Points Assigned
Is the well located outside of an area susceptible to flooding?	2	2
Does well casing terminate at least 18 inches above floor or ground level?	2	2
Is annular space pressure-grouted to depth of at least 20 feet?	3	3
Is the wellhead properly sealed?	3	3
Is there a concrete pad around the wellhead that slopes away from the casing?	1	1
Does the well vent terminate at least 18 inches above floor or ground level, and is the vent screened and oriented to open downward?	1	1
Are check valves, blow-off valves and flow meters properly maintained and operated?	1	1
Is the wellhead fenced, housed or properly protected?	2	2
Total Points	15	15

Integrity Points	Sensitivity Range	Rank Assigned
0-3	High	
4-6	Moderately High	
7-9	Moderate	
10-12	Moderately Low	
13-15	Low	Low

3. DRASTIC Index = **84**

Depth to Water (ft)	374
Net Recharge (inch/yr (approximated))	<2
Aquifer Media	Sand & Gravel with significant Clay
Soil Media	Sandy Loam
Topography (ground slope) (%)	2
Impacts of Vadose Zone Media	Sand & Gravel with significant Clay
Hydraulic Conductivity (Aquifer) (gpd/ft ²)	30

DRASTIC Index	Sensitivity Range	Sensitivity Rank
201 or greater	High	
171-200	Moderately High	
131-170	Moderate	
101-130	Moderately Low	
0-100	Low	Low

Composite Sensitivity Ranking for Ground Water Source (Converted, Uniform Scale) for Well
 Sensitivity Rank = Well Depth Rank (Screen) + Well Construction/Integrity Rank + DRASTIC Index Rank

Rank for Depth of Screened Interval	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	10
Low (5 point)	
Rank for Well Construction Records	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Rank for Integrity of Construction	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Rank for DRASTIC Index	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Point Sum	25
Rank Assigned (see Ranking Guide, below)	Low

Sum of Sensitivity Points	Composite Sensitivity Range	Well Composite Rank Assigned
90-100	High	
70-85	Moderately High	
50-65	Moderate	
30-45	Moderately Low	Moderately Low
20-25	Low	

Sensitivity Rank = **LOW**

VULNERABILITY ANALYSIS for Well

PSOC Ranking Determination				
Number of PSOC in Zone	Zone			Ranking
	Zone A	Zone B	Zone C	
	1+	10+	15+	High
	0	8-9	12-14	Moderately High
	0	5-7	8-11	Moderate
	0	3-4	5-7	Moderately Low
0	0-2	0-4	Low	

PSOC Vulnerability Inventory and Ranking				
Map Reference	Description	Zone of Influence	Number of Type	Vulnerability Rank
Appendix K	MMP	A	1+	High
Appendix K	CFA	B	0-2	Low
Appendix K	CST	B	0-2	Low
Appendix K	CYY	B	0-2	Low
Appendix K	IRG	B	0-2	Low
Appendix K	IUR	B	0-2	Low
Appendix K	MHM	B	0-2	Low
Appendix K	RSF	B	0-2	Low
Appendix K	CST	C	0-4	Low
Appendix K	CSS	C	0-4	Low
Appendix K	CYY	C	0-4	Low
Appendix K	IUR	C	0-4	Low
Appendix K	MSC	C	0-4	Low
Appendix K	RSF	C	15+	High

Vulnerability Rank = **HIGH**

Susceptibility Ranking						
	Sensitivity Ranking					
			High	Moderately High	Moderate	Moderately Low
Vulnerability Ranking	High	High	High	Moderately High	Moderately High	Moderate
	Moderately High	High	Moderately High	Moderately High	Moderate	Moderate
	Moderate	Moderately High	Moderately High	Moderate	Moderate	Moderately Low
	Moderately Low	Moderately High	Moderate	Moderate	Moderately Low	Moderately Low
	Low	Moderate	Moderate	Moderately Low	Moderately Low	Low

WELL #4	WSS # 096-23
Source Type	Ground Water
Susceptibility Analysis Date	November, 2002
Susceptibility Analysis Completed by	NMED-DWB
Date of PSOC Inventory	February, 2002

SENSITIVITY ANALYSIS

1. Depth of Screened Interval

Screened Interval Depth	Sensitivity Range	Rank Assigned
less than 100 feet	High	
100 - 200 feet	Moderately High	
201 - 500 feet	Moderate	
501 - 700 feet	Moderately Low	Moderately Low
greater than 700 feet	Low	

2. Well Construction Information and Integrity

A) Information Ranking

Construction Information Available	Points Possible	Points Assigned
Casing diameter, casing length and casing materials	2	2
Location of screened interval(s)	3	3
Total completion depth	3	3
Static water level at completion	2	2
Pump type, size and setting	2	2
Drilling log or equivalent	3	3
Total Points	15	15

Information Points	Sensitivity Range	Rank Assigned
0-3	High	
4-6	Moderately High	
7-9	Moderate	
10-12	Moderately Low	
13-15	Low	Low

B) Integrity Ranking

Physical Integrity of Supply Well	Points Possible	Points Assigned
Is the well located outside of an area susceptible to flooding?	2	2
Does well casing terminate at least 18 inches above floor or ground level?	2	2
Is annular space pressure-grouted to depth of at least 20 feet?	3	3
Is the wellhead properly sealed?	3	3
Is there a concrete pad around the wellhead that slopes away from the casing?	1	1
Does the well vent terminate at least 18 inches above floor or ground level, and is the vent screened and oriented to open downward?	1	1
Are check valves, blow-off valves and flow meters properly maintained and operated?	1	1
Is the wellhead fenced, housed or properly protected?	2	2
Total Points	15	15

Integrity Points	Sensitivity Range	Rank Assigned
0-3	High	
4-6	Moderately High	
7-9	Moderate	
10-12	Moderately Low	
13-15	Low	Low

3. DRASTIC Index = **115**

Depth to Water (ft)	396
Net Recharge (inch/yr (approximated))	<2
Aquifer Media	Sand & Gravel with significant Clay
Soil Media	Sandy Loam
Topography (ground slope) (%)	2
Impacts of Vadose Zone Media	Sand & Gravel with significant Clay
Hydraulic Conductivity (Aquifer) (gpd/ft ²)	30

DRASTIC Index	Sensitivity Range	Sensitivity Rank
201 or greater	High	
171-200	Moderately High	
131-170	Moderate	
101-130	Moderately Low	Moderately Low
0-100	Low	

Composite Sensitivity Ranking for Ground Water Source (Converted, Uniform Scale) for Well
 Sensitivity Rank = Well Depth Rank (Screen) + Well Construction/Integrity Rank + DRASTIC Index Rank

Rank for Depth of Screened Interval	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	10
Low (5 point)	
Rank for Well Construction Records	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Rank for Integrity of Construction	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Rank for DRASTIC Index	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Point Sum	25
Rank Assigned (see Ranking Guide, below)	Low

APPENDIX B: SUSCEPTIBILITY ANALYSIS

Sum of Sensitivity Points	Composite Sensitivity Range	Well Composite Rank Assigned
90-100	High	
70-85	Moderately High	
50-65	Moderate	
30-45	Moderately Low	
20-25	Low	Low

Sensitivity Rank = **LOW**

VULNERABILITY ANALYSIS for Well

PSOC Ranking Determination				
Number of PSOC in Zone	Zone			Ranking
	Zone A	Zone B	Zone C	
	1+	10+	15+	High
	0	8-9	12-14	Moderately High
	0	5-7	8-11	Moderate
	0	3-4	5-7	Moderately Low
0	0-2	0-4	Low	

PSOC Vulnerability Inventory and Ranking				
Map Reference	Description	Zone of Influence	Number of Type	Vulnerability Rank
Base Map	CGC	A	1+	High
Base Map	CGC	B	0-2	Low
Base Map	CGC	C	0-4	Low

Vulnerability Rank = **HIGH**

Susceptibility Ranking						
	Sensitivity Ranking					
			High	Moderately High	Moderate	Moderately Low
Vulnerability Ranking	High	High	High	Moderately High	Moderately High	Moderate
	Moderately High	High	Moderately High	Moderately High	Moderate	Moderate
	Moderate	Moderately High	Moderately High	Moderate	Moderate	Moderately Low
	Moderately Low	Moderately High	Moderate	Moderate	Moderately Low	Moderately Low
	Low	Moderate	Moderate	Moderately Low	Moderately Low	Low

WELL #6A	WSS # 096-23
Source Type	Ground Water
Susceptibility Analysis Date	November, 2002
Susceptibility Analysis Completed by	NMED-DWB
Date of PSOC Inventory	February, 2002

SENSITIVITY ANALYSIS

1. Depth of Screened Interval

Screened Interval Depth	Sensitivity Range	Rank Assigned
less than 100 feet	High	
100 - 200 feet	Moderately High	
201 - 500 feet	Moderate	Moderate
501 - 700 feet	Moderately Low	
greater than 700 feet	Low	

2. Well Construction Information and Integrity

A) Information Ranking

Construction Information Available	Points Possible	Points Assigned
Casing diameter, casing length and casing materials	2	2
Location of screened interval(s)	3	3
Total completion depth	3	3
Static water level at completion	2	2
Pump type, size and setting	2	2
Drilling log or equivalent	3	3
Total Points	15	15

Information Points	Sensitivity Range	Rank Assigned
0-3	High	
4-6	Moderately High	
7-9	Moderate	
10-12	Moderately Low	
13-15	Low	Low

B) Integrity Ranking

Physical Integrity of Supply Well	Points Possible	Points Assigned
Is the well located outside of an area susceptible to flooding?	2	2
Does well casing terminate at least 18 inches above floor or ground level?	2	2
Is annular space pressure-grouted to depth of at least 20 feet?	3	3
Is the wellhead properly sealed?	3	3
Is there a concrete pad around the wellhead that slopes away from the casing?	1	1
Does the well vent terminate at least 18 inches above floor or ground level, and is the vent screened and oriented to open downward?	1	1
Are check valves, blow-off valves and flow meters properly maintained and operated?	1	1
Is the wellhead fenced, housed or properly protected?	2	2
Total Points	15	15

Integrity Points	Sensitivity Range	Rank Assigned
0-3	High	
4-6	Moderately High	
7-9	Moderate	
10-12	Moderately Low	
13-15	Low	Low

3. DRASTIC Index = 83

Depth to Water (ft)	658
Net Recharge (inch/yr (approximated))	<2
Aquifer Media	Sand & Gravel with significant Clay
Soil Media	Sandy Loam
Topography (ground slope) (%)	≈10
Impacts of Vadose Zone Media	Sand & Gravel with significant Clay
Hydraulic Conductivity (Aquifer) (gpd/ft ²)	133.1

DRASTIC Index	Sensitivity Range	Sensitivity Rank
201 or greater	High	
171-200	Moderately High	
131-170	Moderate	
101-130	Moderately Low	
0-100	Low	Low

Composite Sensitivity Ranking for Ground Water Source (Converted, Uniform Scale) for Well
 Sensitivity Rank = Well Depth Rank (Screen) + Well Construction/Integrity Rank + DRASTIC Index Rank

Rank for Depth of Screened Interval	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Rank for Well Construction Records	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Rank for Integrity of Construction	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Rank for DRASTIC Index	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Point Sum	20
Rank Assigned (see Ranking Guide, below)	Low

APPENDIX B: SUSCEPTIBILITY ANALYSIS

Sum of Sensitivity Points	Composite Sensitivity Range	Well Composite Rank Assigned
90-100	High	
70-85	Moderately High	
50-65	Moderate	
30-45	Moderately Low	
20-25	Low	Low

Sensitivity Rank = **LOW**

VULNERABILITY ANALYSIS for Well

PSOC Ranking Determination				
Number of PSOC in Zone	Zone			Ranking
	Zone A	Zone B	Zone C	
	1+	10+	15+	High
	0	8-9	12-14	Moderately High
	0	5-7	8-11	Moderate
	0	3-4	5-7	Moderately Low
0	0-2	0-4	Low	

PSOC Vulnerability Inventory and Ranking				
Map Reference	Description	Zone of Influence	Number of Type	Vulnerability Rank
Appendix K	MWP	A	1+	High
Appendix K	UNKNOWN	B		
Appendix K	RSF	C	15+	High ?

Vulnerability Rank = **HIGH**

Susceptibility Ranking						
	Sensitivity Ranking					
			High	Moderately High	Moderate	Moderately Low
Vulnerability Ranking	High	High	High	Moderately High	Moderately High	Moderate
	Moderately High	High	Moderately High	Moderately High	Moderate	Moderate
	Moderate	Moderately High	Moderately High	Moderate	Moderate	Moderately Low
	Moderately Low	Moderately High	Moderate	Moderate	Moderately Low	Moderately Low
	Low	Moderate	Moderate	Moderately Low	Moderately Low	Low

WELL #7	WSS # 096-23
Source Type	Ground Water
Susceptibility Analysis Date	November, 2002
Susceptibility Analysis Completed by	NMED-DWB
Date of PSOC Inventory	February, 2002

SENSITIVITY ANALYSIS

1. Depth of Screened Interval

Screened Interval Depth	Sensitivity Range	Rank Assigned
less than 100 feet	High	
100 - 200 feet	Moderately High	
201 - 500 feet	Moderate	
501 - 700 feet	Moderately Low	
greater than 700 feet	Low	Low

2. Well Construction Information and Integrity

A) Information Ranking

Construction Information Available	Points Possible	Points Assigned
Casing diameter, casing length and casing materials	2	2
Location of screened interval(s)	3	3
Total completion depth	3	3
Static water level at completion	2	2
Pump type, size and setting	2	2
Drilling log or equivalent	3	3
Total Points	15	15

Information Points	Sensitivity Range	Rank Assigned
0-3	High	
4-6	Moderately High	
7-9	Moderate	
10-12	Moderately Low	
13-15	Low	Low

B) Integrity Ranking

Physical Integrity of Supply Well	Points Possible	Points Assigned
Is the well located outside of an area susceptible to flooding?	2	2
Does well casing terminate at least 18 inches above floor or ground level?	2	2
Is annular space pressure-grouted to depth of at least 20 feet?	3	3
Is the wellhead properly sealed?	3	3
Is there a concrete pad around the wellhead that slopes away from the casing?	1	1
Does the well vent terminate at least 18 inches above floor or ground level, and is the vent screened and oriented to open downward?	1	1
Are check valves, blow-off valves and flow meters properly maintained and operated?	1	1
Is the wellhead fenced, housed or properly protected?	2	2
Total Points	15	15

Integrity Points	Sensitivity Range	Rank Assigned
0-3	High	
4-6	Moderately High	
7-9	Moderate	
10-12	Moderately Low	
13-15	Low	Low

3. DRASTIC Index = 85

Depth to Water (ft)	740
Net Recharge (inch/yr (approximated))	<2
Aquifer Media	Sand & Gravel with significant Clay
Soil Media	Sandy Loam
Topography (ground slope) (%)	2.5-4
Impacts of Vadose Zone Media	Sand & Gravel with significant Clay
Hydraulic Conductivity (Aquifer) (gpd/ft ²)	127

DRASTIC Index	Sensitivity Range	Sensitivity Rank
201 or greater	High	
171-200	Moderately High	
131-170	Moderate	
101-130	Moderately Low	
0-100	Low	Low

Composite Sensitivity Ranking for Ground Water Source (Converted, Uniform Scale) for Well
 Sensitivity Rank = Well Depth Rank (Screen) + Well Construction/Integrity Rank + DRASTIC Index Rank

Rank for Depth of Screened Interval	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Rank for Well Construction Records	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Rank for Integrity of Construction	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Rank for DRASTIC Index	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Point Sum	20
Rank Assigned (see Ranking Guide, below)	Low

Sum of Sensitivity Points	Composite Sensitivity Range	Well Composite Rank Assigned
90-100	High	
70-85	Moderately High	
50-65	Moderate	
30-45	Moderately Low	
20-25	Low	Low

Sensitivity Rank = **LOW**

VULNERABILITY ANALYSIS for Well

PSOC Ranking Determination				
Number of PSOC in Zone	Zone			Ranking
	Zone A	Zone B	Zone C	
	1+	10+	15+	High
	0	8-9	12-14	Moderately High
	0	5-7	8-11	Moderate
	0	3-4	5-7	Moderately Low
0	0-2	0-4	Low	

PSOC Vulnerability Inventory and Ranking				
Map Reference	Description	Zone of Influence	Number of Type	Vulnerability Rank
Base Map	IUR	B	0-2	Low
Base Map	IUR	C	0-4	Low

Vulnerability Rank = **LOW**

Susceptibility Ranking						
Vulnerability Ranking	Sensitivity Ranking					
		High	Moderately High	Moderate	Moderately Low	Low
	High	High	High	Moderately High	Moderately High	Moderate
	Moderately High	High	Moderately High	Moderately High	Moderate	Moderate
	Moderate	Moderately High	Moderately High	Moderate	Moderate	Moderately Low
	Moderately Low	Moderately High	Moderate	Moderate	Moderately Low	Moderately Low
	Low	Moderate	Moderate	Moderately Low	Moderately Low	Low

WELL #8	WSS # 096-23
Source Type	Ground Water
Susceptibility Analysis Date	November 6, 2002
Susceptibility Analysis Completed by	NMED-DWB
Date of PSOC Inventory	May 1, 2002

SENSITIVITY ANALYSIS

1. Depth of Screened Interval

Screened Interval Depth	Sensitivity Range	Rank Assigned
less than 100 feet	High	
100 - 200 feet	Moderately High	
201 - 500 feet	Moderate	
501 - 700 feet	Moderately Low	
greater than 700 feet	Low	Low

2. Well Construction Information and Integrity

A) Information Ranking

Construction Information Available	Points Possible	Points Assigned
Casing diameter, casing length and casing materials	2	2
Location of screened interval(s)	3	3
Total completion depth	3	3
Static water level at completion	2	2
Pump type, size and setting	2	2
Drilling log or equivalent	3	3
Total Points	15	15

Information Points	Sensitivity Range	Rank Assigned
0-3	High	
4-6	Moderately High	
7-9	Moderate	
10-12	Moderately Low	
13-15	Low	Low

B) Integrity Ranking

Physical Integrity of Supply Well	Points Possible	Points Assigned
Is the well located outside of an area susceptible to flooding?	2	2
Does well casing terminate at least 18 inches above floor or ground level?	2	2
Is annular space pressure-grouted to depth of at least 20 feet?	3	3
Is the wellhead properly sealed?	3	3
Is there a concrete pad around the wellhead that slopes away from the casing?	1	1
Does the well vent terminate at least 18 inches above floor or ground level, and is the vent screened and oriented to open downward?	1	1
Are check valves, blow-off valves and flow meters properly maintained and operated?	1	1
Is the wellhead fenced, housed or properly protected?	2	2
Total Points	15	15

Integrity Points	Sensitivity Range	Rank Assigned
0-3	High	
4-6	Moderately High	
7-9	Moderate	
10-12	Moderately Low	
13-15	Low	Low

3. DRASTIC Index = **81**

Depth to Water (ft)	800
Net Recharge (inch/yr (approximated))	<2
Aquifer Media	Sand & Gravel with significant Clay
Soil Media	Sandy Loam
Topography (ground slope) (%)	≈3
Impacts of Vadose Zone Media	Sand & Gravel with significant Clay
Hydraulic Conductivity (Aquifer) (gpd/ft ²)	38.9

DRASTIC Index	Sensitivity Range	Sensitivity Rank
201 or greater	High	
171-200	Moderately High	
131-170	Moderate	
101-130	Moderately Low	
0-100	Low	Low

Composite Sensitivity Ranking for Ground Water Source (Converted, Uniform Scale) for Well
 Sensitivity Rank = Well Depth Rank (Screen) + Well Construction/Integrity Rank + DRASTIC Index Rank

Rank for Depth of Screened Interval	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Rank for Well Construction Records	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Rank for Integrity of Construction	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Rank for DRASTIC Index	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Point Sum	20
Rank Assigned (see Ranking Guide, below)	Low

Sum of Sensitivity Points	Composite Sensitivity Range	Well Composite Rank Assigned
90-100	High	
70-85	Moderately High	
50-65	Moderate	
30-45	Moderately Low	
20-25	Low	Low

Sensitivity Rank = **LOW**

VULNERABILITY ANALYSIS for Well

PSOC Ranking Determination				
Number of PSOC in Zone	Zone			Ranking
	Zone A	Zone B	Zone C	
	1+	10+	15+	High
	0	8-9	12-14	Moderately High
	0	5-7	8-11	Moderate
	0	3-4	5-7	Moderately Low
0	0-2	0-4	Low	

PSOC Vulnerability Inventory and Ranking				
Map Reference	Description	Zone of Influence	Number of Type	Vulnerability Rank
Base Map	IUR	B	0-2	Low
Base Map	IUR	C	0-4	Low

Vulnerability Rank = **LOW**

Susceptibility Ranking						
Vulnerability Ranking	Sensitivity Ranking					
		High	Moderately High	Moderate	Moderately Low	Low
	High	High	High	Moderately High	Moderately High	Moderate
	Moderately High	High	Moderately High	Moderately High	Moderate	Moderate
	Moderate	Moderately High	Moderately High	Moderate	Moderate	Moderately Low
	Moderately Low	Moderately High	Moderate	Moderate	Moderately Low	Moderately Low
	Low	Moderate	Moderate	Moderately Low	Moderately Low	Low

WELL #9	WSS # 096-23
Source Type	Ground Water
Susceptibility Analysis Date	November, 2002
Susceptibility Analysis Completed by	NMED-DWB
Date of PSOC Inventory	February, 2002

SENSITIVITY ANALYSIS

1. Depth of Screened Interval

Screened Interval Depth	Sensitivity Range	Rank Assigned
less than 100 feet	High	
100 - 200 feet	Moderately High	
201 - 500 feet	Moderate	
501 - 700 feet	Moderately Low	
greater than 700 feet	Low	Low

2. Well Construction Information and Integrity

A) Information Ranking

Construction Information Available	Points Possible	Points Assigned
Casing diameter, casing length and casing materials	2	2
Location of screened interval(s)	3	3
Total completion depth	3	3
Static water level at completion	2	2
Pump type, size and setting	2	2
Drilling log or equivalent	3	3
Total Points	15	15

Information Points	Sensitivity Range	Rank Assigned
0-3	High	
4-6	Moderately High	
7-9	Moderate	
10-12	Moderately Low	
13-15	Low	Low

B) Integrity Ranking

Physical Integrity of Supply Well	Points Possible	Points Assigned
Is the well located outside of an area susceptible to flooding?	2	2
Does well casing terminate at least 18 inches above floor or ground level?	2	2
Is annular space pressure-grouted to depth of at least 20 feet?	3	3
Is the wellhead properly sealed?	3	3
Is there a concrete pad around the wellhead that slopes away from the casing?	1	1
Does the well vent terminate at least 18 inches above floor or ground level, and is the vent screened and oriented to open downward?	1	1
Are check valves, blow-off valves and flow meters properly maintained and operated?	1	1
Is the wellhead fenced, housed or properly protected?	2	2
Total Points	15	15

Integrity Points	Sensitivity Range	Rank Assigned
0-3	High	
4-6	Moderately High	
7-9	Moderate	
10-12	Moderately Low	
13-15	Low	Low

3. DRASTIC Index = **81**

Depth to Water (ft)	1080
Net Recharge (inch/yr (approximated))	<2
Aquifer Media	Sand & Gravel with significant Clay
Soil Media	Sandy Loam
Topography (ground slope) (%)	3
Impacts of Vadose Zone Media	Sand & Gravel with significant Clay
Hydraulic Conductivity (Aquifer) (gpd/ft ²)	36.9

DRASTIC Index	Sensitivity Range	Sensitivity Rank
201 or greater	High	
171-200	Moderately High	
131-170	Moderate	
101-130	Moderately Low	
0-100	Low	Low

Composite Sensitivity Ranking for Ground Water Source (Converted, Uniform Scale) for Well
 Sensitivity Rank = Well Depth Rank (Screen) + Well Construction/Integrity Rank + DRASTIC Index Rank

Rank for Depth of Screened Interval	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Rank for Well Construction Records	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Rank for Integrity of Construction	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Rank for DRASTIC Index	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Point Sum	20
Rank Assigned (see Ranking Guide, below)	Low

APPENDIX B: SUSCEPTIBILITY ANALYSIS

Sum of Sensitivity Points	Composite Sensitivity Range	Well Composite Rank Assigned
90-100	High	
70-85	Moderately High	
50-65	Moderate	
30-45	Moderately Low	
20-25	Low	Low

Sensitivity Rank = **LOW**

VULNERABILITY ANALYSIS for Well

PSOC Ranking Determination				
Number of PSOC in Zone	Zone			Ranking
	Zone A	Zone B	Zone C	
	1+	10+	15+	High
	0	8-9	12-14	Moderately High
	0	5-7	8-11	Moderate
	0	3-4	5-7	Moderately Low
0	0-2	0-4	Low	

PSOC Vulnerability Inventory and Ranking				
Map Reference	Description	Zone of Influence	Number of Type	Vulnerability Rank
Base Map	Arroyo	C	0-4	Low

Vulnerability Rank = **LOW**

Susceptibility Ranking						
Vulnerability Ranking	Sensitivity Ranking					
		High	Moderately High	Moderate	Moderately Low	Low
	High	High	High	Moderately High	Moderately High	Moderate
	Moderately High	High	Moderately High	Moderately High	Moderate	Moderate
	Moderate	Moderately High	Moderately High	Moderate	Moderate	Moderately Low
	Moderately Low	Moderately High	Moderate	Moderate	Moderately Low	Moderately Low
	Low	Moderate	Moderate	Moderately Low	Moderately Low	Low

WELL #10	WSS # 096-23
Source Type	Ground Water
Susceptibility Analysis Date	November, 2002
Susceptibility Analysis Completed by	NMED-DWB
Date of PSOC Inventory	February, 2002

SENSITIVITY ANALYSIS

1. Depth of Screened Interval

Screened Interval Depth	Sensitivity Range	Rank Assigned
less than 100 feet	High	
100 - 200 feet	Moderately High	
201 - 500 feet	Moderate	
501 - 700 feet	Moderately Low	
greater than 700 feet	Low	Low

2. Well Construction Information and Integrity

A) Information Ranking

Construction Information Available	Points Possible	Points Assigned
Casing diameter, casing length and casing materials	2	2
Location of screened interval(s)	3	3
Total completion depth	3	3
Static water level at completion	2	2
Pump type, size and setting	2	2
Drilling log or equivalent	3	3
Total Points	15	15

Information Points	Sensitivity Range	Rank Assigned
0-3	High	
4-6	Moderately High	
7-9	Moderate	
10-12	Moderately Low	
13-15	Low	Low

B) Integrity Ranking

Physical Integrity of Supply Well	Points Possible	Points Assigned
Is the well located outside of an area susceptible to flooding?	2	2
Does well casing terminate at least 18 inches above floor or ground level?	2	2
Is annular space pressure-grouted to depth of at least 20 feet?	3	3
Is the wellhead properly sealed?	3	3
Is there a concrete pad around the wellhead that slopes away from the casing?	1	1
Does the well vent terminate at least 18 inches above floor or ground level, and is the vent screened and oriented to open downward?	1	1
Are check valves, blow-off valves and flow meters properly maintained and operated?	1	1
Is the wellhead fenced, housed or properly protected?	2	2
Total Points	15	15

Integrity Points	Sensitivity Range	Rank Assigned
0-3	High	
4-6	Moderately High	
7-9	Moderate	
10-12	Moderately Low	
13-15	Low	Low

3. DRASTIC Index = 85

Depth to Water (ft)	510
Net Recharge (inch/yr (approximated))	<2
Aquifer Media	Sand & Gravel with significant Clay
Soil Media	Sand
Topography (ground slope) (%)	10
Impacts of Vadose Zone Media	Sand & Gravel with significant Clay
Hydraulic Conductivity (Aquifer) (gpd/ft ²)	33.1

DRASTIC Index	Sensitivity Range	Sensitivity Rank
201 or greater	High	
171-200	Moderately High	
131-170	Moderate	
101-130	Moderately Low	
0-100	Low	Low

Composite Sensitivity Ranking for Ground Water Source (Converted, Uniform Scale) for Well
 Sensitivity Rank = Well Depth Rank (Screen) + Well Construction/Integrity Rank + DRASTIC Index Rank

Rank for Depth of Screened Interval	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Rank for Well Construction Records	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Rank for Integrity of Construction	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Rank for DRASTIC Index	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Point Sum	20
Rank Assigned (see Ranking Guide, below)	Low

APPENDIX B: SUSCEPTIBILITY ANALYSIS

Sum of Sensitivity Points	Composite Sensitivity Range	Well Composite Rank Assigned
90-100	High	
70-85	Moderately High	
50-65	Moderate	
30-45	Moderately Low	
20-25	Low	Low

Sensitivity Rank = **LOW**

VULNERABILITY ANALYSIS for Well

PSOC Ranking Determination				
Number of PSOC in Zone	Zone			Ranking
	Zone A	Zone B	Zone C	
	1+	10+	15+	High
	0	8-9	12-14	Moderately High
	0	5-7	8-11	Moderate
	0	3-4	5-7	Moderately Low
0	0-2	0-4	Low	

PSOC Vulnerability Inventory and Ranking				
Map Reference	Description	Zone of Influence	Number of Type	Vulnerability Rank
Base Map	IUR	B	0-2	Low
Base Map	Arroyo	B	0-2	Low
Base Map	IUR	C	0-4	Low
Base Map	Arroyo	C	0-4	Low

Vulnerability Rank = **LOW**

Susceptibility Ranking							
Vulnerability Ranking	Sensitivity Ranking						
			High	Moderately High	Moderate	Moderately Low	Low
	High	High	High	Moderately High	Moderately High	Moderate	
	Moderately High	High	Moderately High	Moderately High	Moderate	Moderate	
	Moderate	Moderately High	Moderately High	Moderate	Moderate	Moderately Low	
	Moderately Low	Moderately High	Moderate	Moderate	Moderately Low	Moderately Low	
	Low	Moderate	Moderate	Moderately Low	Moderately Low	Low	

WELL #11	WSS # 096-23
Source Type	Ground Water
Susceptibility Analysis Date	November, 2002
Susceptibility Analysis Completed by	NMED-DWB
Date of PSOC Inventory	February, 2002

SENSITIVITY ANALYSIS

1. Depth of Screened Interval

Screened Interval Depth	Sensitivity Range	Rank Assigned
less than 100 feet	High	
100 - 200 feet	Moderately High	
201 - 500 feet	Moderate	Moderate
501 - 700 feet	Moderately Low	
greater than 700 feet	Low	

2. Well Construction Information and Integrity

A) Information Ranking

Construction Information Available	Points Possible	Points Assigned
Casing diameter, casing length and casing materials	2	2
Location of screened interval(s)	3	3
Total completion depth	3	3
Static water level at completion	2	2
Pump type, size and setting	2	2
Drilling log or equivalent	3	3
Total Points	15	15

Information Points	Sensitivity Range	Rank Assigned
0-3	High	
4-6	Moderately High	
7-9	Moderate	
10-12	Moderately Low	
13-15	Low	Low

B) Integrity Ranking

Physical Integrity of Supply Well	Points Possible	Points Assigned
Is the well located outside of an area susceptible to flooding?	2	2
Does well casing terminate at least 18 inches above floor or ground level?	2	2
Is annular space pressure-grouted to depth of at least 20 feet?	3	3
Is the wellhead properly sealed?	3	0
Is there a concrete pad around the wellhead that slopes away from the casing?	1	1
Does the well vent terminate at least 18 inches above floor or ground level, and is the vent screened and oriented to open downward?	1	0
Are check valves, blow-off valves and flow meters properly maintained and operated?	1	0
Is the wellhead fenced, housed or properly protected?	2	2
Total Points	15	10

Integrity Points	Sensitivity Range	Rank Assigned
0-3	High	
4-6	Moderately High	
7-9	Moderate	
10-12	Moderately Low	Moderately Low
13-15	Low	

3. DRASTIC Index = **111**

Depth to Water (ft)	87.5
Net Recharge (inch/yr (approximated))	<2
Aquifer Media	Sand & Gravel with significant Clay
Soil Media	Sandy Loam
Topography (ground slope) (%)	1
Impacts of Vadose Zone Media	Sand & Gravel with significant Clay
Hydraulic Conductivity (Aquifer) (gpd/ft ²)	450

DRASTIC Index	Sensitivity Range	Sensitivity Rank
201 or greater	High	
171-200	Moderately High	
131-170	Moderate	
101-130	Moderately Low	
0-100	Low	Low

Composite Sensitivity Ranking for Ground Water Source (Converted, Uniform Scale) for Well
 Sensitivity Rank = Well Depth Rank (Screen) + Well Construction/Integrity Rank + DRASTIC Index Rank

Rank for Depth of Screened Interval	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	15
Moderately Low (10 points)	
Low (5 point)	
Rank for Well Construction Records	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Rank for Integrity of Construction	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	10
Low (5 point)	
Rank for DRASTIC Index	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	10
Low (5 point)	
Point Sum	40
Rank Assigned (see Ranking Guide, below)	Moderately Low

APPENDIX B: SUSCEPTIBILITY ANALYSIS

Sum of Sensitivity Points	Composite Sensitivity Range	Well Composite Rank Assigned
90-100	High	
70-85	Moderately High	
50-65	Moderate	
30-45	Moderately Low	Moderately Low
20-25	Low	

Sensitivity Rank = **MODERATELY LOW**

VULNERABILITY ANALYSIS for Well

PSOC Ranking Determination				
Number of PSOC in Zone	Zone			Ranking
	Zone A	Zone B	Zone C	
	1+	10+	15+	High
	0	8-9	12-14	Moderately High
	0	5-7	8-11	Moderate
	0	3-4	5-7	Moderately Low
0	0-2	0-4	Low	

PSOC Vulnerability Inventory and Ranking				
Map Reference	Description	Zone of Influence	Number of Type	Vulnerability Rank
Appendix K	MSL	A	1+	High
Appendix K	CFA	B	3-4	Moderately Low
Appendix K	ICC	B	0-2	Low
Appendix K	I OG	B	0-2	Low
Appendix K	CAR	C	0-4	Low
Base Map	ADC	C	0-4	Low
Base Map	ADF	C	0-4	Low
Base Map	MWP	C	0-4	Low
Map Legend	Petroleum storage	C	0-4	Low

Vulnerability Rank = **HIGH**

Susceptibility Ranking						
	Sensitivity Ranking					
			High	Moderately High	Moderate	Moderately Low
Vulnerability Ranking	High	High	High	Moderately High	Moderately High	Moderate
	Moderately High	High	Moderately High	Moderately High	Moderate	Moderate
	Moderate	Moderately High	Moderately High	Moderate	Moderate	Moderately Low
	Moderately Low	Moderately High	Moderate	Moderate	Moderately Low	Moderately Low
	Low	Moderate	Moderate	Moderately Low	Moderately Low	Low

WELL #12	WSS # 096-23
Source Type	Ground Water
Susceptibility Analysis Date	November, 2002
Susceptibility Analysis Completed by	NMED-DWB
Date of PSOC Inventory	February, 2002

SENSITIVITY ANALYSIS

1. Depth of Screened Interval

Screened Interval Depth	Sensitivity Range	Rank Assigned
less than 100 feet	High	
100 - 200 feet	Moderately High	
201 - 500 feet	Moderate	
501 - 700 feet	Moderately Low	Moderately Low
greater than 700 feet	Low	

2. Well Construction Information and Integrity

A) Information Ranking

Construction Information Available	Points Possible	Points Assigned
Casing diameter, casing length and casing materials	2	2
Location of screened interval(s)	3	3
Total completion depth	3	3
Static water level at completion	2	2
Pump type, size and setting	2	0
Drilling log or equivalent	3	3
Total Points	15	13

Information Points	Sensitivity Range	Rank Assigned
0-3	High	
4-6	Moderately High	
7-9	Moderate	
10-12	Moderately Low	
13-15	Low	Low

B) Integrity Ranking

Physical Integrity of Supply Well	Points Possible	Points Assigned
Is the well located outside of an area susceptible to flooding?	2	2
Does well casing terminate at least 18 inches above floor or ground level?	2	2
Is annular space pressure-grouted to depth of at least 20 feet?	3	3
Is the wellhead properly sealed?	3	3
Is there a concrete pad around the wellhead that slopes away from the casing?	1	1
Does the well vent terminate at least 18 inches above floor or ground level, and is the vent screened and oriented to open downward?	1	1
Are check valves, blow-off valves and flow meters properly maintained and operated?	1	1
Is the wellhead fenced, housed or properly protected?	2	2
Total Points	15	15

Integrity Points	Sensitivity Range	Rank Assigned
0-3	High	
4-6	Moderately High	
7-9	Moderate	
10-12	Moderately Low	
13-15	Low	Low

3. DRASTIC Index = **81**

Depth to Water (ft)	200
Net Recharge (inch/yr (approximated))	<2
Aquifer Media	Sand & Gravel with significant Clay
Soil Media	Sandy Loam
Topography (ground slope) (%)	3
Impacts of Vadose Zone Media	Sand & Gravel with significant Clay
Hydraulic Conductivity (Aquifer) (gpd/ft ²)	59.7

DRASTIC Index	Sensitivity Range	Sensitivity Rank
201 or greater	High	
171-200	Moderately High	
131-170	Moderate	
101-130	Moderately Low	
0-100	Low	Low

Composite Sensitivity Ranking for Ground Water Source (Converted, Uniform Scale) for Well
 Sensitivity Rank = Well Depth Rank (Screen) + Well Construction/Integrity Rank + DRASTIC Index Rank

Rank for Depth of Screened Interval	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	10
Low (5 point)	
Rank for Well Construction Records	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Rank for Integrity of Construction	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Rank for DRASTIC Index	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Point Sum	25
Rank Assigned (see Ranking Guide, below)	Moderately Low

APPENDIX B: SUSCEPTIBILITY ANALYSIS

Sum of Sensitivity Points	Composite Sensitivity Range	Well Composite Rank Assigned
90-100	High	
70-85	Moderately High	
50-65	Moderate	
30-45	Moderately Low	Moderately Low
20-25	Low	

Sensitivity Rank = **MODERATELY LOW**

VULNERABILITY ANALYSIS for Well

PSOC Ranking Determination				
Number of PSOC in Zone	Zone			Ranking
	Zone A	Zone B	Zone C	
	1+	10+	15+	High
	0	8-9	12-14	Moderately High
	0	5-7	8-11	Moderate
	0	3-4	5-7	Moderately Low
0	0-2	0-4	Low	

PSOC Vulnerability Inventory and Ranking				
Map Reference	Description	Zone of Influence	Number of Type	Vulnerability Rank
Appendix K	-	-	-	-

Vulnerability Rank = **LOW**

Susceptibility Ranking						
Vulnerability Ranking	Sensitivity Ranking					
		High	Moderately High	Moderate	Moderately Low	Low
	High	High	High	Moderately High	Moderately High	Moderate
	Moderately High	High	Moderately High	Moderately High	Moderate	Moderate
	Moderate	Moderately High	Moderately High	Moderate	Moderate	Moderately Low
	Moderately Low	Moderately High	Moderate	Moderate	Moderately Low	Moderately Low
	Low	Moderate	Moderate	Moderately Low	Moderately Low	Low

WELL #13	WSS # 096-23
Source Type	Ground Water
Susceptibility Analysis Date	November, 2002
Susceptibility Analysis Completed by	NMED-DWB
Date of PSOC Inventory	February, 2002

SENSITIVITY ANALYSIS

1. Depth of Screened Interval

Screened Interval Depth	Sensitivity Range	Rank Assigned
less than 100 feet	High	
100 - 200 feet	Moderately High	
201 - 500 feet	Moderate	
501 - 700 feet	Moderately Low	
greater than 700 feet	Low	Low

2. Well Construction Information and Integrity

A) Information Ranking

Construction Information Available	Points Possible	Points Assigned
Casing diameter, casing length and casing materials	2	2
Location of screened interval(s)	3	3
Total completion depth	3	3
Static water level at completion	2	2
Pump type, size and setting	2	2
Drilling log or equivalent	3	3
Total Points	15	15

Information Points	Sensitivity Range	Rank Assigned
0-3	High	
4-6	Moderately High	
7-9	Moderate	
10-12	Moderately Low	
13-15	Low	Low

B) Integrity Ranking

Physical Integrity of Supply Well	Points Possible	Points Assigned
Is the well located outside of an area susceptible to flooding?	2	2
Does well casing terminate at least 18 inches above floor or ground level?	2	2
Is annular space pressure-grouted to depth of at least 20 feet?	3	3
Is the wellhead properly sealed?	3	3
Is there a concrete pad around the wellhead that slopes away from the casing?	1	1
Does the well vent terminate at least 18 inches above floor or ground level, and is the vent screened and oriented to open downward?	1	1
Are check valves, blow-off valves and flow meters properly maintained and operated?	1	1
Is the wellhead fenced, housed or properly protected?	2	2
Total Points	15	15

Integrity Points	Sensitivity Range	Rank Assigned
0-3	High	
4-6	Moderately High	
7-9	Moderate	
10-12	Moderately Low	
13-15	Low	Low

3. DRASTIC Index = 75

Depth to Water (ft)	1100
Net Recharge (inch/yr (approximated))	<2
Aquifer Media	Sand & Gravel with significant Clay
Soil Media	Sandy Loam
Topography (ground slope) (%)	3
Impacts of Vadose Zone Media	Sand & Gravel with significant Clay
Hydraulic Conductivity (Aquifer) (gpd/ft ²)	30

DRASTIC Index	Sensitivity Range	Sensitivity Rank
201 or greater	High	
171-200	Moderately High	
131-170	Moderate	
101-130	Moderately Low	
0-100	Low	Low

Composite Sensitivity Ranking for Ground Water Source (Converted, Uniform Scale) for Well
 Sensitivity Rank = Well Depth Rank (Screen) + Well Construction/Integrity Rank + DRASTIC Index Rank

Rank for Depth of Screened Interval	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Rank for Well Construction Records	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Rank for Integrity of Construction	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Rank for DRASTIC Index	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Point Sum	20
Rank Assigned (see Ranking Guide, below)	Low

APPENDIX B: SUSCEPTIBILITY ANALYSIS

Sum of Sensitivity Points	Composite Sensitivity Range	Well Composite Rank Assigned
90-100	High	
70-85	Moderately High	
50-65	Moderate	
30-45	Moderately Low	
20-25	Low	Low

Sensitivity Rank = **LOW**

VULNERABILITY ANALYSIS for Well

PSOC Ranking Determination				
Number of PSOC in Zone	Zone			Ranking
	Zone A	Zone B	Zone C	
	1+	10+	15+	High
	0	8-9	12-14	Moderately High
	0	5-7	8-11	Moderate
	0	3-4	5-7	Moderately Low
	0	0-2	0-4	Low

PSOC Vulnerability Inventory and Ranking				
Map Reference	Description	Zone of Influence	Number of Type	Vulnerability Rank
Base Map	IUR	B	0-2	Low
Base Map	Arroyo	B	0-2	Low
Base Map	IUR	C	0-4	Low
Base Map	Arroyo	C	0-4	Low

Vulnerability Rank = **LOW**

Susceptibility Ranking							
Vulnerability Ranking	Sensitivity Ranking						
			High	Moderately High	Moderate	Moderately Low	Low
	High	High	High	Moderately High	Moderately High	Moderate	
	Moderately High	High	Moderately High	Moderately High	Moderate	Moderate	
	Moderate	Moderately High	Moderately High	Moderate	Moderate	Moderately Low	
	Moderately Low	Moderately High	Moderate	Moderate	Moderately Low	Moderately Low	
	Low	Moderate	Moderate	Moderately Low	Moderately Low	Low	

WELL #14	WSS # 096-23
Source Type	Ground Water
Susceptibility Analysis Date	November, 2002
Susceptibility Analysis Completed by	NMED-DWB
Date of PSOC Inventory	February, 2002

SENSITIVITY ANALYSIS

1. Depth of Screened Interval

Screened Interval Depth	Sensitivity Range	Rank Assigned
less than 100 feet	High	
100 - 200 feet	Moderately High	
201 - 500 feet	Moderate	
501 - 700 feet	Moderately Low	
greater than 700 feet	Low	Low

2. Well Construction Information and Integrity

A) Information Ranking

Construction Information Available	Points Possible	Points Assigned
Casing diameter, casing length and casing materials	2	2
Location of screened interval(s)	3	3
Total completion depth	3	3
Static water level at completion	2	2
Pump type, size and setting	2	2
Drilling log or equivalent	3	3
Total Points	15	15

Information Points	Sensitivity Range	Rank Assigned
0-3	High	
4-6	Moderately High	
7-9	Moderate	
10-12	Moderately Low	
13-15	Low	Low

B) Integrity Ranking

Physical Integrity of Supply Well	Points Possible	Points Assigned
Is the well located outside of an area susceptible to flooding?	2	2
Does well casing terminate at least 18 inches above floor or ground level?	2	2
Is annular space pressure-grouted to depth of at least 20 feet?	3	3
Is the wellhead properly sealed?	3	3
Is there a concrete pad around the wellhead that slopes away from the casing?	1	1
Does the well vent terminate at least 18 inches above floor or ground level, and is the vent screened and oriented to open downward?	1	1
Are check valves, blow-off valves and flow meters properly maintained and operated?	1	1
Is the wellhead fenced, housed or properly protected?	2	2
Total Points	15	15

Integrity Points	Sensitivity Range	Rank Assigned
0-3	High	
4-6	Moderately High	
7-9	Moderate	
10-12	Moderately Low	
13-15	Low	Low

3. DRASTIC Index = **81**

Depth to Water (ft)	835
Net Recharge (inch/yr (approximated))	<2
Aquifer Media	Sand & Gravel with significant Clay
Soil Media	Sand
Topography (ground slope) (%)	3
Impacts of Vadose Zone Media	Sand & Gravel with significant Clay
Hydraulic Conductivity (Aquifer) (gpd/ft ²)	36

DRASTIC Index	Sensitivity Range	Sensitivity Rank
201 or greater	High	
171-200	Moderately High	
131-170	Moderate	
101-130	Moderately Low	
0-100	Low	Low

Composite Sensitivity Ranking for Ground Water Source (Converted, Uniform Scale) for Well
 Sensitivity Rank = Well Depth Rank (Screen) + Well Construction/Integrity Rank + DRASTIC Index Rank

Rank for Depth of Screened Interval	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Rank for Well Construction Records	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Rank for Integrity of Construction	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Rank for DRASTIC Index	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Point Sum	20
Rank Assigned (see Ranking Guide, below)	Low

APPENDIX B: SUSCEPTIBILITY ANALYSIS

Sum of Sensitivity Points	Composite Sensitivity Range	Well Composite Rank Assigned
90-100	High	
70-85	Moderately High	
50-65	Moderate	
30-45	Moderately Low	
20-25	Low	Low

Sensitivity Rank = **LOW**

VULNERABILITY ANALYSIS for Well

PSOC Ranking Determination				
Number of PSOC in Zone	Zone			Ranking
	Zone A	Zone B	Zone C	
	1+	10+	15+	High
	0	8-9	12-14	Moderately High
	0	5-7	8-11	Moderate
	0	3-4	5-7	Moderately Low
0	0-2	0-4	Low	

PSOC Vulnerability Inventory and Ranking				
Map Reference	Description	Zone of Influence	Number of Type	Vulnerability Rank
Map Legend	Petroleum Storage	C	0-4	Low

Vulnerability Rank = **LOW**

Susceptibility Ranking						
Vulnerability Ranking	Sensitivity Ranking					
		High	Moderately High	Moderate	Moderately Low	Low
	High	High	High	Moderately High	Moderately High	Moderate
	Moderately High	High	Moderately High	Moderately High	Moderate	Moderate
	Moderate	Moderately High	Moderately High	Moderate	Moderate	Moderately Low
	Moderately Low	Moderately High	Moderate	Moderate	Moderately Low	Moderately Low
	Low	Moderate	Moderate	Moderately Low	Moderately Low	Low

WELL #15	WSS # 096-23
Source Type	Ground Water
Susceptibility Analysis Date	November, 2002
Susceptibility Analysis Completed by	NMED-DWB
Date of PSOC Inventory	February, 2002

SENSITIVITY ANALYSIS

1. Depth of Screened Interval

Screened Interval Depth	Sensitivity Range	Rank Assigned
less than 100 feet	High	
100 - 200 feet	Moderately High	
201 - 500 feet	Moderate	
501 - 700 feet	Moderately Low	
greater than 700 feet	Low	Low

2. Well Construction Information and Integrity

A) Information Ranking

Construction Information Available	Points Possible	Points Assigned
Casing diameter, casing length and casing materials	2	2
Location of screened interval(s)	3	3
Total completion depth	3	3
Static water level at completion	2	2
Pump type, size and setting	2	2
Drilling log or equivalent	3	3
Total Points	15	15

Information Points	Sensitivity Range	Rank Assigned
0-3	High	
4-6	Moderately High	
7-9	Moderate	
10-12	Moderately Low	
13-15	Low	Low

B) Integrity Ranking

Physical Integrity of Supply Well	Points Possible	Points Assigned
Is the well located outside of an area susceptible to flooding?	2	2
Does well casing terminate at least 18 inches above floor or ground level?	2	2
Is annular space pressure-grouted to depth of at least 20 feet?	3	3
Is the wellhead properly sealed?	3	3
Is there a concrete pad around the wellhead that slopes away from the casing?	1	1
Does the well vent terminate at least 18 inches above floor or ground level, and is the vent screened and oriented to open downward?	1	1
Are check valves, blow-off valves and flow meters properly maintained and operated?	1	1
Is the wellhead fenced, housed or properly protected?	2	2
Total Points	15	15

Integrity Points	Sensitivity Range	Rank Assigned
0-3	High	
4-6	Moderately High	
7-9	Moderate	
10-12	Moderately Low	
13-15	Low	Low

3. DRASTIC Index = 75

Depth to Water (ft)	647
Net Recharge (inch/yr (approximated))	<2
Aquifer Media	Sand & Gravel with significant Clay
Soil Media	Sandy Loam
Topography (ground slope) (%)	3
Impacts of Vadose Zone Media	Sand & Gravel with significant Clay
Hydraulic Conductivity (Aquifer) (gpd/ft ²)	74.8

DRASTIC Index	Sensitivity Range	Sensitivity Rank
201 or greater	High	
171-200	Moderately High	
131-170	Moderate	
101-130	Moderately Low	
0-100	Low	Low

Composite Sensitivity Ranking for Ground Water Source (Converted, Uniform Scale) for Well
 Sensitivity Rank = Well Depth Rank (Screen) + Well Construction/Integrity Rank + DRASTIC Index Rank

Rank for Depth of Screened Interval	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Rank for Well Construction Records	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Rank for Integrity of Construction	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Rank for DRASTIC Index	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Point Sum	20
Rank Assigned (see Ranking Guide, below)	Low

APPENDIX B: SUSCEPTIBILITY ANALYSIS

Sum of Sensitivity Points	Composite Sensitivity Range	Well Composite Rank Assigned
90-100	High	
70-85	Moderately High	
50-65	Moderate	
30-45	Moderately Low	
20-25	Low	Low

Sensitivity Rank = **LOW**

VULNERABILITY ANALYSIS for Well

PSOC Ranking Determination				
Number of PSOC in Zone	Zone			Ranking
	Zone A	Zone B	Zone C	
	1+	10+	15+	High
	0	8-9	12-14	Moderately High
	0	5-7	8-11	Moderate
	0	3-4	5-7	Moderately Low
0	0-2	0-4	Low	

PSOC Vulnerability Inventory and Ranking				
Map Reference	Description	Zone of Influence	Number of Type	Vulnerability Rank
Base Map	Arroyo	C	0-4	Low

Vulnerability Rank = **LOW**

Susceptibility Ranking						
Vulnerability Ranking	Sensitivity Ranking					
		High	Moderately High	Moderate	Moderately Low	Low
	High	High	High	Moderately High	Moderately High	Moderate
	Moderately High	High	Moderately High	Moderately High	Moderate	Moderate
	Moderate	Moderately High	Moderately High	Moderate	Moderate	Moderately Low
	Moderately Low	Moderately High	Moderate	Moderate	Moderately Low	Moderately Low
	Low	Moderate	Moderate	Moderately Low	Moderately Low	Low

WELL #16	WSS # 096-23
Source Type	Ground Water
Susceptibility Analysis Date	November, 2002
Susceptibility Analysis Completed by	NMED-DWB
Date of PSOC Inventory	February, 2002

SENSITIVITY ANALYSIS

1. Depth of Screened Interval

Screened Interval Depth	Sensitivity Range	Rank Assigned
less than 100 feet	High	
100 - 200 feet	Moderately High	
201 - 500 feet	Moderate	
501 - 700 feet	Moderately Low	
greater than 700 feet	Low	Low

2. Well Construction Information and Integrity

A) Information Ranking

Construction Information Available	Points Possible	Points Assigned
Casing diameter, casing length and casing materials	2	2
Location of screened interval(s)	3	3
Total completion depth	3	3
Static water level at completion	2	2
Pump type, size and setting	2	2
Drilling log or equivalent	3	3
Total Points	15	15

Information Points	Sensitivity Range	Rank Assigned
0-3	High	
4-6	Moderately High	
7-9	Moderate	
10-12	Moderately Low	
13-15	Low	Low

B) Integrity Ranking

Physical Integrity of Supply Well	Points Possible	Points Assigned
Is the well located outside of an area susceptible to flooding?	2	2
Does well casing terminate at least 18 inches above floor or ground level?	2	2
Is annular space pressure-grouted to depth of at least 20 feet?	3	3
Is the wellhead properly sealed?	3	3
Is there a concrete pad around the wellhead that slopes away from the casing?	1	1
Does the well vent terminate at least 18 inches above floor or ground level, and is the vent screened and oriented to open downward?	1	1
Are check valves, blow-off valves and flow meters properly maintained and operated?	1	1
Is the wellhead fenced, housed or properly protected?	2	2
Total Points	15	15

Integrity Points	Sensitivity Range	Rank Assigned
0-3	High	
4-6	Moderately High	
7-9	Moderate	
10-12	Moderately Low	
13-15	Low	Low

3. DRASTIC Index = 71

Depth to Water (ft)	434
Net Recharge (inch/yr (approximated))	<2
Aquifer Media	Sand & Gravel with significant Clay
Soil Media	Sandy Loam
Topography (ground slope) (%)	3
Impacts of Vadose Zone Media	Sand & Gravel with significant Clay
Hydraulic Conductivity (Aquifer) (gpd/ft ²)	74.8

DRASTIC Index	Sensitivity Range	Sensitivity Rank
201 or greater	High	
171-200	Moderately High	
131-170	Moderate	
101-130	Moderately Low	
0-100	Low	Low

Composite Sensitivity Ranking for Ground Water Source (Converted, Uniform Scale) for Well
 Sensitivity Rank = Well Depth Rank (Screen) + Well Construction/Integrity Rank + DRASTIC Index Rank

Rank for Depth of Screened Interval	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Rank for Well Construction Records	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Rank for Integrity of Construction	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Rank for DRASTIC Index	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Point Sum	20
Rank Assigned (see Ranking Guide, below)	Low

APPENDIX B: SUSCEPTIBILITY ANALYSIS

Sum of Sensitivity Points	Composite Sensitivity Range	Well Composite Rank Assigned
90-100	High	
70-85	Moderately High	
50-65	Moderate	
30-45	Moderately Low	
20-25	Low	Low

Sensitivity Rank = **LOW**

VULNERABILITY ANALYSIS for Well

PSOC Ranking Determination				
Number of PSOC in Zone	Zone			Ranking
	Zone A	Zone B	Zone C	
	1+	10+	15+	High
	0	8-9	12-14	Moderately High
	0	5-7	8-11	Moderate
	0	3-4	5-7	Moderately Low
0	0-2	0-4	Low	

PSOC Vulnerability Inventory and Ranking				
Map Reference	Description	Zone of Influence	Number of Type	Vulnerability Rank
Base Map	Arroyo	A	1+	Low
Base Map	Arroyo	B	0-2	Low
Base Map	Arroyo	C	0-4	Low

Vulnerability Rank = **LOW**

Susceptibility Ranking							
Vulnerability Ranking	Sensitivity Ranking						
			High	Moderately High	Moderate	Moderately Low	Low
	High	High	High	Moderately High	Moderately High	Moderate	Moderate
	Moderately High	High	Moderately High	Moderately High	Moderate	Moderate	Moderate
	Moderate	Moderately High	Moderately High	Moderate	Moderate	Moderate	Moderately Low
	Moderately Low	Moderately High	Moderate	Moderate	Moderately Low	Moderately Low	Moderately Low
	Low	Moderate	Moderate	Moderately Low	Moderately Low	Moderately Low	Low

WELL #17	WSS # 096-23
Source Type	Ground Water
Susceptibility Analysis Date	November, 2002
Susceptibility Analysis Completed by	NMED-DWB
Date of PSOC Inventory	February, 2002

SENSITIVITY ANALYSIS

1. Depth of Screened Interval

Screened Interval Depth	Sensitivity Range	Rank Assigned
less than 100 feet	High	
100 - 200 feet	Moderately High	
201 - 500 feet	Moderate	
501 - 700 feet	Moderately Low	Moderately Low
greater than 700 feet	Low	

2. Well Construction Information and Integrity

A) Information Ranking

Construction Information Available	Points Possible	Points Assigned
Casing diameter, casing length and casing materials	2	2
Location of screened interval(s)	3	3
Total completion depth	3	3
Static water level at completion	2	2
Pump type, size and setting	2	2
Drilling log or equivalent	3	3
Total Points	15	15

Information Points	Sensitivity Range	Rank Assigned
0-3	High	
4-6	Moderately High	
7-9	Moderate	
10-12	Moderately Low	
13-15	Low	Low

B) Integrity Ranking

Physical Integrity of Supply Well	Points Possible	Points Assigned
Is the well located outside of an area susceptible to flooding?	2	2
Does well casing terminate at least 18 inches above floor or ground level?	2	2
Is annular space pressure-grouted to depth of at least 20 feet?	3	3
Is the wellhead properly sealed?	3	3
Is there a concrete pad around the wellhead that slopes away from the casing?	1	1
Does the well vent terminate at least 18 inches above floor or ground level, and is the vent screened and oriented to open downward?	1	1
Are check valves, blow-off valves and flow meters properly maintained and operated?	1	0
Is the wellhead fenced, housed or properly protected?	2	2
Total Points	15	14

Integrity Points	Sensitivity Range	Rank Assigned
0-3	High	
4-6	Moderately High	
7-9	Moderate	
10-12	Moderately Low	
13-15	Low	Low

3. DRASTIC Index = 89

Depth to Water (ft)	358
Net Recharge (inch/yr (approximated))	<2
Aquifer Media	Sand & Gravel with significant Clay
Soil Media	Sandy Loam
Topography (ground slope) (%)	0-2
Impacts of Vadose Zone Media	Fine – Medium Sand with Clay streaks
Hydraulic Conductivity (Aquifer) (gpd/ft ²)	29.9

DRASTIC Index	Sensitivity Range	Sensitivity Rank
201 or greater	High	
171-200	Moderately High	
131-170	Moderate	
101-130	Moderately Low	
0-100	Low	Low

Composite Sensitivity Ranking for Ground Water Source (Converted, Uniform Scale) for Well
 Sensitivity Rank = Well Depth Rank (Screen) + Well Construction/Integrity Rank + DRASTIC Index Rank

Rank for Depth of Screened Interval	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	10
Low (5 point)	
Rank for Well Construction Records	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Rank for Integrity of Construction	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Rank for DRASTIC Index	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Point Sum	25
Rank Assigned (see Ranking Guide, below)	Low

APPENDIX B: SUSCEPTIBILITY ANALYSIS

Sum of Sensitivity Points	Composite Sensitivity Range	Well Composite Rank Assigned
90-100	High	
70-85	Moderately High	
50-65	Moderate	
30-45	Moderately Low	
20-25	Low	Low

Sensitivity Rank = **LOW**

VULNERABILITY ANALYSIS for Well

PSOC Ranking Determination				
Number of PSOC in Zone	Zone			Ranking
	Zone A	Zone B	Zone C	
	1+	10+	15+	High
	0	8-9	12-14	Moderately High
	0	5-7	8-11	Moderate
	0	3-4	5-7	Moderately Low
0	0-2	0-4	Low	

PSOC Vulnerability Inventory and Ranking				
Map Reference	Description	Zone of Influence	Number of Type	Vulnerability Rank
Appendix K	IUR	B	0-2	Low
Appendix K	IUR	C	0-4	Low
Appendix K	RSF	C	0-4	Low
Base Map	Arroyo	B	0-2	Low
Base Map	Arroyo	C	0-4	Low
Map Legend	Petroleum Storage	C	0-4	Low

Vulnerability Rank = **LOW**

Susceptibility Ranking						
	Sensitivity Ranking					
			High	Moderately High	Moderate	Moderately Low
Vulnerability Ranking	High	High	High	Moderately High	Moderately High	Moderate
	Moderately High	High	Moderately High	Moderately High	Moderate	Moderate
	Moderate	Moderately High	Moderately High	Moderate	Moderate	Moderately Low
	Moderately Low	Moderately High	Moderate	Moderate	Moderately Low	Moderately Low
	Low	Moderate	Moderate	Moderately Low	Moderately Low	Low

WELL #19	WSS # 096-23
Source Type	Ground Water
Susceptibility Analysis Date	November, 2002
Susceptibility Analysis Completed by	NMED-DWB
Date of PSOC Inventory	February, 2002

SENSITIVITY ANALYSIS

1. Depth of Screened Interval

Screened Interval Depth	Sensitivity Range	Rank Assigned
less than 100 feet	High	
100 - 200 feet	Moderately High	
201 - 500 feet	Moderate	
501 - 700 feet	Moderately Low	
greater than 700 feet	Low	Low

2. Well Construction Information and Integrity

A) Information Ranking

Construction Information Available	Points Possible	Points Assigned
Casing diameter, casing length and casing materials	2	2
Location of screened interval(s)	3	3
Total completion depth	3	3
Static water level at completion	2	2
Pump type, size and setting	2	2
Drilling log or equivalent	3	3
Total Points	15	15

Information Points	Sensitivity Range	Rank Assigned
0-3	High	
4-6	Moderately High	
7-9	Moderate	
10-12	Moderately Low	
13-15	Low	Low

B) Integrity Ranking

Physical Integrity of Supply Well	Points Possible	Points Assigned
Is the well located outside of an area susceptible to flooding?	2	2
Does well casing terminate at least 18 inches above floor or ground level?	2	2
Is annular space pressure-grouted to depth of at least 20 feet?	3	3
Is the wellhead properly sealed?	3	3
Is there a concrete pad around the wellhead that slopes away from the casing?	1	1
Does the well vent terminate at least 18 inches above floor or ground level, and is the vent screened and oriented to open downward?	1	1
Are check valves, blow-off valves and flow meters properly maintained and operated?	1	1
Is the wellhead fenced, housed or properly protected?	2	2
Total Points	15	15

Integrity Points	Sensitivity Range	Rank Assigned
0-3	High	
4-6	Moderately High	
7-9	Moderate	
10-12	Moderately Low	
13-15	Low	Low

3. DRASTIC Index = **81**

Depth to Water (ft)	780
Net Recharge (inch/yr (approximated))	<2
Aquifer Media	Sand & Gravel with significant Clay
Soil Media	Sandy Loam
Topography (ground slope) (%)	0-2
Impacts of Vadose Zone Media	Fine – Course Sand with Clay
Hydraulic Conductivity (Aquifer) (gpd/ft ²)	112

DRASTIC Index	Sensitivity Range	Sensitivity Rank
201 or greater	High	
171-200	Moderately High	
131-170	Moderate	
101-130	Moderately Low	
0-100	Low	Low

Composite Sensitivity Ranking for Ground Water Source (Converted, Uniform Scale) for Well
 Sensitivity Rank = Well Depth Rank (Screen) + Well Construction/Integrity Rank + DRASTIC Index Rank

Rank for Depth of Screened Interval	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Rank for Well Construction Records	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Rank for Integrity of Construction	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Rank for DRASTIC Index	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Point Sum	20
Rank Assigned (see Ranking Guide, below)	Low

APPENDIX B: SUSCEPTIBILITY ANALYSIS

Sum of Sensitivity Points	Composite Sensitivity Range	Well Composite Rank Assigned
90-100	High	
70-85	Moderately High	
50-65	Moderate	
30-45	Moderately Low	
20-25	Low	Low

Sensitivity Rank = **LOW**

VULNERABILITY ANALYSIS for Well

PSOC Ranking Determination				
Number of PSOC in Zone	Zone			Ranking
	Zone A	Zone B	Zone C	
	1+	10+	15+	High
	0	8-9	12-14	Moderately High
	0	5-7	8-11	Moderate
	0	3-4	5-7	Moderately Low
0	0-2	0-4	Low	

PSOC Vulnerability Inventory and Ranking				
Map Reference	Description	Zone of Influence	Number of Type	Vulnerability Rank
Map Legend	Petroleum Storage	C	0-4	Low

Vulnerability Rank = **LOW**

Susceptibility Ranking						
Vulnerability Ranking	Sensitivity Ranking					
		High	Moderately High	Moderate	Moderately Low	Low
	High	High	High	Moderately High	Moderately High	Moderate
	Moderately High	High	Moderately High	Moderately High	Moderate	Moderate
	Moderate	Moderately High	Moderately High	Moderate	Moderate	Moderately Low
	Moderately Low	Moderately High	Moderate	Moderate	Moderately Low	Moderately Low
	Low	Moderate	Moderate	Moderately Low	Moderately Low	Low

WELL #21	WSS # 096-23
Source Type	Ground Water
Susceptibility Analysis Date	November, 2002
Susceptibility Analysis Completed by	NMED-DWB
Date of PSOC Inventory	February, 2002

SENSITIVITY ANALYSIS

1. Depth of Screened Interval

Screened Interval Depth	Sensitivity Range	Rank Assigned
less than 100 feet	High	
100 - 200 feet	Moderately High	
201 - 500 feet	Moderate	Moderate
501 - 700 feet	Moderately Low	
greater than 700 feet	Low	

2. Well Construction Information and Integrity

A) Information Ranking

Construction Information Available	Points Possible	Points Assigned
Casing diameter, casing length and casing materials	2	2
Location of screened interval(s)	3	3
Total completion depth	3	3
Static water level at completion	2	2
Pump type, size and setting	2	2
Drilling log or equivalent	3	3
Total Points	15	15

Information Points	Sensitivity Range	Rank Assigned
0-3	High	
4-6	Moderately High	
7-9	Moderate	
10-12	Moderately Low	
13-15	Low	Low

B) Integrity Ranking

Physical Integrity of Supply Well	Points Possible	Points Assigned
Is the well located outside of an area susceptible to flooding?	2	2
Does well casing terminate at least 18 inches above floor or ground level?	2	2
Is annular space pressure-grouted to depth of at least 20 feet?	3	0
Is the wellhead properly sealed?	3	3
Is there a concrete pad around the wellhead that slopes away from the casing?	1	1
Does the well vent terminate at least 18 inches above floor or ground level, and is the vent screened and oriented to open downward?	1	1
Are check valves, blow-off valves and flow meters properly maintained and operated?	1	1
Is the wellhead fenced, housed or properly protected?	2	2
Total Points	15	12

Integrity Points	Sensitivity Range	Rank Assigned
0-3	High	
4-6	Moderately High	
7-9	Moderate	
10-12	Moderately Low	Moderately Low
13-15	Low	

3. DRASTIC Index = 67

Depth to Water (ft)	373
Net Recharge (inch/yr (approximated))	<2
Aquifer Media	Sand with significant Clay
Soil Media	Sandy Loam
Topography (ground slope) (%)	0-2
Impacts of Vadose Zone Media	Fine Sand with Clay layers
Hydraulic Conductivity (Aquifer) (gpd/ft ²)	74

DRASTIC Index	Sensitivity Range	Sensitivity Rank
201 or greater	High	
171-200	Moderately High	
131-170	Moderate	
101-130	Moderately Low	
0-100	Low	Low

Composite Sensitivity Ranking for Ground Water Source (Converted, Uniform Scale) for Well
 Sensitivity Rank = Well Depth Rank (Screen) + Well Construction/Integrity Rank + DRASTIC Index Rank

Rank for Depth of Screened Interval	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	15
Moderately Low (10 points)	
Low (5 point)	
Rank for Well Construction Records	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Rank for Integrity of Construction	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	10
Low (5 point)	
Rank for DRASTIC Index	
High (25 points)	
Moderately High (20 points)	
Moderate (15 points)	
Moderately Low (10 points)	
Low (5 point)	5
Point Sum	35
Rank Assigned (see Ranking Guide, below)	Moderately Low

APPENDIX B: SUSCEPTIBILITY ANALYSIS

Sum of Sensitivity Points	Composite Sensitivity Range	Well Composite Rank Assigned
90-100	High	
70-85	Moderately High	
50-65	Moderate	
30-45	Moderately Low	Moderately Low
20-25	Low	

Sensitivity Rank = **MODERATELY LOW**

VULNERABILITY ANALYSIS for Well

PSOC Ranking Determination				
Number of PSOC in Zone	Zone			Ranking
	Zone A	Zone B	Zone C	
	1+	10+	15+	High
	0	8-9	12-14	Moderately High
	0	5-7	8-11	Moderate
	0	3-4	5-7	Moderately Low
0	0-2	0-4	Low	

PSOC Vulnerability Inventory and Ranking				
Map Reference	Description	Zone of Influence	Number of Type	Vulnerability Rank
Appendix K	-	-	-	-

Vulnerability Rank = **LOW**

Susceptibility Ranking						
Vulnerability Ranking	Sensitivity Ranking					
		High	Moderately High	Moderate	Moderately Low	Low
	High	High	High	Moderately High	Moderately High	Moderate
	Moderately High	High	Moderately High	Moderately High	Moderate	Moderate
	Moderate	Moderately High	Moderately High	Moderate	Moderate	Moderately Low
	Moderately Low	Moderately High	Moderate	Moderate	Moderately Low	Moderately Low
	Low	Moderate	Moderate	Moderately Low	Moderately Low	Low

The Inventory of Actual and Potential Sources of Contamination was completed by NMED-DWB and is incorporated in Appendix J at Step 3, Number 9.

INVENTORY OF ACTUAL AND POTENTIAL SOURCES OF CONTAMINATION				
Description of Contaminant	Actual Contamination	Potential Contamination	Distance from Wellhead and/or Zone of Influence	Number of Sources of Contamination (may be expressed by a range i.e., 2-4).
Monitoring Well	No	Yes	Zone A	1+
Hazardous/Solid Waste Generator	No	Yes	Zone B	2-4
Petroleum Storage	No	Yes	Zone B	2-4
Primary Highway	No	Yes	Zone B	2-4
Railroad	No	Yes	Zone B	2-4
Single family Residences – Unsewered	No	Yes	Zone B	2-4
Abandoned Well	No	Yes	Zone C	3-4
Arroyo	No	Yes	Zone C	3-4
Federal Toxic Release Inventory Site	No	Yes	Zone C	3-4
Railroad	No	Yes	Zone C	3-4
Secondary Highway	No	Yes	Zone C	3-4

Adoption of management strategies for specific contaminate sources should be based on a thorough review of the exiting management types. For instance, when considering management of storm water runoff,¹² management methods range from non-structural methods (sewer stenciling, good housekeeping, education,) to engineered devices (buffer and filter strips, infiltration, BMPs) and for municipal systems compliance with U.S. EPA's *National Pollutant Discharge Elimination System (NPDES) Permitting Program* is a regulatory requirement.

MANAGEMENT STRATEGY AND SCHEDULE (EXAMPLE)				
Management Measure/Tool	Management Strategy	Assigned to /Implemented by	Time Line	Update Schedule and Planned Date
Wellhead Protection Ordinance	Identify the wellhead protection area, draft a source water protection ordinance (see example, Appendix G), identify the entity responsible for hearing ordinances, gain citizen support, and petition for adoption of ordinance.	Mr. XYZ and Ms. ABC	July 2003	Not Applicable
Wellhead Protection Sign Posting	Identify the source water delineation area; identify how many signs will be needed and where they may be purchased, the costs and budget considerations, and guidelines and/or laws for posting the signs. Post the signs.	Mr. XYZ and Ms. ABC	August 2003	Every 10 years (August 2013)
Adopt a Zoning Ordinance	Research zoning ordinances. Identify any existing zoning ordinances, and procedures necessary for adoption. Talk with city planners and landowners, gain public support, and petition to adopt the zoning ordinance.	Mr. XYZ Attorney, and Ms. ABC City Planning	September 2003	Not Applicable
Well Abandonment Procedures	Determine if an additional water source is necessary. Check local and state guidelines and regulations for proper well abandonment procedures, properly abandon the well, and report well abandonment to NMED-Drinking Water Bureau.	Ms. Hydrologist	July 2003	Not Applicable
Strom Water Drain Protection	Contact the city-planning department and inquire about storm water drains. Check local and state guidelines and regulations for requirements, and research storm water protection measures/tools.	Mr. Hydrologist	July 2003	Bi-Yearly (July 2005)

¹² *Storm water runoff* is rain or snowmelt flowing from rooftops and other structures, pavement on roads, sidewalks, and parking lots, and degraded land covers such as dirt parking lots, walking paths, baseball fields and suburban lawns, and areas of insufficient land cover such as vegetation.

Your Water Utilities *Contingency Protocol and Schedule* should include the first three categories in Column 1 of the table below, in addition to categories you may wish to include.

CONTINGENCY PROTOCOL AND SCHEDULE (EXAMPLE)						
Contingency Planning Categories	Protocol Elements	Current Issue	Future Issue	Assigned to - Implemented by	Time Line	Update Schedule and Planned Update
Emergency Water Outage	Develop a protocol: list all potential types of water outages, identify responsible agencies/parties, and provide contact information. Estimate how much water per day will be needed by your customers, and budget for this potential expense.	No	Yes	Ms. ABC	July 2003	Quarterly September 2003, November 2003, etc.
Accidental Leak or Spill Near or Into Water Source	Develop a protocol: list all potential types of leaks and spills, identify responsible agencies/parties, and provide contact information.	Yes	Yes	Mr. XYZ and Ms. ABC	August 2003	Yearly August 2004
Water Conservation	Develop a Water Conservation Plan: research the status of your aquifer, identify existing conservation methods, and promote the plan.	Yes	Yes	Ms. DEF	August 2003	Bi-Yearly August 2005
Land Acquisition for New Water Source	Develop a Land Acquisition Strategy: Identify when the source will be needed, where potential new water sources exist, and research land acquisition methods such as ownership, lease, and/or easements. Identify and discuss future zoning issues surrounding the new source site, and prepare a budget for the costs of acquiring the new source.	No	Possibly	Mr. XYZ Attorney, and Ms. ABC Public Works Director	September 2003	Yearly September 2004

Shown below are two examples of Media Aids developed by the International City/County Management Association to promote source water protection, and which may be used as part of your Source Water Protection Plan. Other forms of media aids include posters, fact sheets, informational flyers, brochures, and resources lists.

For Immediate Release: Contact: [Name]

[Date] [Phone #]

Protect Your Drinking Water... Protect the Source!



[City],[State]—Have you ever thought about where your drinking water comes from, beyond the faucet? Did you know that what you do in and around your home can affect not only the quality of your water but also the quality of your neighbor's water? Find out where your drinking water really comes from and learn about how you can help protect it during a [Duration of campaign]-month-long drinking water source awareness campaign, starting [Start date], sponsored by [Name of sponsor]. The campaign will provide information on

- The source of your local drinking water
- The value of safe drinking water
- Potential threats to your local drinking water
- Steps you can take to protect your drinking water
- Contact information for additional resources on drinking water protection.

Safe drinking water is essential to a community's quality of life and continued economic growth. Yet citizens may not always be aware of safe drinking water issues in their community and may

not realize what needs to be done to protect drinking water and keep it safe for their families and businesses. Drinking water wells across the country are being contaminated daily by common activities, such as pouring motor oil and household chemicals down drains, using too much pesticides and fertilizers, and littering streets with refuse that will eventually run off into rivers and streams. When water supplies are not safe, the health of the community — especially of the young, the old, and the sick — is jeopardized. In addition, communities may experience a loss of tax revenues from real estate and new jobs as businesses refuse to locate to or remain in communities with known or suspected water contamination problems. Protecting drinking water sources is the first line of defense in ensuring safe drinking water. If communities are aware of their drinking water sources and of potential threats to these sources, they can take steps to keep the sources safe and improve their local environment. There is something everyone — from retirees to school kids to individuals in their homes — can do to help. To find out what you can do, contact [Contact name and phone number].

[Acknowledgment]



Hi, my name is (Name) with a few words on protecting your drinking water.

Consider where your drinking water comes from.

Get to know the source of your drinking water, and get involved in activities to protect it. Drinking water source protection is a low-cost means to preserving the safety of a vital resource. Here are a few simple things you can do to help keep pollution out of the river, lake, stream, or aquifer that is your drinking water source:

- Take used motor oil to a recycling center. If you let it drain into a storm sewer or bury it in the trash, it can leak into lakes, rivers, and wells. Just one pint of used motor oil can expand over great distances, and potentially harm human health and the environment.
- Properly dispose of toxic household trash. For example, batteries contain lead and mercury. Some household cleaners also contain substances that contaminate water. Many communities have special collection sites for these items.
- Do not dispose of chemicals such as paints, cleaning products, and pesticides into septic systems, dry wells, stormwater drainage wells, or other shallow disposal systems that discharge to groundwater.
- Properly install and maintain septic systems. Be sure to inspect them regularly and pump them out when necessary.
- Find out what your community is doing to protect your water source and get involved. Work with schools, civic groups, and others to start a protection program. Safe drinking water is everyone's responsibility.

For more information, contact (Name) and (Contact information) Together, we can make a difference. This is a public service announcement brought to you by (Name of sponsoring organization).

Examples of Categories of Management Measures & Tools Used for Source Water Protection Planning

PUBLIC EDUCATION

- Newspaper Articles
- Radio
- Pamphlets
- Brochures
- Community Meetings
- Seminars –Slide Shows and Video
- Storm Drain Stencil Program

BEST MANAGEMENT PRACTICES

- Agricultural Tillage Practices / Erosion Control Measures Range & Pasture Management

- Forestry Forest Revegetation Logging & Road Construction Management Streamside Area Management

- Urban Buffer Zones / Setbacks Primary & Secondary Containment Storm Drain Maintenance

- Waterbody River/Reservoir Management Program(s) Shoreline Restoration

ZONING (Regulatory)

- Overlay/Protection District
- Prohibition of Various Land Use
- Special Permitting
- Large-Lot Zoning
- Transfer of Development Rights
- Growth Control
- Performance Standards

HEALTH REQUIREMENTS (Regulatory)

- Privately Owned Wastewater Treatment Plant
- Septic Cleaner Ban
- Septic System Upgrade
- Toxic & Hazardous Materials Handling Requirements
- Private Well Protection

LAND TRANSFER (Non-Regulatory/ Voluntary)

- Sale/Donation
- Conservation Easement
- Limited Development

LEGISLATIVE (Regulatory)

- Regional Source Water Protection Districts
- Land Banking

POINT SOURCE POLLUTION RESTRICTIONS

- Waste Processing Plants

LAND ACQUISITION (Non-Regulatory & Regulatory)

OTHER (Non-Regulatory)

- Increased Monitoring
- Hazardous Waste Collection



A Variety of Resources are Available

Wellhead Protection Signs




Water Sourcebooks Contain 324 Activities for Grades K-12

U.S. EPA STORM DRAIN STENCILING PROGRAMS



NO DUMPING

DRAINS TO RIVER

DUMP NO WASTE

PROTECT YOUR WATER SUPPLY

DUMP NO WASTE

PROTECT YOUR GROUND WATER

Planning tools such as ordinances, zoning decisions, regulations, and descriptions of BMP used to support your Source Water Protection Plan should be attached (*the Ordinance shown below is an example based on a Wellhead Protection Ordinance adopted by the City of Wilber, Saline County, Nebraska*).

ORDINANCE NO. __

AN ORDINANCE FOR THE CITY OF (NAME), (NAME) COUNTY, (NAME OF STATE) TO CREATE SECTION XXX OF THE MUNICIPAL CODE OF THE CITY OF (NAME), BY ADDING A NEW SECTION TO DESIGNATE A WELLHEAD PROTECTION AREA.

BE IT ORDAINED BY THE MAYOR AND COUNCIL OF THE CITY OF (NAME), STATE OF (NAME), as follows:

Section 1. Definition. Source Water Protection Area means the surface and subsurface area surrounding a water well or well field supplying a public water system through which contaminants are reasonably likely to move toward and reach such water or well field.

Section 2. The City of (Name) designates a Wellhead Protection Area for the purpose of protection of the public water supply system. The boundaries of the source Water Protection Area are delineated based upon a map prepared by the (Name) presented to the City of (Name) on (Date), which is on file at the office of the (Name) City/County Clerk, and is available for public inspection.

Section 3. Any other Ordinance or section passed and approved prior to the passage, approval, and publication of this Ordinance and in conflict herewith, is hereby repealed.

Section 4. This Ordinance shall take effect and be in full force from and after its passage, approval, and publication as required by law.

PASSED AND APPROVED THIS (Date)

Mayor

ATTEST:

City Clerk

(SEAL)

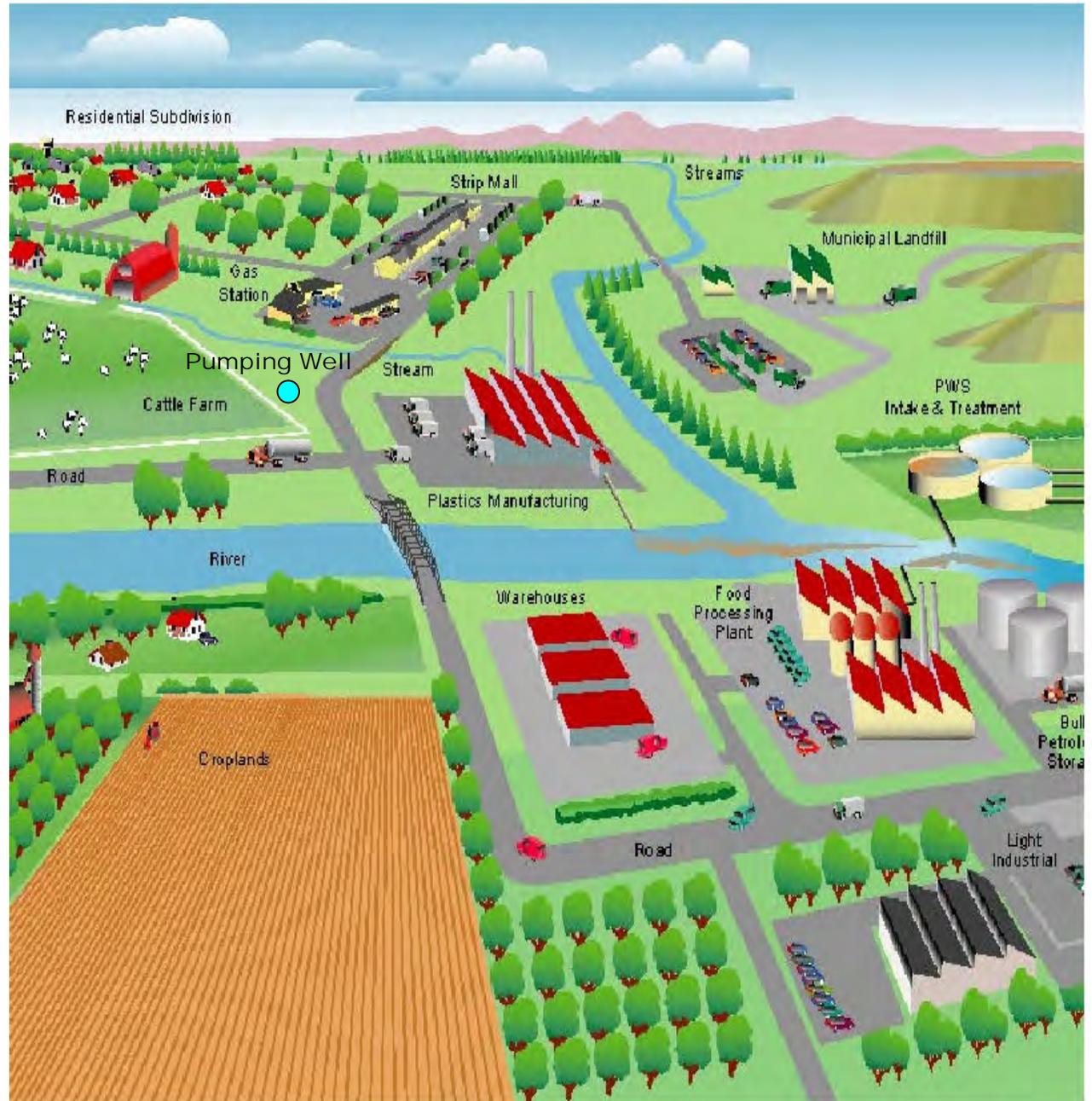
By completing the following exercise many of the tasks and goals of the source water protection planning team (team) should become more apparent.

For the exercise imagine that, as the “Pumping Well (center/ left in the graphic) pumps, contaminants are pulled toward the wellhead and eventually may enter the drinking water system. The team should complete the following: 1) Delineate the source water area as it may extend outward from the wellhead, 2) Identify actual (these are not pictured in the illustration) and potential sources of contamination and their potential impacts to your source water, 3) Identify management measures/tools that may be implemented to protect the water source, 4) Identify potential barriers (physical /economic /political) to implementing the measures, and 5) Identify solutions to the potential barriers.

[As an example, imagine the following: The Plastic Manufacturing Plant (plant) is within 1,00 feet of the pumping well. Although no actual contaminants have been detected in your utilities drinking water samples, potential contaminants from the plant include solvents, oils, organic/inorganic chemicals, acids, and bases, which are considered significant sources of contamination. The plant may or may not be adequately designed to prevent releases of these chemicals into the environment/groundwater.

The team might begin by 1) notifying officials at the plant that the plant is located within a planned source water protection area, 2) Make arrangements with the officials to gather information, discuss concerns, 3) Seek information regarding potential protection measures, and 4) Develop management measures (i.e., BMPs) that may help prevent potential releases. The team should work with the plant officials to document any management measures implemented, select a time for updating the measure(s), properly inform the public of the **proactive** protective measure taken by the plant (any responses from the public should be reviewed and considered), enter the management measure in the Source Water Protection Plan].

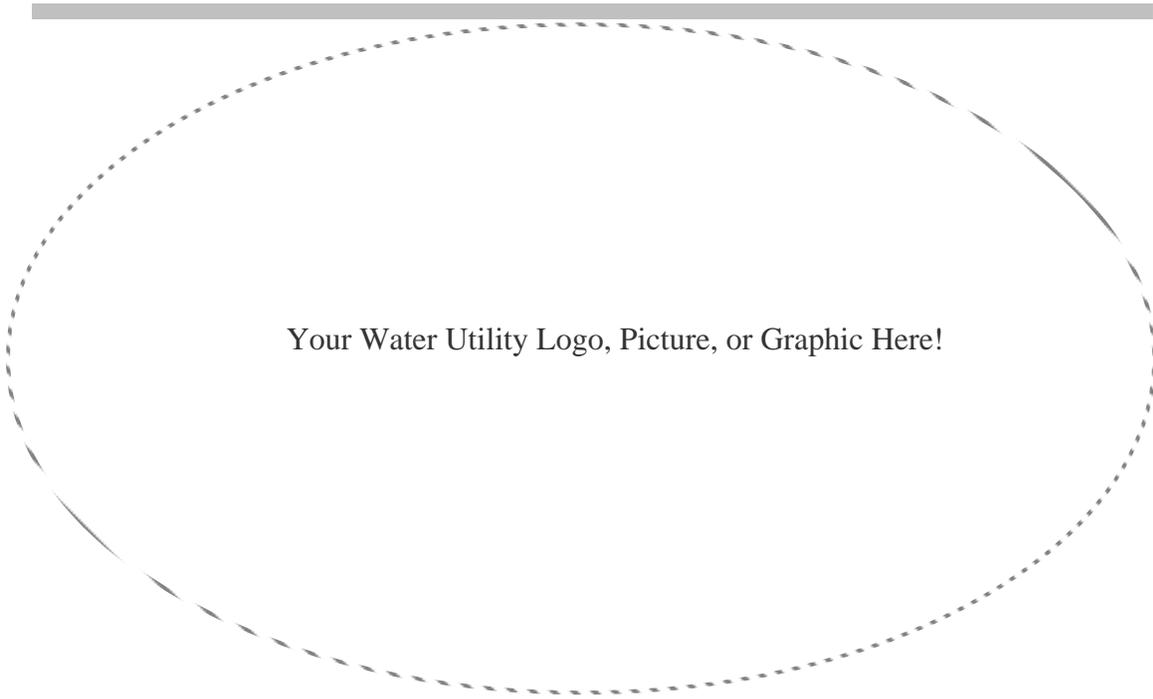
Source Water Protection Planning Exercise



This Protection Plan Template lists the necessary elements of a Source Water Protection plan. You may complete this template and return it to NMED-DWB or create a template of your own design.

*Source Water Protection Plan of the
Rio Rancho Sewer & Wastewater Services Water Utility
Public Water System # 096-23*

Date:



*Prepared by
Rio Rancho Sewer & Wastewater Services Water Utility &
The New Mexico Environment Department Drinking Water Bureau
Funded under the Federal Safe Drinking Water Amendments of 1996*

*The Rio Rancho Sewer & Wastewater Services Water Utility**Address**Utility Administrator and Operator Contact Information**Number of Water Supply Sources (#)**Current Date**Scheduled Update by (Date)*

On (Date) a *Source Water Assessment and Protection Plan* (SWAPP) was adopted by the Rio Rancho Sewer & Wastewater Services water utility. The SWAPP complies with the requirements for source water protection defined under the *Safe Drinking Water Act Amendments of 1996*. In recognition for its contribution toward preventing adverse effects to human health and the environment, and for protection of the environmental integrity of the State of New Mexico's ground water resources, the executive branch agency presents the (NAME) Utility with the attached (Certificate/Letter of Commendation).

SOURCE WATER PROTECTION PLAN OF THE RIO RANCHO SEWER & WASTEWATER SERVICES WATER UTILITY

(The following information is required for NMED-DWB to approve your protection plan. Once a draft protection plan is prepared, and before public review, your utility must submit the plan to NMED-DWB for review and approval)¹³

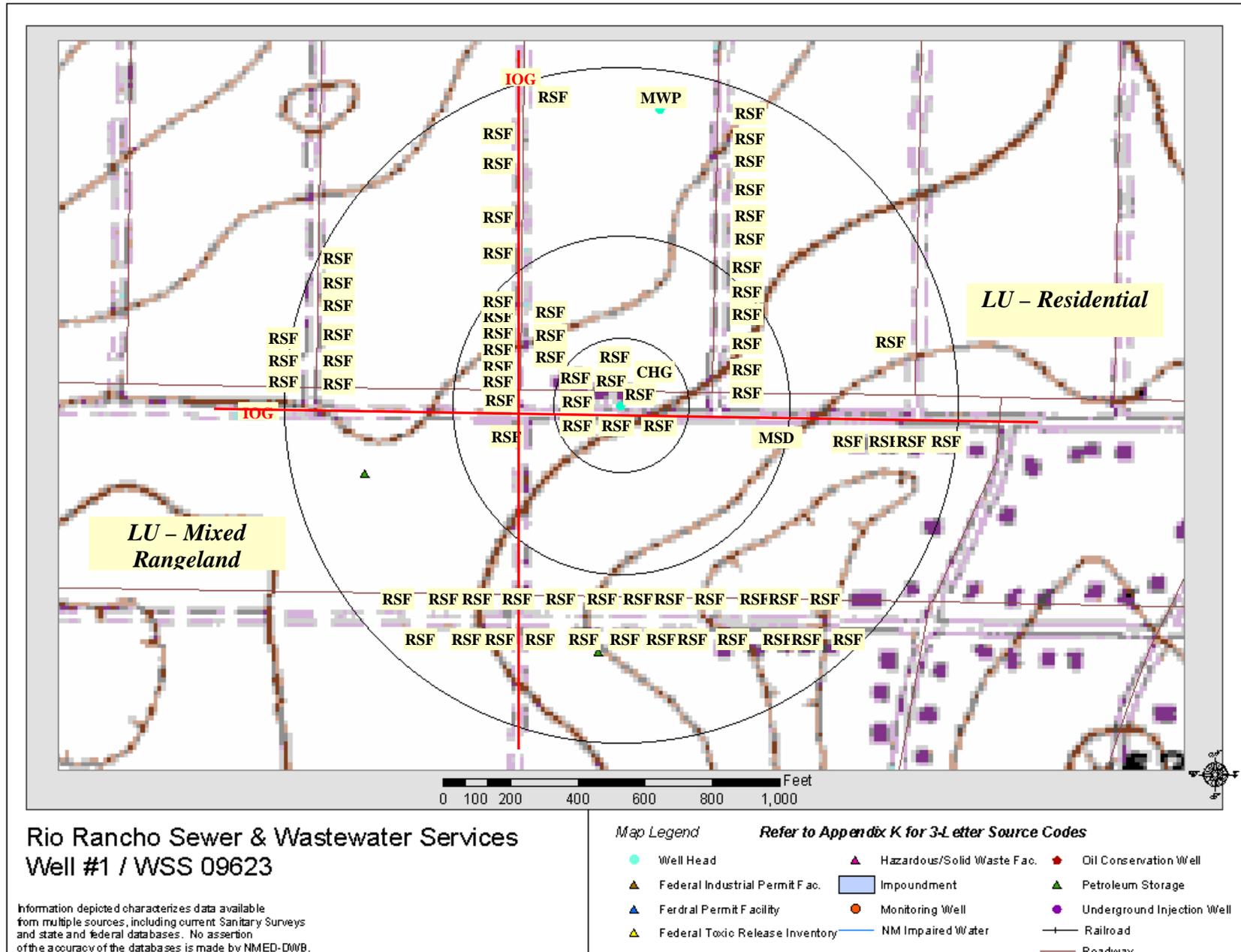
STEP 1

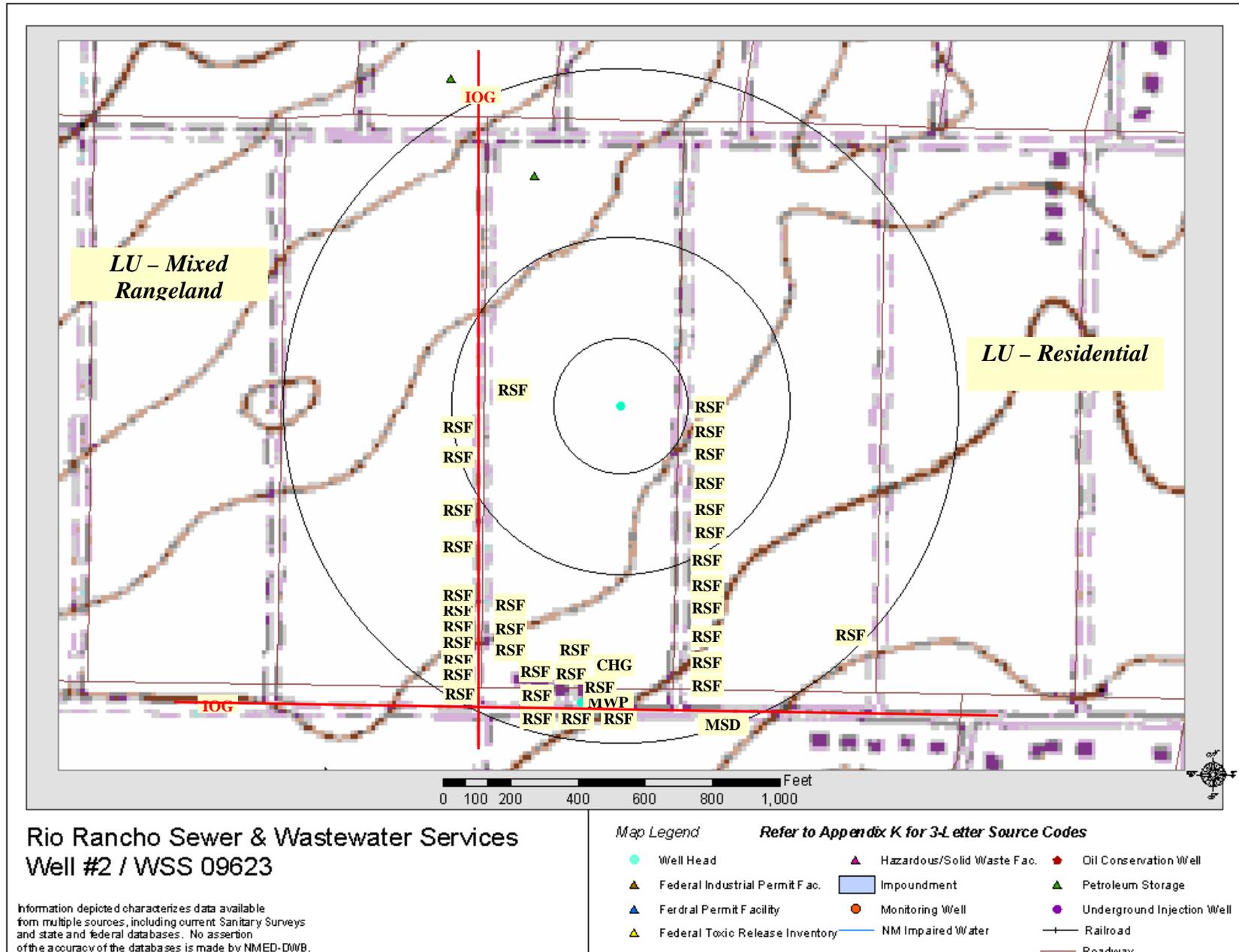
- 1) List the names of the Community Planning team.
- 2) List the name(s) and provide signature(s) of the governing entity.
- 3) Describe the public's involvement/participation in the development and implementation of the Source Water Protection Plan. Attach copies of all relevant public notice(s).
- 4) Describe how the public will continue to participate in and/or be informed of Source Water Protection Plan issues (one example is to petition to have your Source Water Protection Plan on a weekly or monthly agenda, such as your town or city council meeting).

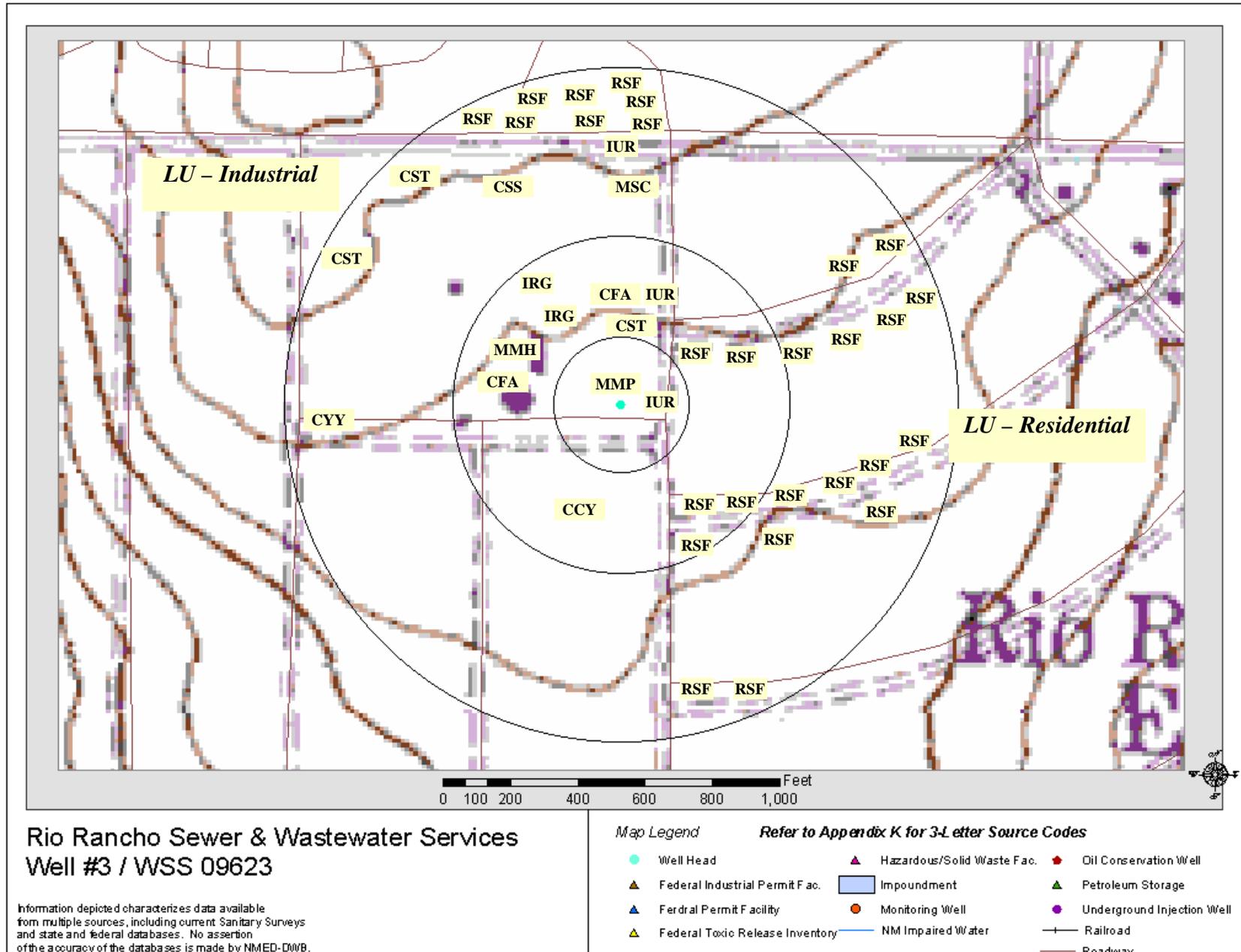
STEP 2

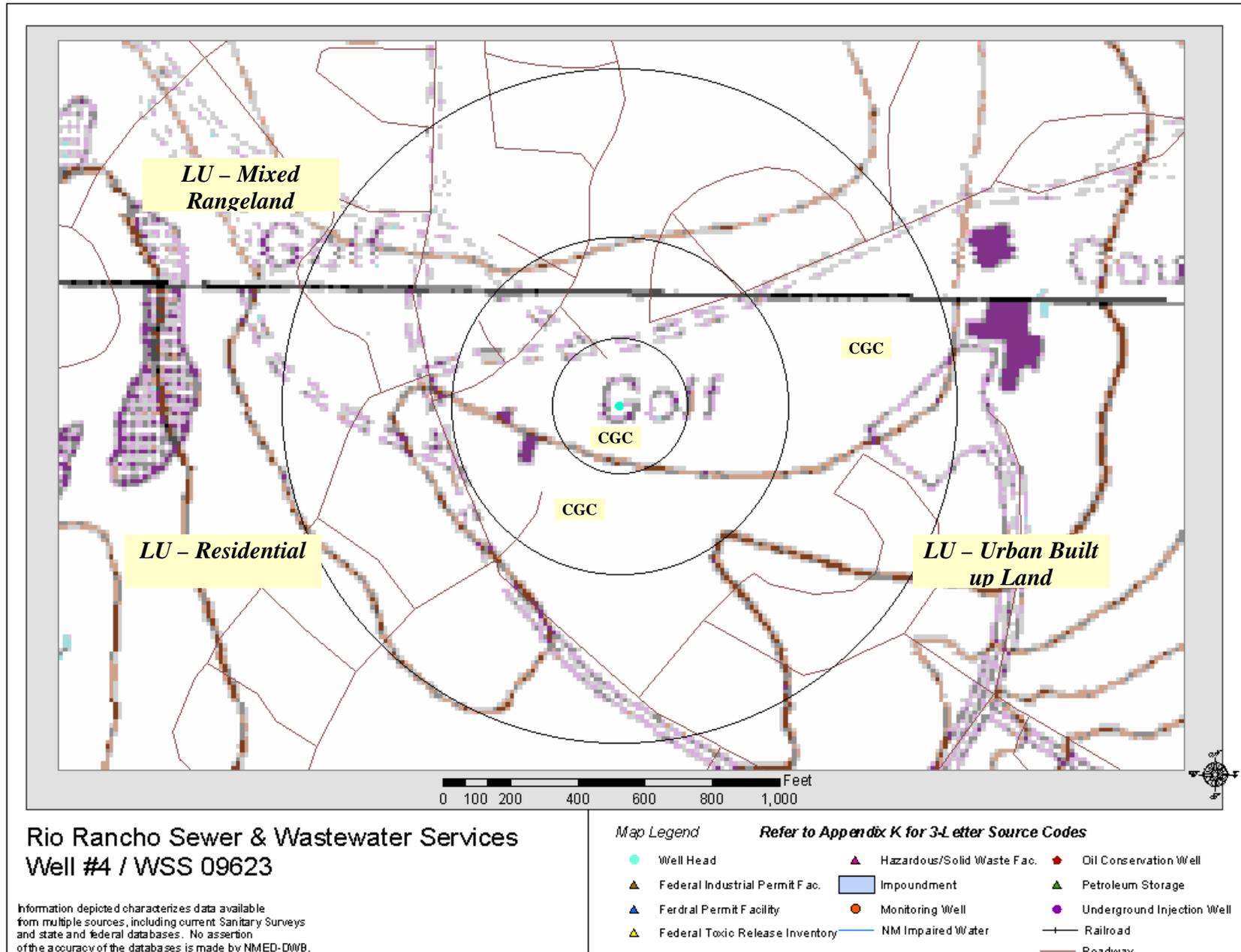
- 5) Describe the water supply system.
- 6) Describe the hydrogeology of the area.
- 7) Describe how the source water protection area(s) were determined (your answer may include topographic maps, ArcView Geographical Information Systems, Wellhead Analytical Element Model, Modflow, *etc*). Attach a copy of all source water maps (see example, Appendix A). ***NMED-DWB has inserted the Source Area Delineation Maps for your water utility. You may use these maps to satisfy this required element, or develop your own approach.***

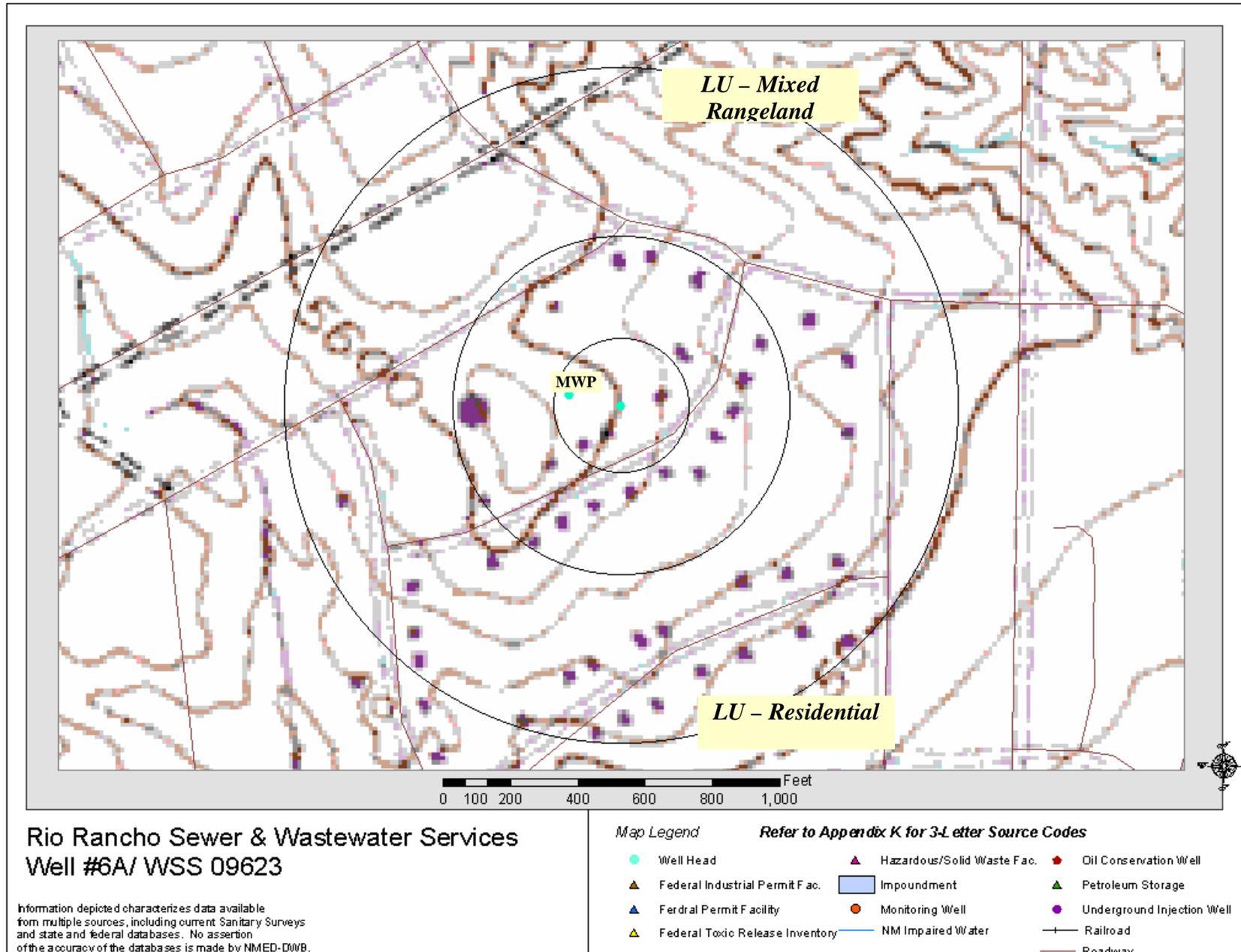
¹³ Please allow 45 days for the NMED-DWB approval process, once you have completed and submitted a SWAPP for review.

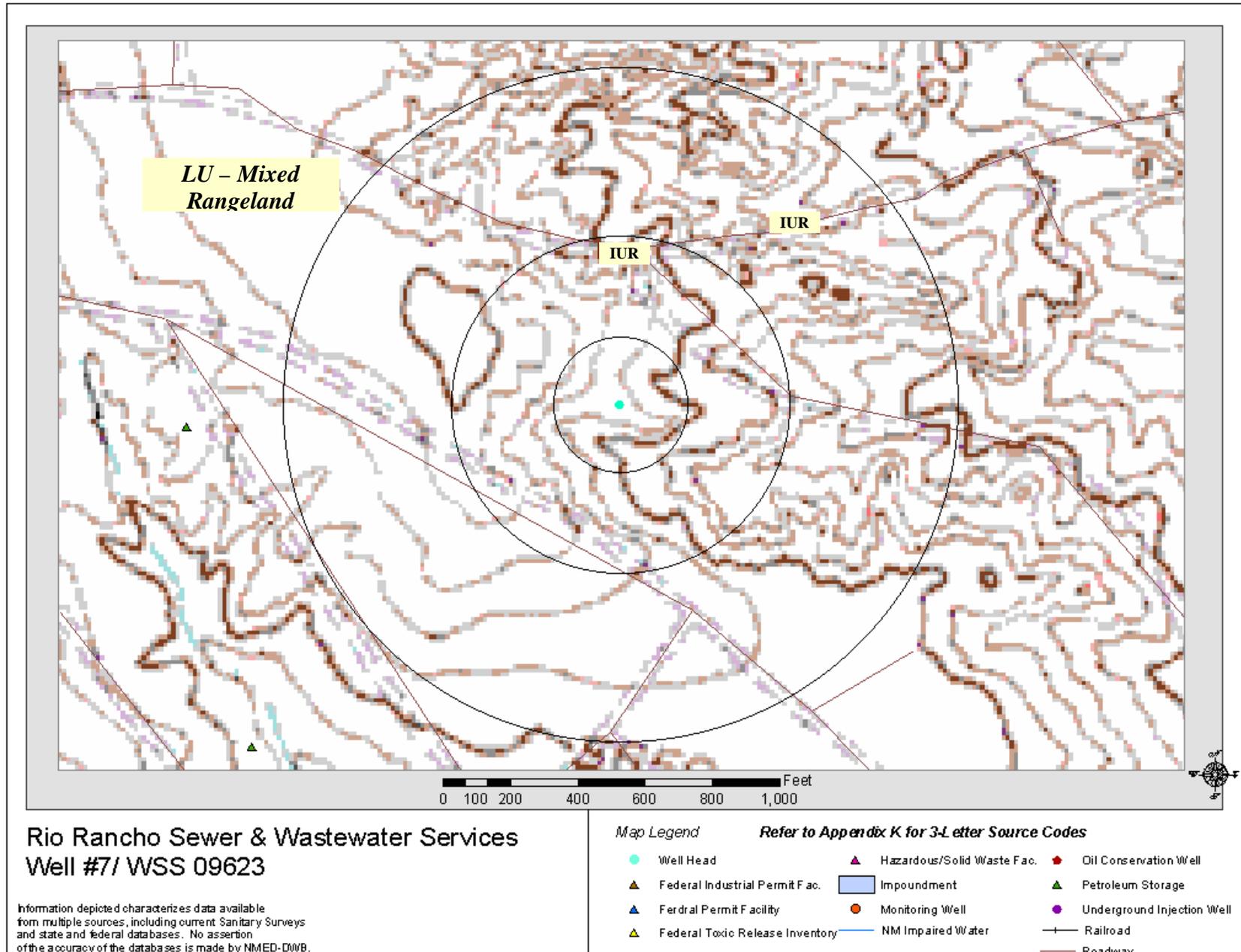


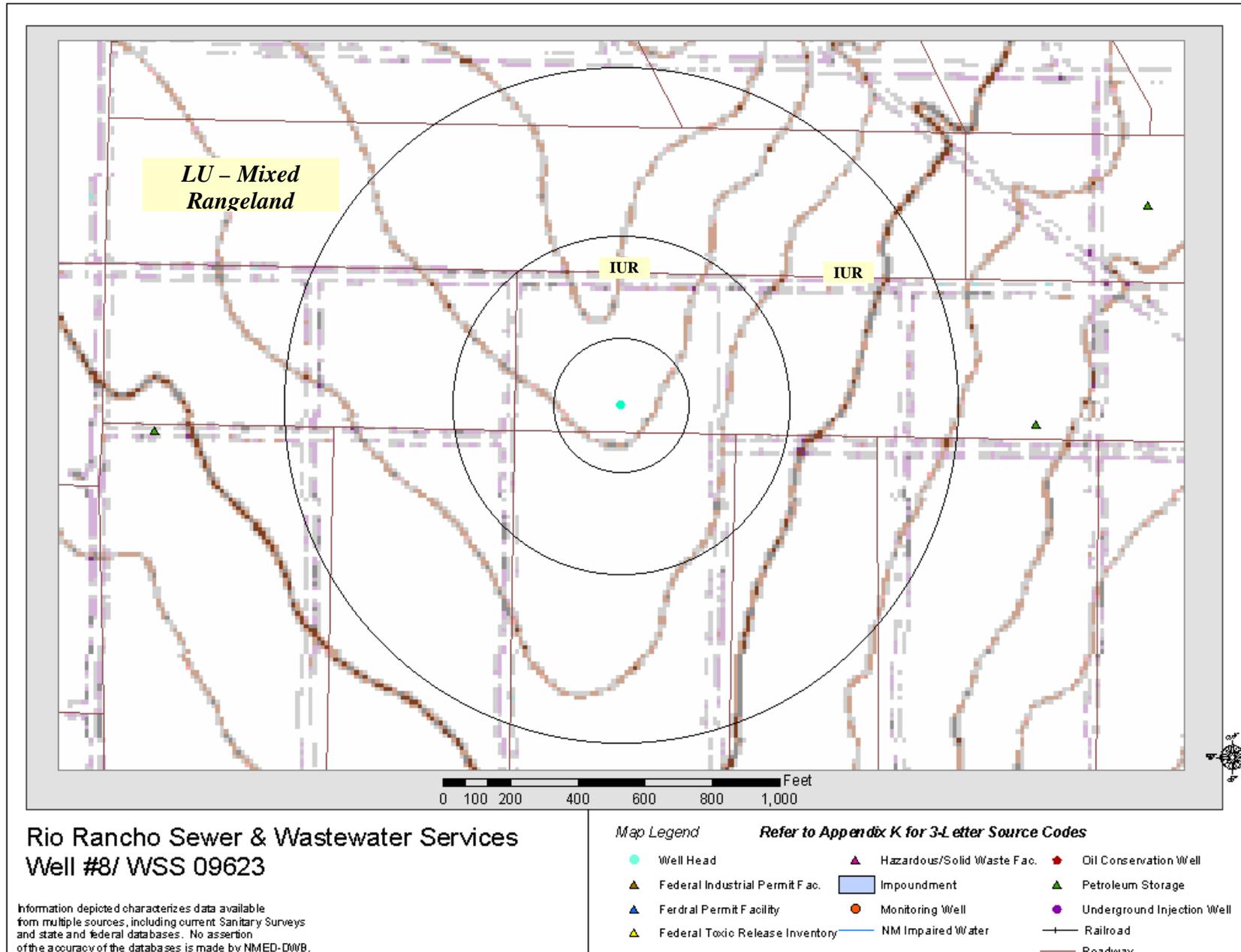


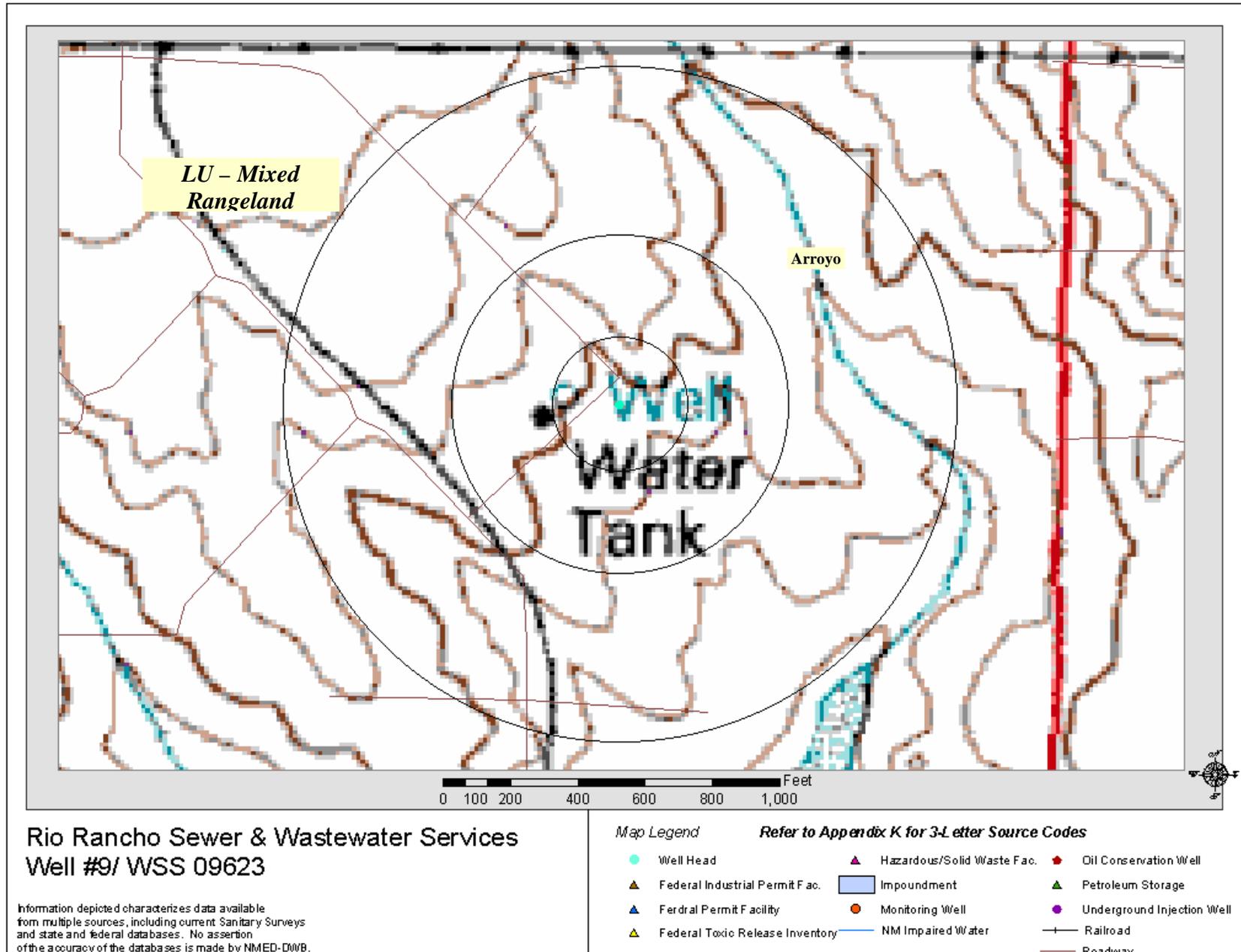


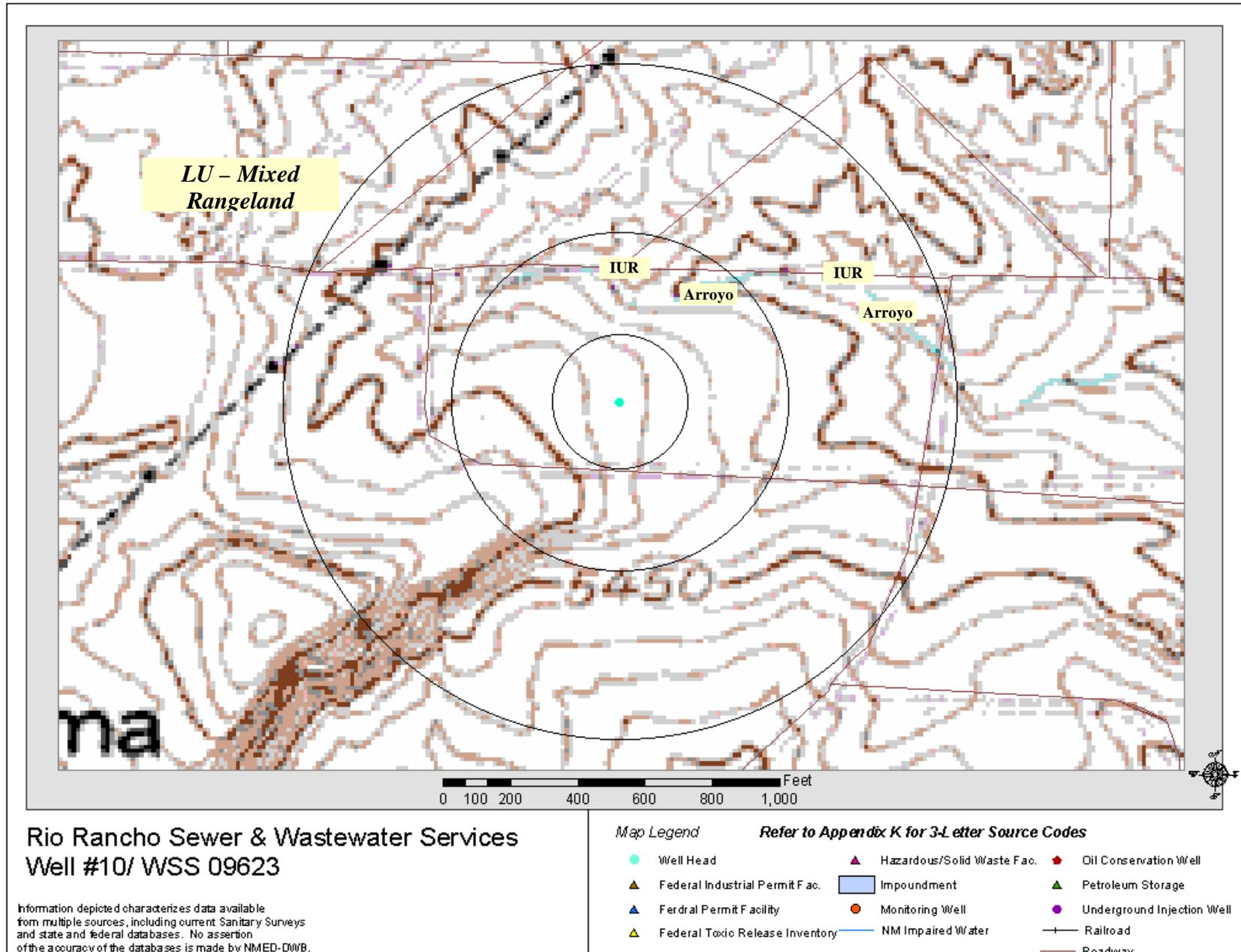


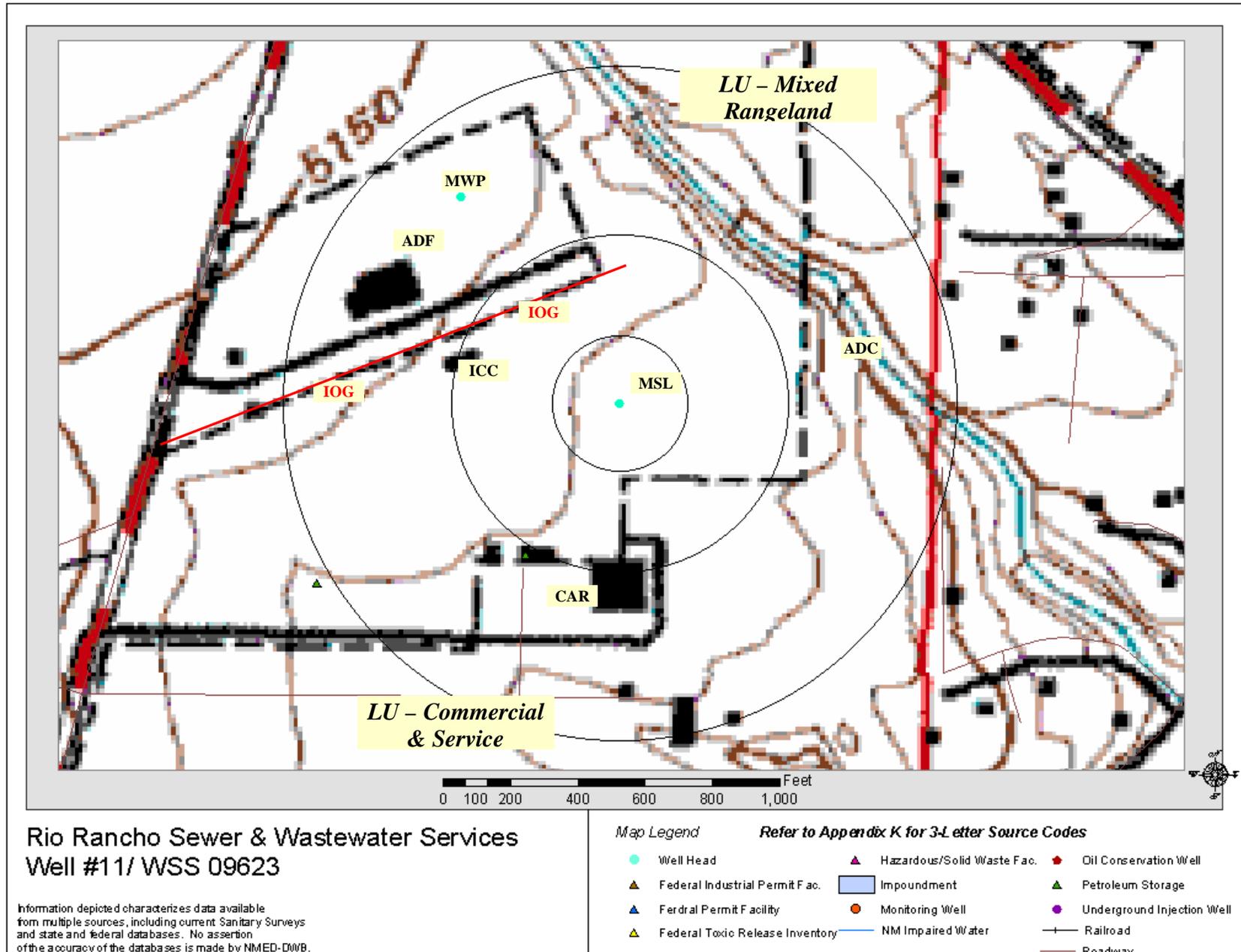


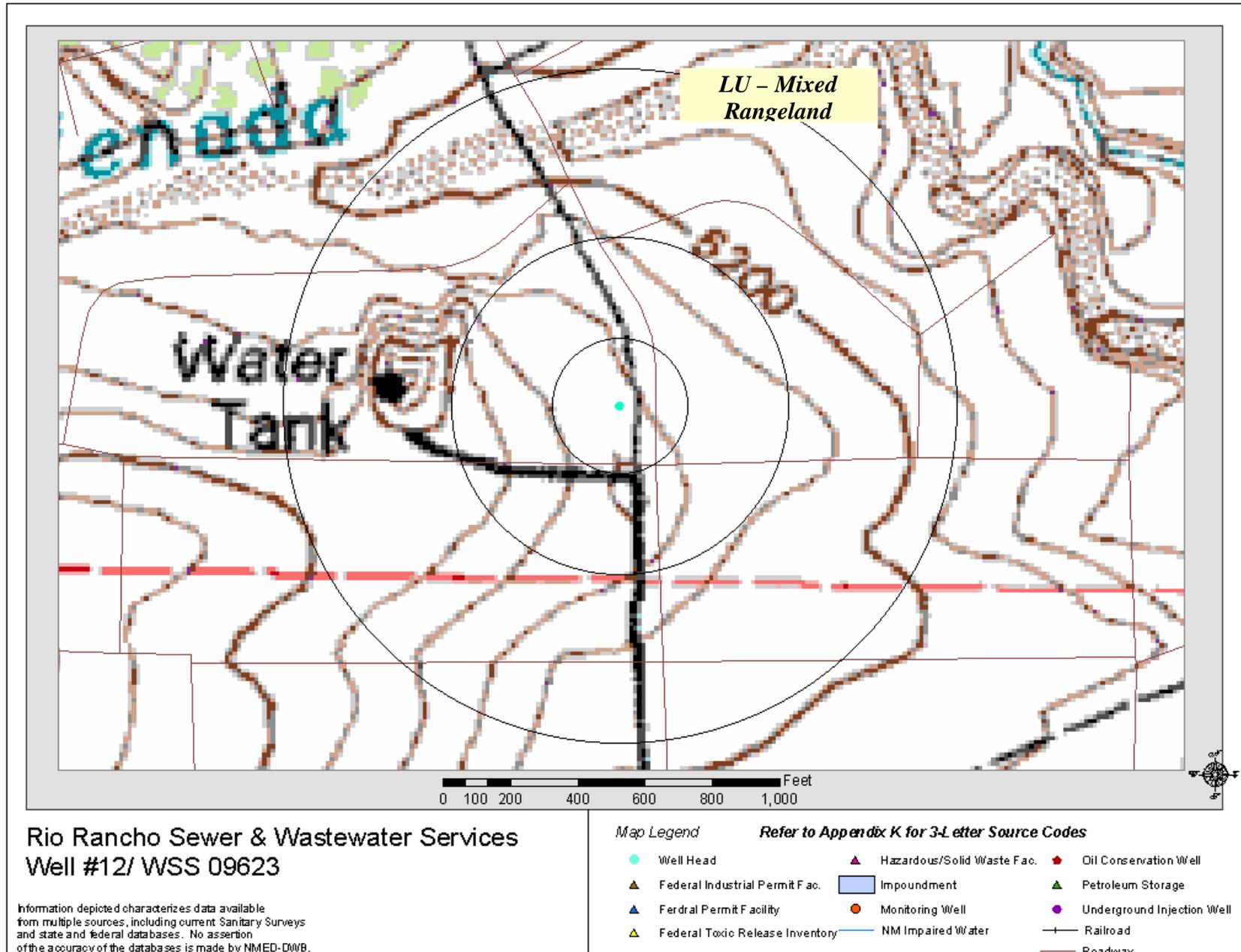


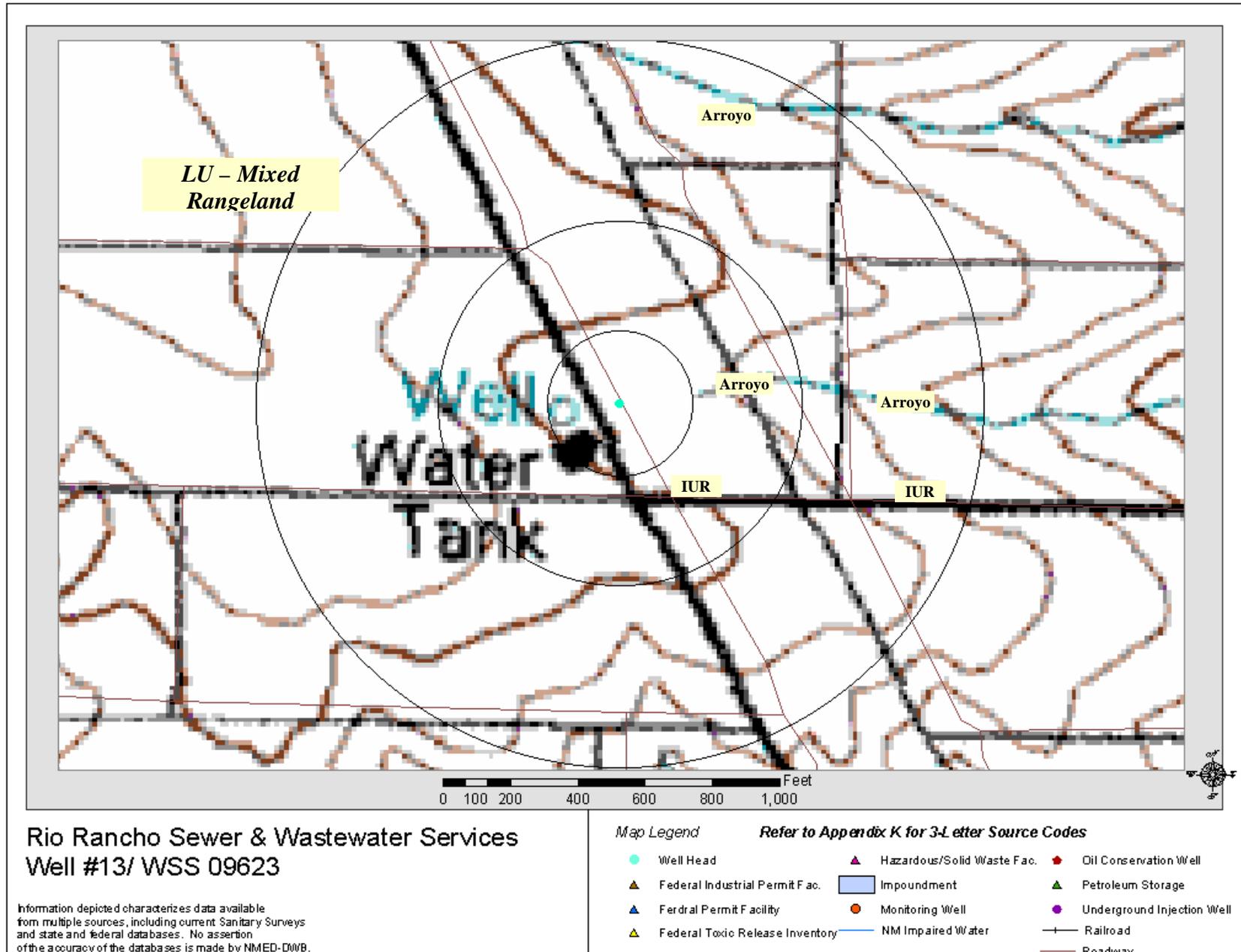


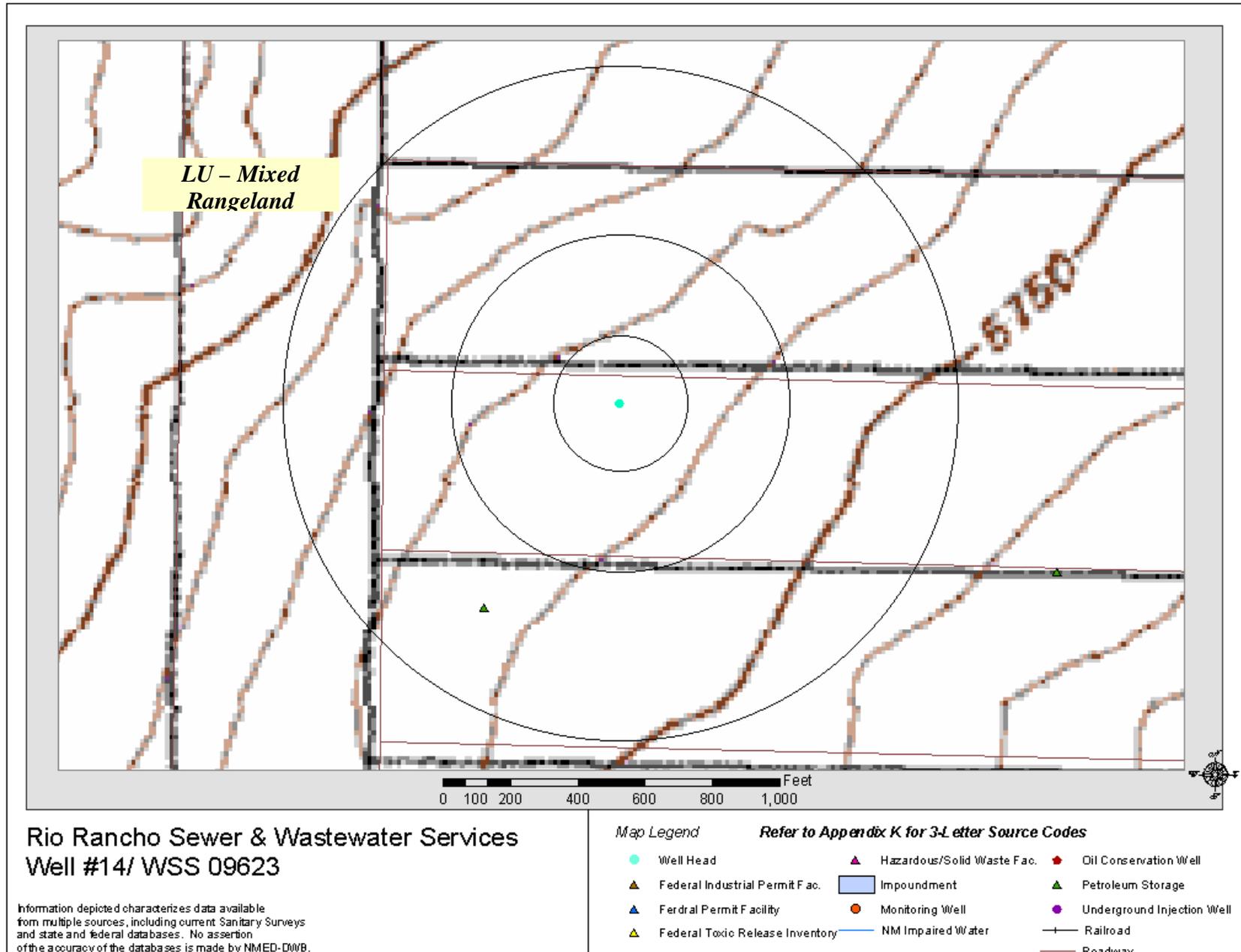


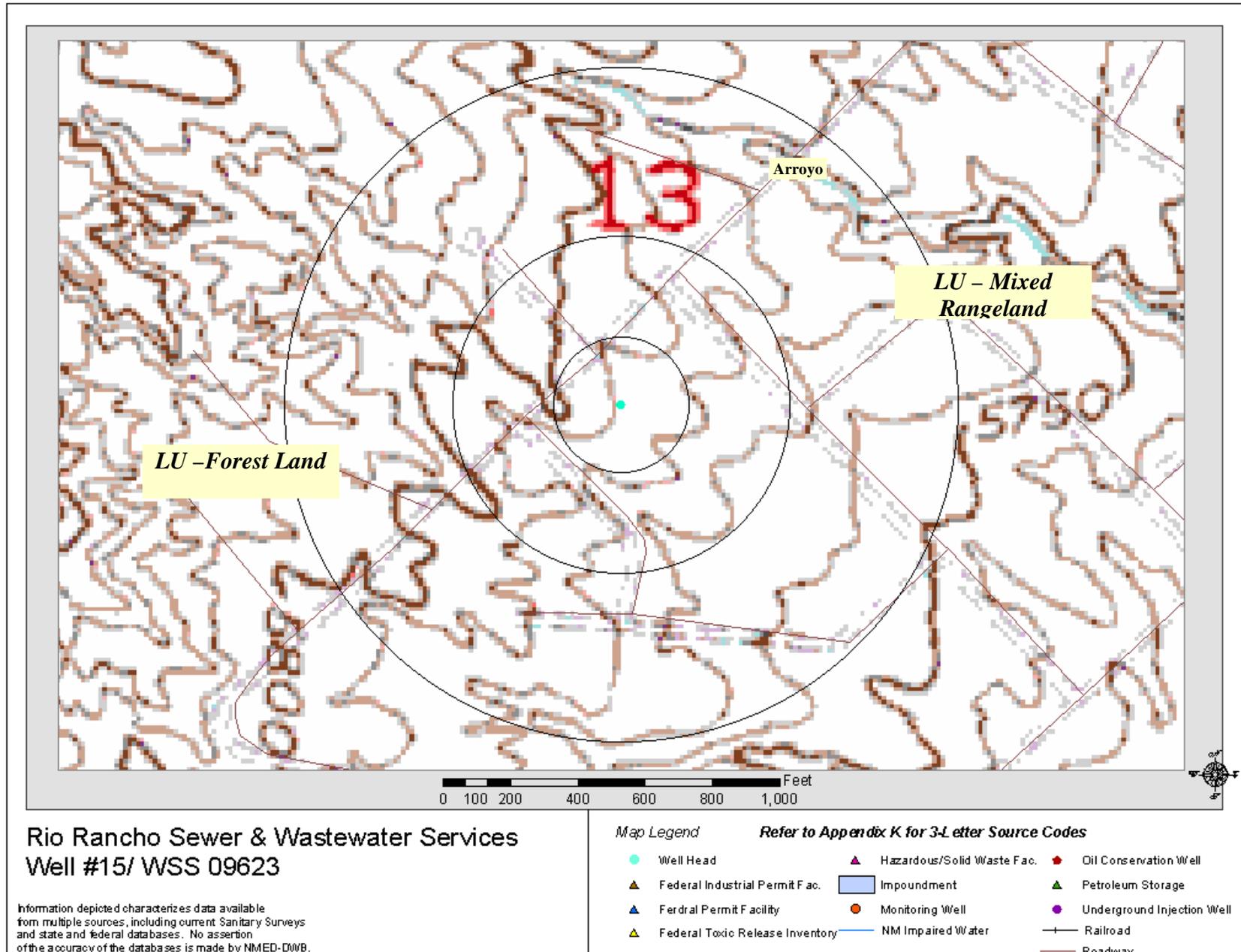


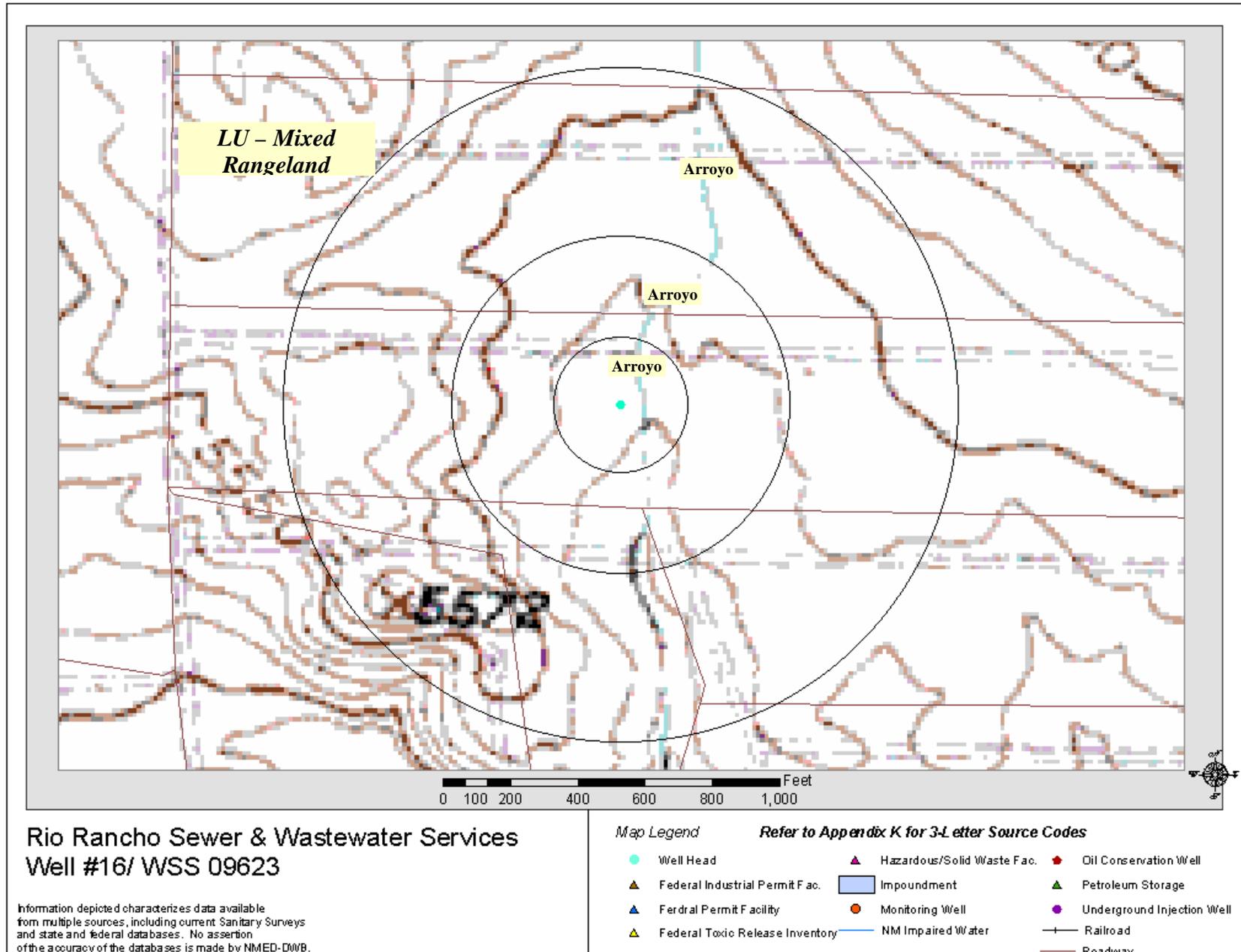


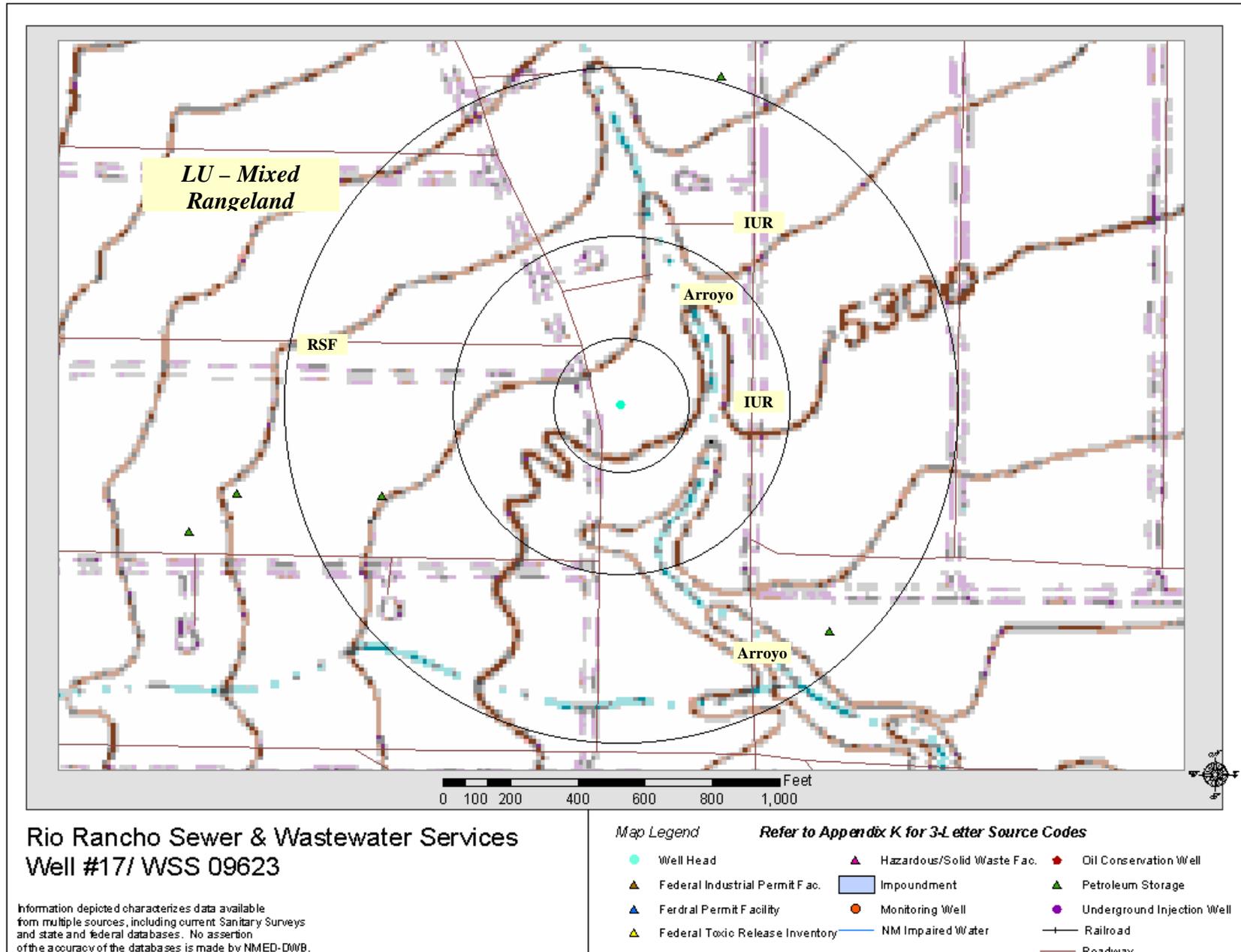


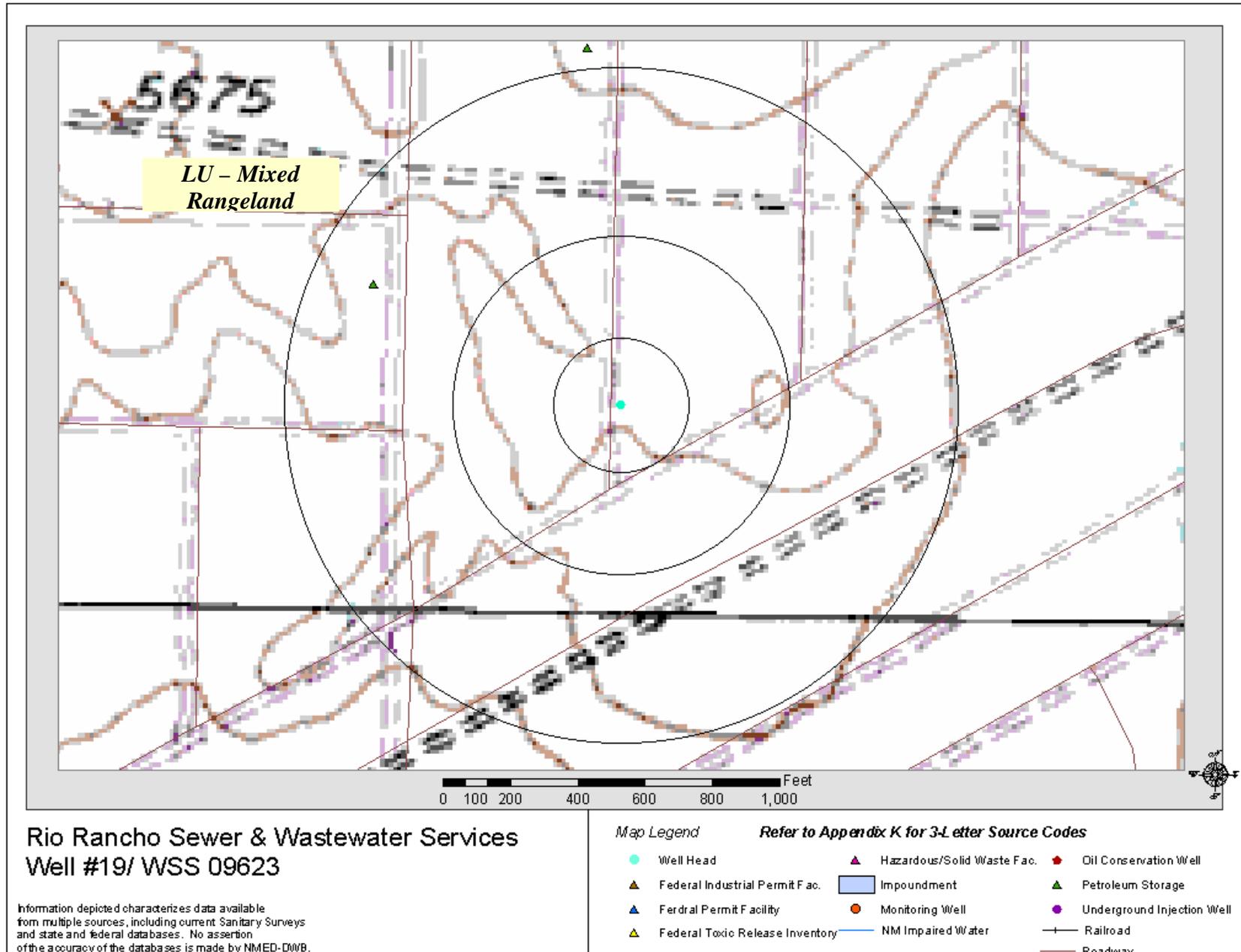


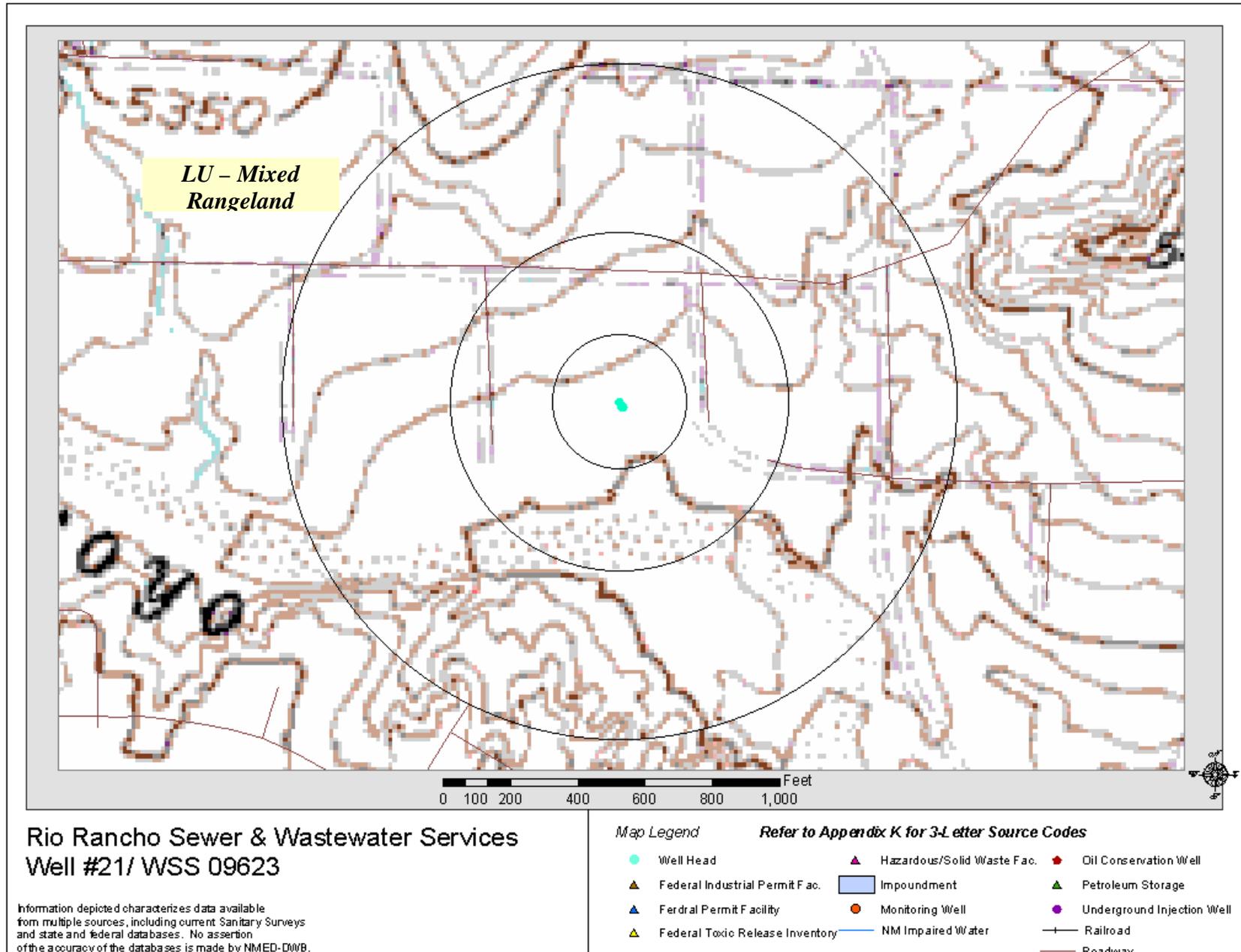












- 8) Show and/or describe any potential changes to the source water protection area that might be considered. For instance, one might extend a boundary determined in the initial delineation in order to incorporate a particular parcel of land or existing or planned zoning area.

STEP 3

- 9) List the actual and potential sources of contamination identified during the inventory, identify the distances and/or zones of influence where they are located, and provide the date(s) the inventory was conducted (see example, Appendix B). *NMED-DWB has inserted the Inventory of Actual and Potential Sources of Contamination for your water utility. You may use this inventory to satisfy this required element, or you may wish to customize the inventory.*

Well #1

PSOC Vulnerability Inventory and Ranking				
Map Reference	Description	Zone of Influence	Number of Type	Vulnerability Rank
Appendix K	CHG	A	1+	High
Appendix K	IOG	A	1+	High
Appendix K	RSF	A	1+	High
Appendix K	MSD	B	0-2	Low
Appendix K	IOG	B	0-2	Low
Appendix K	RSF	B	10+	High
Appendix K	IOG	C	0-4	Low
Appendix K	MWP	C	0-4	Low
Appendix K	RSF	C	15+	High
Map Legend	Federal Industrial Permit Facility	C	0-4	Low

Well #2

PSOC Vulnerability Inventory and Ranking				
Map Reference	Description	Zone of Influence	Number of Type	Vulnerability Rank
Appendix K	MSD	B	0-2	Low
Appendix K	IOG	B	0-2	Low
Appendix K	RSF	B	10+	High
Appendix K	CHG	C	0-4	Low
Appendix K	IOG	C	0-4	Low
Appendix K	MWP	C	0-4	Low
Appendix K	RSF	C	15+	High
Map Legend	Federal Industrial Permit Facility	C	0-4	Low

Well #3

PSOC Vulnerability Inventory and Ranking				
Map Reference	Description	Zone of Influence	Number of Type	Vulnerability Rank
Appendix K	MMP	A	1+	High
Appendix K	CFA	B	0-2	Low
Appendix K	CST	B	0-2	Low
Appendix K	CYY	B	0-2	Low
Appendix K	IRG	B	0-2	Low
Appendix K	IUR	B	0-2	Low
Appendix K	MHM	B	0-2	Low
Appendix K	RSF	B	0-2	Low

Appendix K	CST	C	0-4	Low
Appendix K	CSS	C	0-4	Low
Appendix K	CYY	C	0-4	Low
Appendix K	IUR	C	0-4	Low
Appendix K	MSC	C	0-4	Low
Appendix K	RSF	C	15+	High

Well #4

PSOC Vulnerability Inventory and Ranking				
Map Reference	Description	Zone of Influence	Number of Type	Vulnerability Rank
Base Map	CGC	A	1+	High
Base Map	CGC	B	0-2	Low
Base Map	CGC	C	0-4	Low

Well #6A

PSOC Vulnerability Inventory and Ranking				
Map Reference	Description	Zone of Influence	Number of Type	Vulnerability Rank
Appendix K	MWP	A	1+	High
Appendix K	UNKNOWN	B		
Appendix K	RSF	C	15+	High ?

Well #7

PSOC Vulnerability Inventory and Ranking				
Map Reference	Description	Zone of Influence	Number of Type	Vulnerability Rank
Base Map	IUR	B	0-2	Low
Base Map	IUR	C	0-4	Low

Well #8

PSOC Vulnerability Inventory and Ranking				
Map Reference	Description	Zone of Influence	Number of Type	Vulnerability Rank
Base Map	IUR	B	0-2	Low
Base Map	IUR	C	0-4	Low

Well #9

PSOC Vulnerability Inventory and Ranking				
Map Reference	Description	Zone of Influence	Number of Type	Vulnerability Rank
Base Map	Arroyo	C	0-4	Low

Well #10

PSOC Vulnerability Inventory and Ranking				
Map Reference	Description	Zone of Influence	Number of Type	Vulnerability Rank
Base Map	IUR	B	0-2	Low
Base Map	Arroyo	B	0-2	Low
Base Map	IUR	C	0-4	Low

Base Map	Arroyo	C	0-4	Low
----------	--------	---	-----	-----

Well #11

PSOC Vulnerability Inventory and Ranking				
Map Reference	Description	Zone of Influence	Number of Type	Vulnerability Rank
Appendix K	MSL	A	1+	High
Appendix K	CFA	B	3-4	Moderately Low
Appendix K	ICC	B	0-2	Low
Appendix K	IOG	B	0-2	Low
Appendix K	CAR	C	0-4	Low
Base Map	ADC	C	0-4	Low
Base Map	ADF	C	0-4	Low
Base Map	MWP	C	0-4	Low
Map Legend	Petroleum storage	C	0-4	Low

Well #12

PSOC Vulnerability Inventory and Ranking				
Map Reference	Description	Zone of Influence	Number of Type	Vulnerability Rank
Appendix K	-	-	-	-

Well #13

PSOC Vulnerability Inventory and Ranking				
Map Reference	Description	Zone of Influence	Number of Type	Vulnerability Rank
Base Map	IUR	B	0-2	Low
Base Map	Arroyo	B	0-2	Low
Base Map	IUR	C	0-4	Low
Base Map	Arroyo	C	0-4	Low

Well #14

PSOC Vulnerability Inventory and Ranking				
Map Reference	Description	Zone of Influence	Number of Type	Vulnerability Rank
Map Legend	Petroleum Storage	C	0-4	Low

Well #15

PSOC Vulnerability Inventory and Ranking				
Map Reference	Description	Zone of Influence	Number of Type	Vulnerability Rank
Base Map	Arroyo	C	0-4	Low

Well #16

PSOC Vulnerability Inventory and Ranking				
Map Reference	Description	Zone of Influence	Number of Type	Vulnerability Rank
Base Map	Arroyo	A	1+	Low
Base Map	Arroyo	B	0-2	Low
Base Map	Arroyo	C	0-4	Low

Well #17

PSOC Vulnerability Inventory and Ranking				
Map Reference	Description	Zone of Influence	Number of Type	Vulnerability Rank
Appendix K	IUR	B	0-2	Low
Appendix K	IUR	C	0-4	Low
Appendix K	RSF	C	0-4	Low
Base Map	Arroyo	B	0-2	Low
Base Map	Arroyo	C	0-4	Low
Map Legend	Petroleum Storage	C	0-4	Low

Well #19

PSOC Vulnerability Inventory and Ranking				
Map Reference	Description	Zone of Influence	Number of Type	Vulnerability Rank
Map Legend	Petroleum Storage	C	0-4	Low

Well #21

PSOC Vulnerability Inventory and Ranking				
Map Reference	Description	Zone of Influence	Number of Type	Vulnerability Rank
Appendix K	-	-	-	-

STEP 4

10) NMED-DWB has inserted a susceptibility analysis of your water utility, according to the U.S. EPA approved susceptibility guidelines under SWAPP, 2000.

Table 8	SOURCE SUSCEPTIBILITY RANKING				
SOURCE NAME	Sensitivity Rank	Vulnerability Rank	Susceptibility Rank	Operational Exceptions	Final Rank
WELL # 1	Moderately Low	High	Moderately High	LU – Mixed Rangeland LU – Residential	High
WELL # 2	Low	High	Moderate	LU – Mixed Rangeland LU – Residential	Moderately High
WELL # 3	Low	High	Moderate	LU – Industrial LU – Mixed Rangeland LU – Residential	Moderately High
WELL # 4	Low	High	Moderate	LU – Urban or Built up Land LU – Mixed Rangeland LU – Residential	Moderately High
WELL # 6A	Low	High	Moderate	LU – Mixed Rangeland LU – Residential	Moderately High
WELL # 7	Low	Low	Low	LU – Mixed Rangeland	Moderately Low
WELL # 8	Low	Low	Low	LU – Mixed Rangeland	Moderately Low
WELL # 9	Low	Low	Low	LU – Mixed Rangeland	Moderately Low
WELL # 10	Low	Low	Low	LU – Mixed Rangeland	Moderately Low
WELL # 11	Moderately Low	High	Moderately High	LU – Mixed Rangeland LU – Commercial & Service >= 3 PSOC in a Zone	High

Table 8	SOURCE SUSCEPTIBILITY RANKING				
SOURCE NAME	Sensitivity Rank	Vulnerability Rank	Susceptibility Rank	Operational Exceptions	Final Rank
WELL # 12	Moderately Low	Low	Moderately Low	LU – Mixed Rangeland	Moderate
WELL # 13	Low	Low	Low	LU – Forest Land	Low
WELL # 14	Low	Low	Low	LU – Mixed Rangeland	Moderately Low
WELL # 15	Low	Low	Low	LU – Mixed Rangeland LU – Forest Land	Moderately Low
WELL # 16	Low	Low	Low	LU – Mixed Rangeland	Moderately Low
WELL # 17	Low	Low	Low	LU – Mixed Rangeland >= 3 PSOC in a Zone	Moderately Low
WELL # 19	Low	Low	Low	LU – Mixed Rangeland	Moderately Low
WELL # 21	Low	Low	Low	LU – Mixed Rangeland	Moderately Low

STEP 5

- 11) List the existing and proposed land use of the delineated source area(s) such as recreation, agriculture, forestry, commercial, and residential. If applicable, this should include current and proposed zoning.
- 12) Provide a management strategy (measures/tools) and schedule for *each* actual and/or potential contaminate (noted in the *Inventory of Actual and Potential Sources of Contamination*). *Although there may be a time-delay in the implementing specific management strategies, priority should be given to water sources identified as having the greatest susceptibility to contamination. **Your water utility is not required to develop a susceptibility analysis, and, NMED-DWB has completed and inserted an analysis for purposes of prioritizing protection planning, refer to Step 4, # 10.***
In addition, state if, when, and how the management strategies will be updated (see example, Appendix D).

STEP 6

- 13) Develop a *contingency protocol and schedule* that addresses potential future events that may adversely impact your water supply system such as water outages, accidental leaks and/or spills, water conservation, and land acquisition for new sources of water supply. You should include when and how the plan will be updated (see example, Appendix E).

Map Code	Land Use	Description	Contaminants of Concern*
<i>AGRICULTURAL LAND USE</i>			
AAP	Animal Processing or Rendering Plants	Commercial Operations/Waste Storage/Disposal Facility	Nitrates, Pathogens, Organic/Inorganic Chemicals
ACS	Farm/Ranch Agrochemical Storage Facilities or Sites	Farm/Ranch Storage Site	Pesticides, Herbicides, Fertilizers
ADC	Drainage Canals, Ditches or Acequias-Unlined, Wells (Private, Stock wells, and Irrigation)	Runoff and Infiltration	Pesticides, Herbicides, Fertilizers, Nitrate, Pathogens
ADF	Livestock Production-Dairies	Livestock Wastes, Runoff and Infiltration	Nitrate, Phosphate, Chloride, Pathogens, Pharmaceuticals
AFI	Farming-Irrigated Croplands	Runoff and Infiltration	Nitrate, Ammonia, Chloride, Fertilizers, Pesticides, Herbicides
AFL	Confined Animal Feeding Operations	Runoff and Infiltration of Livestock Wastes	Nitrate, Phosphate, Chloride, Pathogens, Pharmaceuticals
AFM	Farm Machinery Storage or Maintenance Areas	Farm Machinery Maintenance Areas	Automotive Wastes, Welding Wastes, Fuels, Oils, Lubricants
AFN	Farming-Non-irrigated Croplands	Runoff and Infiltration Operations	Nitrate, Ammonia, Chloride, Fertilizers, Pesticides, Herbicides
AHC	Horticultural/Gardens/Nurseries/Greenhouses	Operations/Storage	Pesticides, Herbicides, Fertilizers
AHF	Hay/Feed and Veterinary Product Storage Sites	Farm/Ranch Storage Site	Fungicides, Pesticides, Nitrates, Pharmaceuticals
AMA	Manure or Livestock Waste-Land Application Areas	Land Application of Manure	Nitrate, Ammonia, Phosphate, Chloride, Pathogens, Pharmaceuticals
AMS	Manure or Livestock Waste-Storage Facilities or Sites	Lined and Unlined Manure Storage Facilities	Nitrate, Ammonia, Phosphate, Chloride, Pathogens, Pharmaceuticals
AOA	Livestock Production-Other Animal	Livestock Wastes	Nitrate, Ammonia, Phosphate, Chloride, Pathogens, Pharmaceuticals
APF	Livestock Production -Poultry	Poultry Sewage Wastes	Nitrate, Ammonia, Phosphate, Chloride, Pathogens, Pharmaceuticals
APP	Processing Plants or Mills- Hay, Grain, or Produce	Operations, Waste Storage and Disposal	Organic/Inorganic Chemicals, Lubricants, Machinery Wastes
ARL	Animal Rangeland	Rangeland and Pasturage	Nitrate, Ammonia, Phosphate, Chloride, Pesticides, Pathogens
ASC	Bulk Agrochemical Storage-Petroleum/Chemicals	Storage-500 gallons or more	Petroleum Products, Inorganic/Organic Chemicals
ASF	Bulk Agrochemical Storage-Fertilizers	Feed Mill, Agricultural Co-op	Fertilizers
ASG	Bulk Agricultural Product Storage-Grain or Produce	Grain Elevator, Warehouse or Storage Site	Fungicides, Oils, Lubricants, Machinery Wastes

Map Code	Land Use	Description	Contaminants of Concern*
ASH	Livestock Production -Sheep	Livestock Sewage Wastes	Nitrate, Ammonia, Phosphate, Chloride, Pathogens, Pharmaceuticals
ASP	Bulk Agrochemical Storage-Pesticides	Feed Mill, Agricultural Co-op	Pesticides
ASW	Livestock Production -Swine	Livestock Sewage Wastes	Nitrate, Ammonia, Phosphate, Chloride, Pathogens, Pharmaceuticals
<i>COMMERCIAL LAND USE</i>			
CAI	Airports (Active/Inactive)	Operations/Maintenance/Construction	Aircraft Fuels, Deicers, Batteries, Diesel Fuel, Chlorinated Solvents, Automobile Wastes, Heating Oil, Building Wastes, Sewage, Septage, Pathogens, Pesticides, Fertilizers
CAR	Automotive Repair Shops	Operations/Maintenance/Storage	Solvents, Metals, Automotive Waste, Oils, Gasoline
CAW	Abandoned/Improperly Closed Wells	Storage/Disposal	Organic/Inorganic Chemicals, Brines, Waste Oil, Treated Sewage Effluent, Storm Water Runoff, Process Waste Water, Metals, Pathogens, Nitrate
CBS	Automotive Body Shops	Operations/Maintenance	Paints, Solvents
CBY	Boat Yards/Marinas	Operations/Maintenance	Gasoline, Diesel Fuels, Septage, Wood Treatment Chemicals, Paints, Varnishes, Automotive Wastes, Solvents, Building Wastes
CCG	Camp Grounds - Unsewered	Untreated Domestic Wastewater	Septage, Gasoline, Pesticides, Organic/Inorganic Chemicals
CCE	Cemeteries	Operations/Maintenance	Leachate, Arsenic, Pesticides, Fertilizers
CCW	Car Washes	Unsewered, Without Total Recycling System	Soaps, Detergents, Waxes, Organic/Inorganic Chemicals
CCY	Construction/Demolition Yard/Staging Areas	Storage/Maintenance	Gasoline, Diesel Fuels, Wood Treatment Chemicals, Paints, Varnishes, Automotive Wastes, Solvents, Building Wastes, Explosives, Oil
CDC	Dry Cleaning Shops	Operations/Maintenance	Chlorinated Solvents, Organic/Inorganic Chemicals
CFA	Fuel Storage Tanks-Above Ground	Non-Service Station Tanks	Gasoline, Diesel Fuel, Organic/Inorganic Chemicals
CFB	Fuel Storage Tanks-Below Ground	Non-Service Station Tanks	Gasoline, Diesel Fuel, Organic/Inorganic Chemicals
CFC	Funeral Homes/Crematories	Operations	Biohazard Waste, Organic/Inorganic Chemicals, Septage
CFR	Furniture Repair/Refinishing	Operations	Paints, Solvents, Organic Chemicals
CGC	Golf Courses	Operations/Maintenance	Fertilizers, Pesticides, Gasoline, Automotive Wastes, Batteries, Septage
CHG	Historic Gasoline Service Stations	Above/Below Ground Storage Tanks/Operations	Gasoline, Oils, Solvents, Automotive Wastes, Septage

Map Code	Land Use	Description	Contaminants of Concern*
CHM	Home Manufacturing	Operations/Maintenance/Storage	Paints, Solvents, Organic/Inorganic Chemicals
CHN	Hospitals/Nursing Homes - Unsewered	Wastewater Discharge to Septic Tank/Leach Field	Biohazard Waste, Organic/Inorganic Chemicals, Septage, Radiological Waste
CHW	Hardware/Lumber/Parts Stores	Operations/Storage	Pesticides, Fertilizers, Organic/Inorganic Chemicals
CLD	Laundromats - Unsewered	Wastewater Discharge	Detergents, Soaps, Septage
CPP	Photo Processing Laboratories	Operations/Storage	Organic/Inorganic Chemicals
CPR	Printing Shops	Operations/Storage	Solvents, Inks, Dyes, Organic/Inorganic Chemicals
CPS	Paint Stores	Storage	Paint, Solvents
CRL	Research Laboratories	Operations/Maintenance/Storage	Biohazard Waste, Radiological Materials and Waste, Metals, Organic/Inorganic Chemicals
CRY	Railroad Yards and Tracks	Operations/Maintenance/Storage	Diesel Fuel, Pesticides, Organic/Inorganic Chemicals
CSS	Gasoline Service Stations	Above/Below Ground Storage Tanks/Operations	Gasoline, Oils, Solvents, Automotive Wastes, Septage
CST	Commercial Septic Tanks/Leachfields/Leachpits/Cesspools	Storage/Disposal	Septage, Septic Effluent, Pathogens, Nitrate, Ammonia, Chloride
CVS	Veterinary Facilities	Operations/Maintenance	Biohazard Waste, Organic/Inorganic Chemicals, Septage, Radiological Waste
INDUSTRIAL LAND USE			
IAS	Asphalt Plants	Production/Storage	Petroleum Derivatives
ICC	Cement/Concrete Plants	Operations/Maintenance/Storage	Organic/Inorganic Chemicals, Oils, Natural Gas, Propane,
ICE	Communications Equipment Manufacturers	Production/Maintenance/Storage	Solvents, Organic/Inorganic Chemicals, Oils, Waste Oils, Metals
ICL	Chemical Landfills	Storage/Disposal	Leachate of Organic/Inorganic Chemicals, Acids, Bases, Metals, Solvents, Gasoline, Diesel Fuel, Pesticides, PCB's
ICP	Chemical Production Plants	Production/Maintenance/Storage	Organic/Inorganic Chemicals, Solvents, Oils, Metals
IEE	Electronic/Electrical Equipment Manufacturers	Production/Maintenance/Storage	Solvents, Organic/Inorganic Chemicals, Oils, Waste Oils, Metals, Acids, Bases
IFM	Furniture and Fixture Manufacturers	Production/Maintenance/Storage	Paints, Solvents, Organic/Inorganic Chemicals

Map Code	Land Use	Description	Contaminants of Concern*
IFW	Foundry/Smelting Plants	Production/Maintenance/Storage	Organic/Inorganic Chemicals, Metals, Solvents, Acids, Bases, Oils
IGO	Gas/Oil Wells-Active/Abandoned/Test, Wells Geothermal and Industrial	Production	Oil, Natural Gas, Organic/Inorganic Chemicals, Acids, Bases, Drilling Wastes
IHD	Historic Dumps/Landfills	Storage/Disposal	Leachate of Organic/Inorganic Chemicals, Acids, Bases, Metals, Solvents, Gasoline, Diesel Fuel, Pesticides, PCB's, Automotive Wastes
IHM	Historic Mining Operations	Production Waste/Storage	Metals, Inorganic Chemicals, Acids, Bases, Radiological Materials
IMI	Primary Metal Industries	Steel/Metal Works, Rolling/Wire Mills	Metals, Inorganic Chemicals, Acids, Bases
IMO	Mining Operations (Surface And Subsurface)	Production Waste/Storage	Metals, Inorganic Chemicals, Acids, Bases, Radiological Materials
IMP	Metal Plating/Processing Facilities	Operations/Maintenance/Storage	Organic/Inorganic Chemicals, Acids, Bases, Metals
IMW	Machine/Metal Working Shops	Operations/Maintenance/Storage	Cutting Oils, Metals, Solvents, Organic/Inorganic Chemicals, Detergents
IOG	Oil/Gas Pipelines	Transport	Oils, Gasoline, Volatile Organic Chemicals, Natural Gas, Propane
IPL	Plastics Manufacturing/Molder	Operations/Maintenance/Storage	Solvents, Oils, Organic/Inorganic Chemicals, Acids, Bases
IPM	Paper Mills	Operations/Maintenance/Storage	Acids, Metals, Organic/Inorganic Chemicals
IPP	Petroleum Production/Refining/ Bulk Plants	Operations/Maintenance/Storage	Oils, Gasoline, Diesel Fuels, Organic Chemicals, Oil Drilling/Refining Wastes
IPU	Public Utilities	Power Generating Stations	PCB's, Solvents, Diesel Fuel, Propane, Natural Gas, Oil, Acids, Bases, Organic/Inorganic Chemicals, Metals
IRG	RCRA Waste Generators - Other	Storage/Disposal	Organic/Inorganic Chemicals, Solvents, Metals, PCB's, Acids, Bases, Radiological Materials
IRW	Radioactive Waste Disposal Sites	Storage/Disposal	High and Low Level Radiological Wastes
ISD	Sumps/Dry Wells	Storage/Disposal	Storm Water Runoff, Organic/Inorganic Chemicals, Solvents, Process Wastewater, Pesticides, Oils
ISF	Superfund Sites	Storage/Disposal	Organic/Inorganic Chemicals, Solvents, Metals, PCB's, Acids, Bases, Radiological Materials
ISM	Primary Wood Industries	Saw Mills, Planers, Wood Treatment	Organic/Inorganic Chemicals, Metals, Solvents
IST	Stone, Tile, Glass Manufacturing	Operations/Maintenance/Storage	Solvents, Oils, Metals, Organic/Inorganic Chemicals
ITS	Treatment/Storage/Disposal Ponds/Lagoons	Treatment/Storage	Organic/Inorganic Chemicals, Metals, Acids, Bases, Sewage

Map Code	Land Use	Description	Contaminants of Concern*
ITT	Transport/Distribution, Warehouses, Truck Terminals	Operations/Maintenance/Storage	Gasoline, Diesel Fuels, Automotive Wastes, Metals, Organic/Inorganic Chemicals, Acids, Bases
IUD	Unregulated Dumps/Excavated Sites, Snow Dumps	Storage/Collection/Disposal	Organic/Inorganic Chemicals, Automotive Wastes, Oil, Gasoline, Runoff from Adjacent Sites
IUI	Underground Injection (UIC) Wells	Storage/Disposal	Organic/Inorganic Chemicals, Brines, Waste Oil, Treated Sewage Effluent, Storm Water Runoff, Process Wastewater, Metals, Pathogens, Nitrate
IUR	Utility/Transportation Right of Ways, major transportation corridor	Power Lines, Gas/Oil Pipelines	Pesticides, Gasoline, Diesel Fuels, Automotive Wastes, Organic/Inorganic Chemicals, PCB's, Sewage, Metals, Storm water Runoff, Pathogens
MUNICIPAL/RESIDENTIAL LAND USE			
MHM	Highway/Road Maintenance Yards	Operations/Maintenance/Storage	Gasoline, Diesel Fuels, Solvents, Road Salt, Asphalt, Pesticides, Automotive Wastes,
MHR	Highway Rest Areas	Operations/Maintenance/Storage/Disposal	Automotive Wastes, Septage, Gasoline, Diesel Fuels, Pesticides
MIN	Incinerators - Commercial or Municipal	Operations/Disposal	Metals, Organic/Inorganic Chemicals
MLF	Municipal Waste Landfills	Storage/Disposal	Leachate, Organic/Inorganic Chemicals, Pesticides, Metals, Oils
MMF	Military Facilities	Operations/Maintenance/Storage/Disposal	Gasoline, Aircraft Fuels, Diesel Fuels, Automotive Wastes, Metals, Organic/Inorganic Chemicals, Explosives, Radiological Materials, Pesticides, Sewage/Septage, Oils, Solvents, Fertilizers, Batteries, Deicers
MMP	Motor Pools	Operations/Maintenance/Storage/Disposal	Gasoline, Diesel Fuel, Oils, Waste Oils, Automotive Waste, Batteries, Metals
MPS	Sewage Pump Stations	Operations/Storage	Sewage, Pathogens, Nitrate, Metals, Organic/Inorganic Chemicals
MPW	Polluted Surface Water Sources	Naturally Occurring/Anthropogenic	Sewage, Pathogens, Nitrate, Metals, Acids, Bases, Organic/Inorganic Chemicals
MRF	Recycling Facilities	Operations/Storage/Disposal	Metals, Organic/Inorganic Chemicals, Pesticides, Automotive Wastes, Oils
MSC	Schools – Unsewered	Wastewater Discharge to Septic Tank/Leach Field	Septage, Septic Effluent, Pathogens, Nitrate, Ammonia, Chloride
MSD	Storm Drainage Collection Areas or Outlets-Unlined	Storage/Disposal	Runoff, Pesticides, Fertilizer, Pathogens, Nitrate, Phosphate, Oil
MSL	Sewer Lines	Transport	Sewage, Pathogens, Nitrate, Metals, Organic/Inorganic Chemicals
MSP	Wastewater Seepage/Retention Ponds (Unlined/Lined)	Storage/Disposal	Sewage Effluent, Nitrate, Ammonia, Pathogens, Organic/Inorganic Chemicals, Pesticides
MSS	Sewage Effluent/Sludge Land Application Areas	Storage/Disposal	Sewage/Sewage Sludge, Nitrate, Pathogens, Organic/Inorganic Chemicals, Metals
MST	Sewage Treatment Plants	Operations/Maintenance/Storage/Disposal	Sewage, Sewage Sludge, Metals, Pathogens, Organic/Inorganic Chemicals

Map Code	Land Use	Description	Contaminants of Concern*
MSW	Solid Waste Transfer Stations	Storage/Disposal	Metals, Organic/Inorganic Chemicals, Pesticides, Automotive Wastes, Oils
MWP	Water Treatment Plants and Water Supply Wells	Operations/Maintenance/Storage/Disposal	Organic/Inorganic Chemicals, Chlorine
RSF	Single Family Residences - Unsewered	Wastewater Discharge to Septic Tank/Leach Field or Cesspool	Septage, Pathogens, Nitrate, Ammonia, Chloride, Heavy Metals, Household Pesticides, Herbicides, Cleaning Agents and Solvents, Fuels
* Contaminants of Concern include substances that are commonly, but not always, associated with the Contaminant Source listed in column 2			

Name of Contaminant	MCL *	Potential Contaminant Source (by Contaminant Code)***	Health Effects
VOLATILE ORGANIC CHEMICALS			
Benzene	0.005	AAP, APP, CAI, CAR, CBS, CBY, CCY, CDC, CHW, CHM, CHN, CSY, CPP, CPR, CPS, CRL, CRY, CUS, CVS, ICC, ICE, ICL, ICP, IEE, IFW, IFM, IHD, ILS, IMI, IMW, IMP, IPL, IPM, IPP, IPU, IRG, ISD, ISF, ISM, IST, ITS, ITT, IUD, IUI, IUR, MMF, MMP, MSW	Anemia; decrease in blood platelets; nervous system disorders; immune system depression; increased risk of cancer
Carbon Tetrachloride	0.005	AAP, APP, CAI, CDC, CHM, CHN, CHW, CPP, CPR, CRL, CUS, CVS, ICE, ICL, ICP, IEE, IHD, ILS, IMI, IMP, IMW, IPL, IPM, IPP, IPU, IRG, ISD, ISF, ISM, IST, ITS, ITT+, IUD, MLF, MMF, MMP, MSC, MSW	Liver problems; kidney, lung damage; increased risk of cancer
Ortho-Dichlorobenzene	0.6	CAR, CBS, CBY, CCY, CDC, CFR, CHM, CHW, CPP, CPR, CPS, CRL, CRY, CUS, ICE, ICP, ICL, IEE, IFM, IHD, ILS, IMI, IMP, IMW, IPL, IPM, IPP, IPU, IRG, ISD, ISF, ISM, IST, ITS, ITT, IUD, MHM, MMF, MMP, MSC	Liver, kidney, nervous system or circulatory problems
Para-Dichlorobenzene	0.075	ACS, AFI, AFN, AHC, AHF, ASC, ASP, CAR, CDC, CPP, CHW, CPP, CPR, CPS, CRL, CRY, CUS, ICL, ICP, ILS, IMP, IMW, IPL, IPP, IPU, IRG, ISF, ITS, ITT, MMF, MMP, MSC	Eye, respiratory, gastrointestinal tract irritation; anemia; skin lesions; liver, kidney, spleen damage; blood changes
1, 2-Dichloroethane	0.005	ACS, AFI, AFN, AHC, AHF, ASC, ASG, ASP, CFR, CHN, CPP, CPR, CRL, CUS, CVS, ICL, ICP, IEE, IFM, ILS, ITT, IMW, IPL, IPP, IRG, ISD, ISF, IUD, MMF, MSC	Nervous system disorders; lung, kidney, liver, circulatory, gastrointestinal effects; increased risk of cancer
1,1-Dichloroethene	0.007	CPP, CPR, CRL, CUS, ICP, ICL, IHD, ILS, IMW, IPL, IPM, IPU, IRG, ISD, ISF, ISM, ITS, ITT, IUD, MSC	Liver, kidney damage; increased risk of cancer; fetal toxicity
Cis-1, 2-Dichloroethene	0.07	AAP, CAI, CAR, CBS, CCY, CFR, CHG, CHM, CPP, CPR, CPS, CRL, CRY, CSS, CSY, ICP, ICL, IEE, IFM, IHD, ILS, IMI, IMP, IMW, IPL, IPM, IPP, IPU, IRG, ISD, ISF, ISM, ITS, ITT, IUD, IUI, MMF, MMP, MSP, MST	Nervous system disorders; liver, circulatory system damage
Trans-1, 2-Dichloroethene	0.1	AAP, CAI, CAR, CBS, CCY, CFR, CHG, CHM, CPP, CPR, CPS, CRL, CRY, CSS, CSY, IEE, IFM, ICP, ICL, IHD, ILS, IMI, IMP, IMW, IPL, IPM, IPP, IPU, IRG, ISD, ISF, ISM, ITS, ITT, IUD, IUI, MMF, MMP, MSP, MST	Nervous system disorders; liver, circulatory system damage
Dichloromethane	0.005	AAP, APP, ACS, AFI, AFN, AHC, AHF, ASC, ASG, ASP, CAI, CAR, CBS, CBY, CCE, CCY, CFC, CFR, CHN, CHW, CHM, CPP, CPR, CPS, CRY, CRL, CSS, CUS, CVS, ICC, ICE, ICP, ICL, IEE, IFM, IHD, ILS, IMI, IMP, IMW, IPL, IPM, IPP, IPU, IRG, ISD, ISF, ISM, IST, ITS, ITT, IUD, MHM, MMF, MMP, MSC, MSP, MSW	Nervous system, liver, blood damage; increased risk of cancer

Name of Contaminant	MCL *	Potential Contaminant Source (by Contaminant Code)***	Health Effects
1,2-Dichloropropane	0.1	ACS, AFI, AFN, AHC, AHF, ASC, ASG, ASP, CAW, CPP, CPR, CRL, CUS, ICL, ICP, IHD, ILS, IPM, IPP, IRG, ISD, ISF, ISM, ITT, IUD, IUI, MLF, MSP	Liver, kidney, adrenal glands, bladder, gastrointestinal tract, respiratory tract damage; increased risk of cancer
Ethylbenzene	0.1	CAI, CFR, CHM, CRL, CUS, ICC, ICP, ICL, IEE, IFM, IHD, ILS, IMI, IMP, IMW, IPL, IPM, IPP, IRG, ISD, ISF, ISM, ITS, ITT, IUD, IUI, MSC, MSP	Eye, liver, kidney, central nervous system damage; respiratory irritation
Chlorobenzene	0.005	CAR, CBS, CDC, CHW, CHM, CPP, CPR, CRL, CUS, ICP, ICL, IEE, IHD, ILS, IMI, IMP, IMW, IPL, IPP, IPU, IRG, ISD, ISF, ITS, ITT, IUD, IUI, MMF, MSC, MSP	Liver, kidney, central nervous system damage
Styrene	1	CHM, CPP, CPR, CRL, CUS, ICC, ICP, ICL, IEE, IHD, ILS, IMI, IMP, IMW, IPL, IPM, IPP, IRG, ISD, ISF, ISM, ITS, ITT, IUD, IUI, MSP	Liver, kidney, circulatory problems; nerve damage; increased risk of cancer
Tetrachloroethene	0.005	AAP, APP, CAI, CAR, CBS, CCY, CDC, CHM, CHN, CHW, CPP, CPR, CRL, CRY, CSS, CSY, CUS, CVS, ICC, ICL, ICP, IEE, IHD, ILS, IMI, IMO, IMP, IMW, IPL, IPM, IPP, IPU, IRG, ISD, ISF, ISM, ITS, ITT, IUD, IUI, MMF, MMP, MSC, MSP, MWP	Liver, kidney, circulatory problems; nerve damage; increased risk of cancer
Toluene	1	AAP, APP, CFR, CHW, CHM, CHN, CPP, CPR, CRL, CUS, CVS, ICC, ICP, ICL, IEE, IFM, IHD, ILS, IMI, IMP, IMW, IPL, IPM, IPP, IPU, IRG, ISD, ISF, ISM, ITS, ITT, IUD, MMF, MSC, MSP, MWP	Nervous system, liver, kidney damage
1,2,4-Trichlorobenzene	0.07	CRL, CUS, ICL, ICP, IHD, ILS, IPM, IPP, IRG, ISD, ISF, ISM, ITS, IUD	Liver, kidney, adrenal gland changes
1,1,1-Trichloroethane	0.2	AAP, APP, CAR, CAI, CBS, CBY, CCY, CDC, CFR, CHM, CHN, CHW, CPP, CPR, CRL, CUS, CVS, ICP, ICL, IEE, IFM, IHD, IHM, ILS, IMI, IMO, IMP, IMW, IPM, IPP, IRG, ISD, ISF, ISM, ITS, ITT, IUD, MHM, MMF, MMP, MSC, MSP, MWP	Liver, nervous system, circulatory problems
1,1,2-Trichloroethane	0.005	AAP, CDC, CPP, CPR, CRL, CUS, ICP, ICL, IEE, IFW, IHD, ILS, IMI, IMP, IMW, IPL, IPP, IRG, ISD, ISF, ITS, IUD, MSP	Liver, kidney, gastrointestinal tract, immune system problems; lung damage; increased risk of cancer
Trichloroethene	0.005	AAP, AFM, APP, CAI, CAR, CBS, CBY, CFR, CHG, CHM, CHW, CPP, CPR, CRL, CRY, CSY, CUS, ICE, ICL, ICP, IEE, IFM, IHD, ILS, IMI, IMP, IMW, IPL, IPM, IPP, IPU, IRG, ISD, ISF, ISM, ITS, ITT, IUD, IUI, MHM, MMF, MMP, MSC, MSP	Liver damage; increased risk of cancer

Name of Contaminant	MCL *	Potential Contaminant Source (by Contaminant Code)***	Health Effects
Vinyl Chloride	0.002	CRL, ICP, ICL, IEE, IHD, IMI, IMP, IMW, IPL, IPP, IRG, ISF, IST, ITT, IUD,	Liver, nervous system damage; increased risk of cancer
Xylenes (Total)	10	AAP, APP, ASC, CAI, CAR, CBS, CBY, CCY, CFR, CHM, CHN, CHW, CPP, CPR, CPS, CRL, CUS, CVS, IAS, ICC, ICL, ICP, IEE, IFM, IHD, ILS, IMI, IMP, IMW, IPL, IPM, IPP, IPU, IRG, ISD, ISF, ISM, IST, ITT, IUD, MHM, MMF, MSC, MSP	Central nervous system, liver, kidney damage
SYNTHETIC ORGANIC CHEMICALS: PESTICIDES			
Alachlor	0.002	ACS, ADC, AFI, AFN, AHC, ARL, ASC, ASP, CCE, CCG, CGC, CHW, CRL, CRY, CUS, ICL, ICP, IHD, ILS, IPP, IRG, ISD, ISF, ITS, ITT, IUD, IUI, IUR, MHM, MHR, MMF, MPR, MSC, MSD, MSP	Eye, skin irritation; liver, kidney, spleen, nose, eye damage; increased risk of cancer
Aldicarb	0.003	ACS, ADC, AFI, AFN, AHC, ASC, ASP, CAW, CGC, CHW, CRL, CUS, ICL, ICP, IHD, ILS, IPP, IRG, ISD, ISF, ITS, ITT, IUD, MPR, MPW, MSC, MSP	Gastrointestinal, central nervous system, eye problems
Aldicarb Sulfone	0.003	ACS, ADC, AFI, AFN, AHC, ASC, ASP, CAW, CGC, CHW, CRL, CUS, ICL, ICP, IHD, ILS, IPP, IRG, ISD, ISF, ITS, ITT, IUD, MPR, MPW, MSC, MSP	Gastrointestinal, central nervous system, eye problems
Aldicarb Sulfoxide	0.003	ACS, ADC, AFI, AFN, AHC, ASC, ASP, CAW, CGC, CHW, CRL, CUS, ICL, ICP, IHD, ILS, IPP, IRG, ISD, ISF, ITS, ITT, IUD, MPR, MPW, MSC, MSP	Gastrointestinal, central nervous system, eye problems
Atrazine	0.003	ACS, ADC, AFI, AFN, AHC, ARL, ASC, ASP, CAI, CAW, CCG, CCE, CFC, CGC, CHW, CRL, CRY, CUS, ICL, ICP, IHD, ILS, IPP, IPU, IRG, ISD, ISF, ITS, ITT, IUD, IUI, IUR, MHD, MHM, MLF, MMF, MPR, MPW, MSC, MSD, MSP, RMS	Cardiovascular system, kidney, adrenal gland damage; increased risk of cancer
Carbofuran	0.04	ACS, ADC, AFI, AFN, AHC, ASC, ASP, CAI, CAW, CCE, CCG, CGC, CHW, CPL, CRL, CST, CUS, ICL, ICP, IHD, ILS, IPP, IPU, IRG, ISD, ISF, ITS, ITT, IUD, IUI, IUR, MHR, MLF, MMF, MPR, MSC, MSD, MSP, RMS	Central nervous system, reproductive system damage
Chlordane	0.002	ACS, ADC, AFI, AFN, AHC, ASC, ASP, CAI, CAW, CBY, CCY, CRL, CST, CUS, ICP, ICL, IHD, ILS, IPP, IPU, IRG, ISD, ISF, ITS, ITT, IUD, IUR, MHM, MLF, MMF, MPR, MRF, MSC, MSD, MSP, RMS	Central nervous system, blood disorders; liver, kidney, heart, lung, spleen, adrenal gland damage; increased risk of cancer

Name of Contaminant	MCL *	Potential Contaminant Source (by Contaminant Code)***	Health Effects
2, 4-Dichlorophenoxyacetic acid (2,4-D)	0.07	ACS, ADC, AFI, AFN, AHC, ARL, ASC, ASP, CAI, CAW, CCE, CCG, CCY, CGC, CHW, CRL, CRY, CST, CUS, ICL, ICP, IHD, ILS, IPP, IPU, IRG, ISD, ISF, ITS, ITT, IUD, IUR, MHM, MHR, MLF, MMF, MPR, MPW, MSC, MSD, MSP	Nervous system, kidney, liver damage
Dalapon	0.2	ACS, ADC, AFI, AFN, AHC, ARL, ASC, ASP, CAI, CAW, CCE, CCG, CCY, CGC, CHW, CRL, CRY, CSY, CUS, ICL, ICP, IHD, ILS, IPP, IPU, IRG, ISD, ISF, ITS, ITT, IUD, IUI, IUR, MHD, MHM, MHR, MLF, MMF, MPR, MPW, MSC, MSD, MSP, RMS	Kidney changes
Dibromochloropropane	0.0002	ACS, ADC, AFI, AFN, AHC, ASC, ASP, CAI, CAW, CCE, CGC, CHW, CRL, CUS, ICL, ICP, IHD, ILS, IPP, IPU, IRG, ISD, ISF, ITS, ITT, IUD, IUR, MHM, MMF, MSC, MSD, MSP	Kidney, liver, reproductive system damage; increased risk of cancer
Dinoseb	0.007	ACS, ADC, AFI, AFN, AHC, ARL, ASC, ASP, CHW, CRL, ICL, ICP, IHD, IRG, ISD, ISF, ITT, IUD	Reproductive system problems
Diquat	0.02	ACS, ADC, AFI, AFN, AHC, AHF, ARL, ASC, ASG, ASP, CAW, CGC, CRL, CUS, ICL, ICP, IHD, ILS, IPP, IPU, ISD, ISF, ITS, ITT, IUD, IUR, MHM, MMF, MPW, MSD, MSP	Cataracts
Endothall	0.1	ACS, ADC, AFI, AFN, AHC, AHF, ARL, ASC, ASG, ASP, CAI, CAW, CBY, CCE, CCG, CCY, CGC, CHW, CPL, CRL, CRY, CST, CUS, ICL, ICP, IHD, ILS, IPP, IPU, IRG, ISD, ISF, ITS, ITT, IUD, IUR, MHM, MHR, MLF, MMF, MPR, MPW, MSC, MSD, MSP	Stomach, intestinal problems
Endrin	0.002	ACS, ADC, AFI, AFN, AHC, AHF, ARL, ASC, ASG, ASP, CAW, CRL, CRV, CRY, CST, CUS, ICL, ICP, IHD, ILS, IPP, IPU, IRG, ISD, ISF, ITS, ITT, IUD, IUR, MHM, MMF	Central nervous system problems; liver damage
Ethylene Dibromide (EDB)	0.00005	ACS, ADC, AHC, APP, ASC, ASG, ASP, CAI, CAW, CFR, CHW, CPP, CPR, CPS, CRL, CUS, ICL, ICP, IFM, IHD, ILS, IPL, IPP, IRG, ISD, ISF, ITS, ITT, IUD, MMF, MSP	Liver, stomach, adrenal gland, reproductive system, respiratory, nervous system, heart, kidney damage; increased risk of cancer
Glyphosate	0.7	ACS, ADC, AFI, AFN, AHC, AHF, ARL, ASC, ASP, CAI, CAW, CCE, CCG, CCY, CGC, CHW, CPL, CRL, CRY, CUS, ICL, ICP, IHD, ILS, IPP, IPU, IRG, ISD, ISF, ITS, IUD, IUI, IUR, MHM, MHR, MLF, MMF, MPR, MPW, MSC, MSD, MSP, RMS	Respiratory problems; kidney, reproductive system damage
Heptachlor	0.0004	CAI, CCY, CGC, CPL, CRL, CRV, CRY, ICE, ICL, ICP, IHD, IPP, IPU, ISF, ITT, IUD, IUR, MHM, MMF, MSC	Central nervous system, liver damage; increased risk of cancer

Name of Contaminant	MCL *	Potential Contaminant Source (by Contaminant Code)***	Health Effects
Heptachlor Epoxide	0.0002	CAI, CCY, CGC, CPL, CRL, CRV, CRY, ICE, ICL, ICP, IHD, IPP, IPU, ISF, ITT, IUD, IUR, MHM, MMF, MSC	Central nervous system, liver damage; increased risk of cancer
Hexachlorobenzene	0.001	ACS, ADC, ASC, ASG, ASP, CPP, CPR, CRL, CUS, ICL, ICP, IHD, ILS, IMW, IPL, IPP, IRG, ISF, ITS, ITT, IUD, MMF	Skin lesions; nerve, liver, kidney damage; reproductive system problems; endocrine gland tumors; increased risk of cancer
Hexachlorocyclopentadiene	0.05	CRL, CUS, ICL, ICP, IHD, ILS, IPL, IPP, IRG, ISF, ITS, ITT, IUD	Gastrointestinal problems; liver, kidney, heart damage
Lindane	0.0002	ACS, ADC, ADF, AFI, AFL, AFN, AHC, ARL, ASC, ASP, CCY, CHW, CPP, CPR, CRL, CVS, ICL, ICP, IHD, IPM, IPP, IRG, ISF, ISM, ITS, ITT, IUD, MHM, MMF, MSC, MSP	Liver, kidney damage; pulmonary problems
Methoxychlor	0.04	ACS, ADC, ADF, AFI, AFL, AFN, AHC, AHF, ASC, ASG, ASH, ASP, ASW, CBY, CCG, CGC, CHW, CRL, CUS, ICL, ICP, IHD, ILS, IPP, IPU, IRG, ISD, ISF, ITS, ITT, IUD, IUR, MHD, MHR, MMF, MPR, MSC, MSD	Central nervous system, gastrointestinal tract problems; liver, kidney, heart damage
Oxamyl (Vydate)	0.2	ACS, ADC, AFI, AFN, AHC, ASC, ASP, CAW, CCE, CGC, CHW, CRL, ICL, ICP, IHD, IPP, IPU, IRG, ISD, ISF, ITS, ITT, IUD, IUI, IUR, MHM, MLF, MMF, MSC, MSP	Central nervous system problems
Pentachlorophenol	0.001	ACS, ADC, AFI, AFN, AHC, ASC, ASP, CBY, CCY, CFR, CHW, CRL, CRY, ICL, ICP, IFM, IHD, IPM, IPP, IPU, IRG, ISF, ISM, ITT, IUD, MHM, MLF, MMF	Central nervous system damage, liver, kidney, reproductive system damage; increased risk of cancer
Picloram	0.5	ACS, ADC, AFI, AFN, AHC, ARL, ASC, ASP, CAI, CAW, CCE, CCG, CCY, CGC, CHW, CPL, CRL, CRY, ICL, ICP, IHD, IPP, IPU, IRG, ISD, ISF, ITS, ITT, IUD, IUI, IUR, MHD, MHM, MHR, MLF, MMF, MPR, MSC, MSD, MSP, RMS	Central nervous system, liver damage
Simazine	0.004	ACS, ADC, AFI, AFN, AHC, ARL, ASC, ASP, CAI, CAW, CBY, CCG, CCE, CCY, CGC, CHW, CPL, CRL, CRY, CSY, ICL, ICP, IHD, IPP, IPU, IRG, ISD, ISF, ITS, ITT, IUD, IUI, IUR, MHD, MHM, MHR, MLF, MMF, MPR, MPW, MSC, MSD, MSP	Reproductive system, blood, kidney, liver, thyroid damage; gene mutation; increased risk of cancer
2,3,7,8-TCDD (Dioxin)	3x10 ⁻⁸	CAI, CRL, ICL, ICP, IEE, IHD, IPP, IPU, ISF, IUD, IUR, MIN, MMF, MSW	Reproductive system problems; birth defects; increased risk of cancer

Name of Contaminant	MCL *	Potential Contaminant Source (by Contaminant Code)***	Health Effects
Toxaphene	0.003	ACS, ADC, AFI, AFL, AFN, APF, ARL, ASC, ASP, CRL, ICL, ICP, IHD, IPP, ISF, IUD	Central nervous system, thyroid problems; liver, kidney degeneration; increased risk of cancer
2,4,5-TP (Silvex)	0.05	ACS, ADC, ARL, ASC, ASP, CBY, CCE, CGC, CRL, CRY, ICL, ICP, IHD, IPP, IPU, ISF, ITT, IUD, IUR, MHM, MLF, MMF	Liver, kidney damage; central nervous system problems
Benzo (a) pyrene	0.0002	AFM, CAI, CAR, CBS, CCY, CFC, CRL, CRY, IAS, ICC, ICL, ICP, IFW, IHD, IMI, IMP, IPL, IPP, IPU, IRG, ISF, IST, ITT, MFS, MHM, MIN, MLF, MMF, MMP, MSC	Anemia; immune system depression; reproductive, developmental problems; increased risk of cancer
Di (2-ethylhexyl) adipate	0.4	AAP, CAI, CAR, CBY, CCY, CHW, CPS, CRL, CST, ICL, ICP, IHD, IMI, IMP, IMW, IPL, IPP, IPU, IRG, ISF, ITS, ITT, IUD, MIN, MLF, MMF, MMP, MSL, MSP, MSS, MST	Liver, reproductive system damage; increased risk of cancer
Di (2-ethylhexyl) phthalate	0.006	AAP, APP, CHM, CHW, CPP, CPR, CRL, CSY, ICE, ICL, ICP, IEE, IHD, IMP, IMW, IPL, IPP, IRG, ISF, IST, ITT, IUD, MHM, MIN, MLF, MMF, MRF, MSW	Liver, reproductive system damage; increased risk of cancer
Polychlorinated Biphenyls (PCB's)	0.0005	ACS, ASC, CAI, CCY, CHM, CRL, CRY, CST, CSY, ICL, ICP, IEE, IHD, IMI, IMP, IMW, IPL, IPM, IPP, IPU, IRG, ISF, ISM, ITS, IUD, IUR, MHM, MIN, MLF, MMF, MSS, MST, MSW	Skin problems, thymus gland, reproductive system, immune system problems; liver function changes; increased risk of cancer
INORGANIC CHEMICALS			
Antimony	0.006	CRL, CSY, ICL, ICP, IEE, IFW, IHD, IMI, IMP, IPL, IPP, IRG, ISF, IST, IUD, MIN, MLF, MSW	Blood changes; increased risk of cancer
Arsenic	0.05	AAP, ACS, ADC, AFI, AFN, AHC, APP, ASC, ASP, CAI, CAR, CBS, CCE, CCY, CFC, CGC, CHM, CHN, CPP, CPR, CRL, CRV, CSY, CVS, ICL, ICP, IEE, IHD, IMI, IMP, IMW, IPM, IPP, IRG, ISF, ISM, IUD, IPU, MLF, MMF, MSC, MSW	Skin damage; circulatory problems; increased risk of cancer
Asbestos	7 MLF (million fibers/Liter)	CAI, CAR, CBS, CBY, CCY, CHM, CHN, CHW, CRL, CRV, CRY, CSY, ICC, ICL, ICP, IHD, IHM, IMI, IMO, IMW, IPU, IRG, ISF, IST, ITT, IUD, MHD, MHM, MIN, MLF, MMF, MMP, MSC, MSW, MWP	Lung disease, increased risk of cancer

Name of Contaminant	MCL *	Potential Contaminant Source (by Contaminant Code)***	Health Effects
Barium	2	CAI, CAR, CAW, CBS, CCY, CFR, CHM, CHN, CHW, CPP, CPR, CRL, CRV, CRY, CSY, CVS, ICC, ICL, ICP, IEE, IFW, IFM, IGO, IHD, IHM, IMI, IPL, IPM, IPP, IPU, IRG, ISF, ISM, IST, ITT, IUD, IUI, IUR, MHM, MIN, MLF, MMF, MMP, MSC, MSW	Gastrointestinal problems; high blood pressure
Beryllium	0.004	CRL, CSY, ICL, ICP, IEE, IFW, IHD, IHM, IMI, IMO, IMP, IMW, IPP, IPU, IRG, IRW, ISF, IST, IUD, MIN, MLF, MMF, MSW	Lung, bone damage; increased risk of cancer
Cadmium	0.005	AAP, APP, CAI, CAR, CBS, CBY, CCY, CHG, CHM, CHW, CPP, CPR, CPS, CRL, CRY, CSS, CSY, ICC, ICE, ICL, ICP, IEE, IFW, IHD, IHM, IMI, IMO, IMP, IMW, IPL, IPM, IPP, IPU, IRG, ISF, ISM, IST, ITT, IUD, IUR, MHM, MIN, MLF, MMF, MMP, MSC, MSP, MSS, MST, MSW, MWP	Gastrointestinal problems; kidney, liver, bone, blood damage
Chromium	0.1	CPP, CPR, CRL, CSY, ICC, ICL, ICP, IEE, IFW, IHD, IHM, IMI, IMO, IMP, IMW, IPP, IPU, IRG, ISF, IST, ITS, ITT, IUD, MIN, MLF, MMF, MPW, MSC, MSP, MSS, MST	Skin problems; liver, kidney, circulatory, nerve damage.
Copper	1.3 TT** Action Level	AAP, ACS, ADC, AHC, APF, APP, ASC, ASP, CAR, CBS, CCY, CHM, CHN, CHW, CPP, CPR, CRL, CRY, CST, CSY, CVS, ICL, ICP, IEE, IFM, IFW, IHD, IHM, IMI, IMO, IMP, IMW, IPL, IPM, IPP, IPU, IRG, ISF, ISM, IST, ITS, ITT, IUD, MIN, MLF, MMF, MSP, MSS, MST, MSW	Gastrointestinal problems; liver, kidney damage; anemia
Cyanide	0.2	ACS, ADC, AFI, AFN, AHC, ASC, ASP, CCY, CHN, CHW, CPP, CPR, CPS, CRL, CST, CUS, CVS, ICL, ICP, IEE, IFW, IHD, ILS, IMI, IMP, IMW, IPL, IPM, IPP, IPU, IRG, ISD, ISF, ISM, IST, ITS, ITT, IUD, MHM, MLF, MMF, MPW, MSC, MSS, MST	Thyroid problems; nerve damage
Fluoride	4	ACS, ADC, ASC, ASF, CCY, ICC, ICL, ICP, IFW, IHM, IMI, IMO, IMP, IST, IUD, MWP	Tooth mottling; bone disease
Lead	0.015 TT**	CAI, CAR, CBS, CBY, CCY, CFR, CHG, CHM, CHN, CHW, CPP, CPR, CPS, CRL, CRY, CSY, ICC, ICL, ICP, IEE, IFM, IFW, IHD, IHM, IMI, IMO, IMP, IMW, IPL, IPM, IPP, IPU, IRG, ISF, ISM, IST, ITS, ITT, IUD, IUR, MHD, MHM, MIN, MLF, MMF, MMP, MRF, MSC, MSP, MSS, MST, MSW, MWP, RMS	Blood, neurological development problems; kidney disease; stroke; increased risk of cancer
Mercury	0.002	AAP, ACS, ADC, AFI, AFN, AHC, APP, ASC, ASP, CAI, CAR, CBS, CBY, CCY, CFR, CHM, CHN, CHW, CPP, CPR, CRL, CRV, CRY, CST, CSY, CUS, CVS, ICE, ICL, ICP, IEE, IFM, IFW, IHD, IHM, ILS, IMI, IMO, IMP, IMW, IPL, IPM, IPP, IPU, IRG, ISF, ISM, IST, ITS, ITT, IUD, IUR, MHM, MIN, MLF, MMF, MPW, MRF, MSC, MSP, MSS, MST, MSW	Kidney damage
Nickel	0.1	CAI, CAR, CBS, CBY, CCY, CPP, CPR, CRL, CST, CSY, CUS, ICE, ICL, ICP, IEE, IFW, IHD, IHM, ILS, IMI, IMO, IMP, IMW, IPL, IPM, IPP, IPU, IRG, ISF, IST, ITS, ITT, IUD, MHM, MIN, MLF, MMF, MMP, MPW, MRF, MSC, MSP, MSS, MST, MSW	Gastrointestinal irritation; nerve, liver, kidney, reproductive system damage

Name of Contaminant	MCL *	Potential Contaminant Source (by Contaminant Code)***	Health Effects
Nitrate	10	AAP, ACS, ADC, ADF, AFI, AFL, AFN, AHC, AMA, AMS, AOA, APF, APP, ARL, ASC, ASF, ASH, ASW, CAI, CAW, CBB, CBY, CCE, CCG, CCW, CCY, CFC, CGC, CHG, CHN, CPL, CPP, CPR, CRL, CST, CVS, ICL, ICP, IHD, IHM, IMI, IMO, IMP, IMW, IPL, IPM, IPP, IPU, ISD, ISF, ISM, ITS, ITT, IUD, IUR, MHD, MHM, MLF, MMF, MPR, MPS, MPW, MSC, MSD, MSL, MSP, MSS, MST, MSW, MWP, RMS	Methemoglobinemia; spleen damage
Nitrite	1	AAP, ACS, ADC, ADF, AFI, AFL, AFN, AHC, AMA, AMS, AOA, APF, APP, ARL, ASC, ASF, ASH, ASW, CAI, CAW, CBB, CBY, CCG, CCE, CCW, CCY, CFC, CGC, CHG, CHN, CPL, CPP, CPR, CRL, CST, CVS, ICL, ICP, IHD, IHM, IMI, IMO, IMP, IMW, IPL, IPM, IPP, IPU, ISD, ISF, ISM, ITS, ITT, IUD, IUR, MHD, MHM, MLF, MMF, MPR, MPS, MPW, MSC, MSD, MSL, MSP, MSS, MST, MSW, MWP, RMS	Methemoglobinemia; spleen damage
Selenium	0.05	ADC, AFI, AFN, ARL, CPP, CPR, CRL, ICC, ICL, ICP, IEE, IFW, IHD, IHM, IMI, IMO, IMP, IMW, IPL, IPM, IPP, IPU, IRG, ISF, IST, IUD, MHM, MIN, MLF, MMF, MPW, MSC, MSS, MST, MSW	Peripheral nervous system, kidney, liver, circulatory system damage
Thallium	0.002	CHN, CPP, CRL, ICC, ICE, ICL, ICP, IEE, IFW, IHD, IHM, IMI, IMO, IMP, IPL, IPP, IPU, IRG, ISF, IUD, IUR, MIN, MLF, MMF, MSS, MST, MSW	Blood chemistry changes; nerve, liver, kidney, intestinal, reproductive system damage
RADIONUCLIDES			
Beta Particles and Photon Emitters	4 Millirems per year	CAW, CHN, CRL, IGO, IHM, IMO, IRG, IRW, ISF, MMF, MWP	Increased risk of cancer
Gross Alpha Particle Activity	15 Picocuries per Liter	CAW, CHN, CRL, IGO, IHM, IMO, IRG, IRW, ISF, MMF, MWP	Increased risk of cancer
Radium 226 and Radium 228 (Combined)	5 Picocuries per year	CAW, CHN, CRL, IGO, IHM, IMO, IRG, IRW, ISF, MMF, MWP	Increased risk of cancer
MICROBIOLOGICAL (Pathogenic organisms)			
Cryptosporidium parvum		AAP, ADC, ADF, AFL, AMA, AMS, AOA, APF, APP, ARL, ASH, ASW, CAW, CBY, CCG, CFC, CHN, CPL, CRV, CSS, CST, CVS, ISD, ITS, IUI, IUR, MHD, MHR, MMF, MPR, MPS, MPW, MSC, MSD, MSL, MSP, MSS, MST, MWP, RMS	Cryptosporidiosis (a gastroenteric disease)
Giardia lamblia	TT**	AAP, ADC, ADF, AFL, AMA, AMS, AOA, APF, APP, ARL, ASH, ASW, CAW, CBY, CCG, CFC, CHN, CPL, CRV, CSS, CST, CVS, ISD, ITS, IUI, IUR, MHD, MHR, MMF, MPR, MPS, MPW, MSC, MSD, MSL, MSP, MSS, MST, MWP, RMS	Giardiasis (a gastroenteric disease)

Name of Contaminant	MCL *	Potential Contaminant Source (by Contaminant Code)***	Health Effects
Legionella sp.	TT**	ADC, CBY, ITS, MPW, MSD, MSP, MWP	Legionnaire's Disease; pneumonia
Total Coliforms (Including	5 Percent (See NOTE 1)	AAP, ADC, ADF, AFL, AMA, AMS, AOA, APF, APP, ARL, ASH, ASW, CAW, CBY, CCG, CFC, CHN, CPL, CRV, CSS, CST, CVS, ISD, ITS, IUI, IUR, MHD, MHR, MMF, MPR, MPS, MPW, MSC, MSD, MSL, MSP, MSS, MST, MWP, RMS	Used as an indicator that other potentially harmful bacteria may be present (see NOTE 2)
Fecal Coliform & E. coli)			
Turbidity	TT**	ADC, CBY, CCG, CCW, CCY, CGC, CPL, CRV, CRY, ICC, IHD, IHM, IMO, IPM, IUD, IUR, MHD, MHM, MHR, MIN, MLF, MMF, MPR, MPW, MRF, MSC, MSD, MSL, MSP, MSS, MST, MSW, RMS	Turbidity has no health effects but can interfere with disinfection and provide a medium for bacterial growth. It may indicate the presence of microbes
Viruses (Enteric)	TT**	AAP, ADC, ADF, AFL, AMA, AMS, AOA, APF, APP, ARL, ASH, ASW, CAW, CBY, CCG, CFC, CHN, CPL, CRV, CSS, CST, CVS, ISD, ITS, IUI, IUR, MHD, MHR, MMF, MPR, MPS, MPW, MSC, MSD, MSL, MSP, MSS, MST, MWP, RMS	Gastroenteric disease

Conservative Values were used to complete the DRASTIC Index under the Sensitivity Analysis when adequate and/or complete information was not available (one or more of the conservative values may have been used):

1. Where $\text{DRASTIC Index} = D_R \times D_W + R_R \times R_W + A_R \times A_W + S_R \times S_W + T_R \times T_W + I_R \times I_W + C_R \times C_W$

- D (depth to ground water) – Use 10 ($10 \times 5[\text{weight}] = 50$)
- R (recharge) - If the well is near a stream bed or is receiving mountain front recharge, use 9 ($9 \times 4[\text{weight}] = 36$) as the “Most conservative”. Otherwise use 6 ($6 \times 4[\text{weight}] = 24$)
- A (aquifer media) – Use 10 ($10 \times 3[\text{weight}] = 30$)
- S (soil media) – Use 10 ($10 \times 2[\text{weight}] = 20$)
- T (Topography/slope) – Use 10 ($10 \times 1[\text{weight}] = 10$)
- I (Impacts of the Vadose Zone) – If the well is in a limestone area, use 10 ($10 \times 5[\text{weight}] = 50$). If the well is not in a limestone area, use 8 ($8 \times 5[\text{weight}] = 40$).
- C (Hydraulic Conductivity) – Use 10 ($10 \times 4[\text{weight}] = 40$)

The equation:

$\text{DRASTIC (conservative)} = (10 \times 5) + (9 \times 4) + (10 \times 3) + (10 \times 2) + (10 \times 1) + (10 \times 5) + (10 \times 4) = 236$
(If the lower values for R and I are used the result will be 214. Both of these results fall in the “High” range).

The Pesticide Index equation was used when calculating a DRASTIC Index for a well located in an area where crops and/or orchards were the predominant land use or when pesticide use was known.

2. Where $\text{DRASTIC Pesticide Index} = D_R \times D_W + R_R \times R_W + A_R \times A_W + S_R \times S_W + T_R \times T_W + I_R \times I_W + C_R \times C_W$

- D (depth to ground water) – Use 10 ($10 \times 5[\text{weight}] = 50$)
- R (recharge) - If the well is near a stream bed or is receiving mountain front recharge, use 9 ($9 \times 4[\text{weight}] = 36$) as the “Most conservative”. Otherwise use 6 ($6 \times 4[\text{weight}] = 24$)
- A (aquifer media) – Use 10 ($10 \times 3[\text{weight}] = 30$)
- S (soil media) – Use 10 ($10 \times 5[\text{weight}] = 50$)
- T (Topography/slope) – Use 10 ($10 \times 3[\text{weight}] = 30$)
- I (Impacts of the Vadose Zone) – If the well is in a limestone area, use 10 ($10 \times 4[\text{weight}] = 40$). If the well is not in a limestone area, use 8 ($8 \times 4[\text{weight}] = 32$)
- C (Hydraulic Conductivity) – Use 10 ($10 \times 4[\text{weight}] = 40$)

The equation:

$(10 \times 5) + (9 \times 4) + (10 \times 3) + (10 \times 5) + (10 \times 3) + (10 \times 4) + (10 \times 4) = 276$
(If the lower values for R and I are used the result will be 260. Both of these results fall in the “High” range).

If a screened interval is needed the conservative value used was <100 feet.

ROADS AND RELATED FEATURES

Roads on Provisional edition maps are not classified as primary, secondary, or light duty. They are all symbolized as light duty roads.

Primary highway	
Secondary highway	
Light duty road	
Unimproved road	
Trail	
Dual highway	
Dual highway with median strip	
Road under construction	
Underpass; overpass	
Bridge	
Drawbridge	
Tunnel	

VEGETATION

Woods	
Scrub	
Orchard	
Vineyard	
Mangrove	

CONTOURS

Topographic

Intermediate	
Index	
Supplementary	
Depression	
Cut; fill	

Bathymetric

Intermediate	
Index	
Primary	
Index Primary	
Supplementary	

BUILDINGS AND RELATED FEATURES

Building	
School; church	
Built-up Area	
Racetrack	
Airport	
Landing strip	
Well (other than water); windmill	
Tanks	
Covered reservoir	
Gaging station	
Landmark object (feature as labeled)	
Campground; picnic area	
Cemetery; small; large	

RAILROADS AND RELATED FEATURES

Standard gauge single track; station	
Standard gauge multiple track	
Abandoned	
Under construction	
Narrow gauge single track	
Narrow gauge multiple track	
Railroad in street	
Juxtaposition	
Roundhouse and turntable	

LAND SURVEY SYSTEMS

U.S. Public Land Survey System

Township or range line	
Location doubtful	
Section line	
Location doubtful	
Found section corner; found closing corner	
Witness corner; meander corner	

Other land surveys

Township or range line	
Section line	
Land grant or mining claim; monument	
Fence line	

MINES AND CAVES

Quarry or open pit mine	
Gravel, sand, clay, or borrow pit	
Mine tunnel or cave entrance	
Prospect; mine shaft	
Mine dump	
Tailings	

DARIES

ional	
æ or territorial	
nty or equivalent	
l township or equivalent	
orporated city or equivalent	
k, reservation, or monument	
Small park	

RIVERS, LAKES, AND CANALS

Intermittent stream	
Intermittent river	
Disappearing stream	
Perennial stream	
Perennial river	
Small falls; small rapids	
Large falls; large rapids	
Masonry dam	
Dam with lock	
Dam carrying road	
Perennial lake; Intermittent lake or pond	
Dry lake	
Narrow wash	
Wide wash	
Canal, flume, or aqueduct with lock	
Elevated aqueduct, flume, or conduit	
Aqueduct tunnel	
Well or spring; spring or seep	

Appendix B
Consumer Confidence
Reports



2017 Consumer Confidence Report



We are pleased

to present this year's Annual Water Quality Report (Consumer Confidence Report) as required by the Safe Drinking Water Act (SDWA). This report is designed to provide details about where your water comes from, what it contains, and how it compares to standards set by regulatory agencies. This report is a snapshot of last year's water quality.

We are committed to providing you with information because informed customers are our best allies.



Get Involved In City Water Matters

The City encourages you to get involved in water matters. For more information, please call 505.896.8715 or visit www.rnm.gov.

Where does my water come from?

Rio Rancho's drinking water comes entirely from the Santa Fe Group Aquifer. An aquifer is an underground layer of water-bearing permeable rock or unconsolidated materials (gravel, sand, or silt) from which groundwater can be extracted. This underground water source is not limitless, so conservation of this natural resource is important. The aquifer in our area lies within volcanic rocks and these rocks contain naturally occurring arsenic. As water infiltrates through the rock type, it dissolves some of the arsenic from the rocks.



To ensure that tap water is safe to drink, the Environmental Protection Agency (EPA) prescribes regulations that limit the amount of certain contaminants in water provided by public water systems. The Food and Drug Administration (FDA) regulates bottled water, which must provide the same protection of public health.

Table Of Contents

About Our Drinking Water Inside Front Cover

Get Involved Inside Front Cover

From the Mayor 1

Water Quality Report Definitions 2

EPA Hotline, RR Water Production Phone Number 2

Susceptibility Analysis 3

People With Sensitivities 3

Budget Billing 4

Why Are There Contaminants in my Drinking Water? 5

Test Results 5-7

2019 Calendar Photos Needed 7

Every Drop Counts Award 8

Accurate Meters Vital to Billing 8

Violations 9

Free Landfill Days 10

Special Collections 10

Time to Rethink Recycling 11

Wipes – To Flush or Not to Flush? 11

Rio Rancho Pure 12

2017 Water Use Stats 12

Meet Maria Salida Inside Back Cover

Water Your Trees Inside Back Cover

Mulching Mishap Inside Back Cover



from the **MAYOR**

THE CITY OF RIO RANCHO takes great pride in the quality of

the drinking water provided to its citizens and businesses. The City's Utilities Department regularly tests our drinking water to ensure that the quality is higher than the U.S. Environmental Protection Agency's requirements.

This report gives the citizens of Rio Rancho valuable information about the quality of our drinking water, ideas for water conservation and efficiency, and a look at our 2017 water use.

Please take time to read this informative report, brought to you by your Utilities Department. I encourage your participation, input and feedback, and vision for a healthy water future.

Mayor Gregg Hull



These Definitions are Used in this Water Quality Report

AL: Action Level

The concentration of a contaminant, which, if exceeded, triggers treatment or other requirements that a water system must follow.

LRAA: Locational Running Annual Average

The average of sample analytical results for samples taken at a particular monitoring location during the previous four calendar quarters.

MCL: Maximum Contaminant Level

The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.

MCLG: Maximum Contaminant Level Goal

The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.

MRDL: Maximum Residual Disinfectant Level

The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

MRDLG: Maximum Residual Disinfectant Level Goal

The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

MRL: Minimum Reporting Levels

The smallest measured concentration of a substance that can be reliably measured by using a given analytical method.

N/A: Not applicable.

ND: Not detected.

pCi/L: Picouries per liter

A measure of radioactivity.

ppb: Parts per billion or micrograms per liter

Approximately equal to 3 seconds out of a century.

ppm: Parts per million or milligrams per liter

Approximately equal to 32 seconds out of a year.

RAA: Running Annual Average

The level detected is the highest running annual average, computed quarterly, of monthly averages of all samples collected.

Range of detection:

Highest and lowest levels of a substance found in treated drinking water.



**U.S. Environmental
Protection Agency (EPA)
Safe Drinking Water Hotline:
800.426.4791**

**Rio Rancho Water Production:
505.896.8812**

**Source Water Protection Program:
www.rnm.gov/38861/
Source-Water-Protection-Program**





Susceptibility Analysis

The Susceptibility Analysis of the Rio Rancho Water Utilities reveals that the utility is well maintained and operated, and the sources of drinking water are generally protected from potential sources of contamination. The susceptibility rank of the entire water system is MODERATELY LOW, which is a good rating.

Call New Mexico Environment Department at 877.654.8720 if you have questions.

Do I Need To Take Special Precautions?

Some people may be more vulnerable to contaminants in drinking water than the general population.

Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/ AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers.

EPA/Centers for Disease Control (CDC) guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the Safe Water Drinking Hotline at 800.426.4791.





Avoid Seasonal Billing Ups and Downs with Budget Billing

Budget Billing is a free service that helps customers avoid fluctuations in their utilities bills by evenly distributing utilities costs over a 12-month period. The budget payment amount is based on your average utilities usage over a 12-month period.

Accounts set up on budget billing are evaluated and settled once a year in August. Bills may fluctuate due to usage and updated estimates of utilities cost.

In the event an account becomes delinquent, the account will automatically be removed from Budget Billing and any deferred balance will be added to the next month's statement. Customers may discontinue Budget Billing at any time.

Eligibility

To be eligible for Budget Billing:

- 1) your account must be current, and
- 2) you must have a 12-month billing history.

To find out more about the program, determine eligibility, or to sign up for this option, please call **505.891.5020** or email utilitycustomerservice@rrnm.gov



Why Are There Contaminants in my Drinking Water?

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the EPA's Safe Drinking Water Hotline at **800.426.4791**.

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over land or through the ground, it dissolves naturally occurring minerals and, in some cases, can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in source water before treatment include:

- **MICROBIAL CONTAMINANTS**, such as viruses and bacteria, which may come from wildlife, septic systems, sewage treatment plants, and agricultural livestock operations.
- **INORGANIC CONTAMINANTS**, such as salts and metals, which can be naturally-occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges.
- **PESTICIDES & HERBICIDES**, which may come from a variety of sources such as

Substance	MCL	MCLG	Our Water	Range of Detection	Sample Year	Violation	Typical Source of Contamination
Alpha emitters (pCi/L)	15	0	2	ND-2	2017	No	Erosion of natural deposits
Radium (combined 226/228) (pCi/L)	5	0	0.34	0.01-0.34	2017	No	Erosion of natural deposits
Beta/ photon emitters (pCi/L)	50*	0	7	2-7	2017	No	Decay of natural and man-made deposits. *The EPA considers 50 pCi/L to be the level of concern for Beta particles.
Uranium (ppb)	30	0	9	1-9	2017	No	Erosion of natural deposits

Substance	MCL or MRDC	MCLG or MRDCG	Our Water	Range of Detection	Sample Year	Violation	Typical Source of Contamination
TTHMs* (ppb)	80	N/A	10 (LRAA)	ND-17	2017	No	By-product of drinking water disinfection
HAA5* (ppb)	60	N/A	6 (LRAA)	ND-19	2017	No	By-product of drinking water chlorination
Chlorine (as Cl ₂) (ppm)	4	4	1.0 (RAA)	0.05-1.4	2017	No	Water additive used to control microbes

*TTHMs: Total Trihalomethanes; HAA5: Haloacetic acids

agriculture, urban stormwater runoff, and residential use.

- **RADIOACTIVE CONTAMINANTS**, which are naturally occurring.
- **ORGANIC CHEMICAL CONTAMINANTS**, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and can also come from gas

stations, urban stormwater runoff, and septic systems.

EPA/Centers for Disease Control (CDC) guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the Safe Water Drinking Hotline at 800.426.4791.

ARSENIC

While your drinking water meets EPA's standard for arsenic, it does contain low levels of arsenic. EPA's standard balances the current understanding of arsenic's possible health effects against the cost of removing arsenic from drinking water. EPA continues to research the health effects of low levels of arsenic, which is a mineral known to cause cancer in humans at high concentrations and is linked to other health effects such as skin damage and circulatory problems.

LEAD/COPPER

Every three years, the City is required to test for lead and copper from the tap in homes of a certain age range.

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with metal service lines and home plumbing. The Rio Rancho Utilities Department is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking.

Substance	MCL	MCLG	Our Water	Range of Detection	Sample Year	Violation	Typical Source of Contamination
Arsenic (ppb)	10	0	10	4-10	2017	No	Erosion of natural deposits

Substance	Action Level (AL)	MCLG	Our Water	Number of Sites Exceeding AL	Sample Year	Violation	Typical Source of Contamination
Copper - AL at consumer taps (ppm)	1.3	1.3	0.19	0	2017	No	Corrosion of household plumbing systems
Lead - AL at consumer taps (ppb)	15	0	1	0	2017	No	Corrosion of household plumbing systems

If you are concerned about lead in your drinking water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline at 800.426.4791, or at www.epa.gov/safewater/lead

Substance	MCL	MCLG	Our Water	Range of Detection	Sample Year	Violation	Typical Source of Contamination
Chromium (ppb)	100	100	10	ND-10	2017	No	Erosion of natural deposits
Fluoride (ppm)	4	4	1	0.41-1	2017	No	Erosion of natural deposits
Nitrate [measured as Nitrogen] (ppm)	10	10	4	0.14-4	2017	No	Runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits

Call for Calendar Photos

The theme for our 2019 calendar is our domestic animal companions. We'd love to feature your favorite, high-resolution photos of your furry, feathered, finned, or scaled pets (or other companion animal)!

Digital images must be shot at a minimum of 9" x 12" at 300 ppi (or 50" x 37.5" at 72 ppi) to be printed in the calendar. You may also send us a hard-copy photograph that we can scan.

For more information please call Phyllis at 505.480.4928.



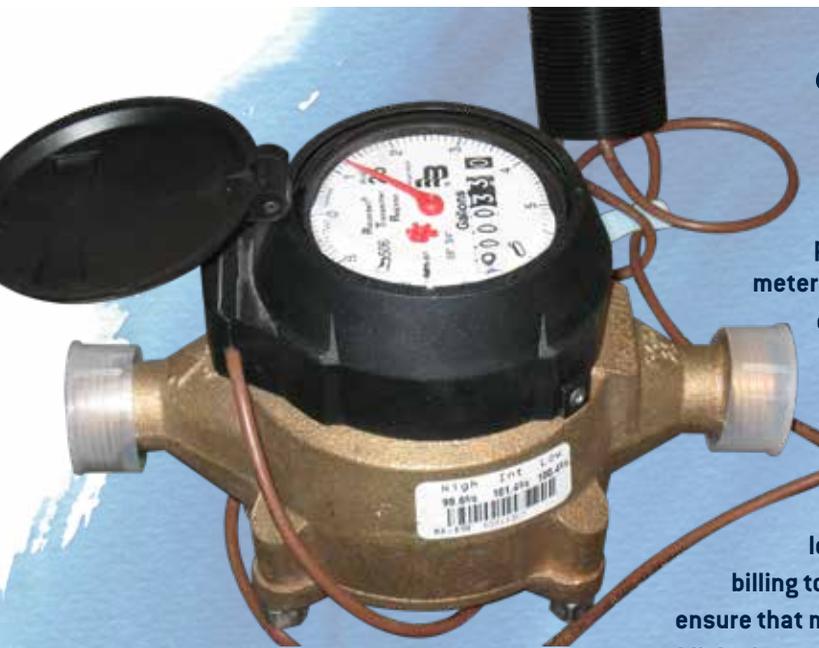
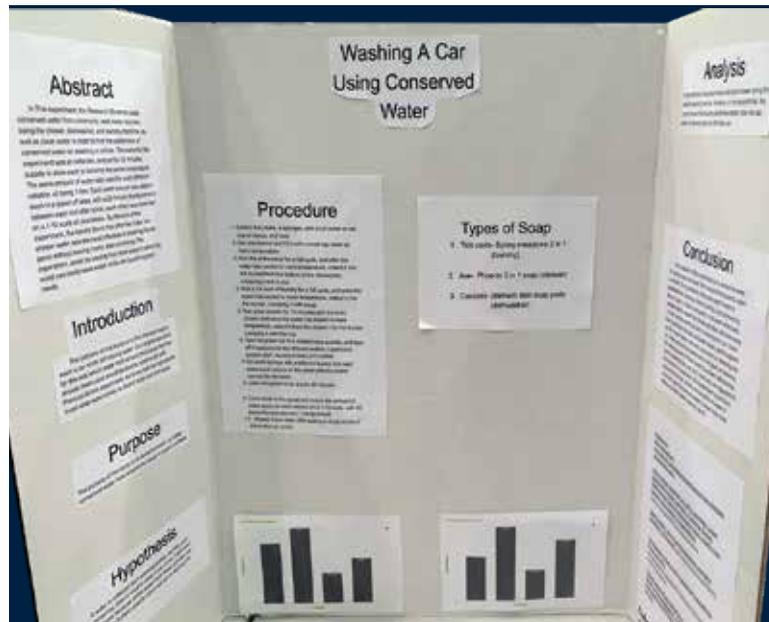


Every Drop Counts

Each year, the City of Rio Rancho honors one project from the high school science fair with the “Every Drop Counts” award. This year’s winning project was called “Washing a Car Using Conserved Water,” a joint project by Brad Jeffries and Joseph Otero, both from Cleveland High School. The young scientists used various types of grey water (used water from showers, kitchen sinks, etc.) and experimented to see which would clean a section of the dirty car best.

Marian Wrage, Environmental Programs Manager, presented the two with their award during the ceremony at Cleveland High on January 23, 2018. Ms. Wrage said, “Water conservation and efficiency is so important in the Southwest. These two young men are looking at ways to ‘stretch’ the water by reusing it.”

RIGHT: “Washing A Car Using Conserved Water,” Brad Jeffries and Joseph Otero’s winning entry for the Every Drop Counts Award.



Accurate Meters are Vital for Fair and Correct Billing

The accuracy and performance of water meters are vital to utility companies whose billable revenues are derived directly from the register readings collected.

The best way to minimize revenue loss and provide equitable billing to customers is to ensure that meters perform within established parameters.

Because of the importance of accurate meters, the City of Rio Rancho recently

established a meter testing program. This past spring, 150 single-family residential meters were tested in the Northern Meadows subdivision. This area of town is where the first automatic reading meters were installed in late 2006, making them just over 10 years old.

To ensure independent evaluation, the City hired a contractor to test the residential meters using the American Water Works Association testing methodology. Each meter is tested at low, medium and high flow and those that are not within $\pm 2\%$ are re-evaluated and replaced if necessary.

Violations

The City is required to ensure that your drinking water is regularly monitored for specific contaminants. Results of regular monitoring indicate whether or not our drinking water meets specific health standards. From January 3, 2013 to July 10, 2017, the City's contractor did not properly monitor and/or complete all required testing for total coliform and chlorine residuals at certain areas within the distribution system. Therefore the City cannot guarantee the drinking water met required standards during that time. The violation was discovered through an internal audit and was immediately self-reported to the New Mexico Environment Department.

Coliforms are bacteria which exist naturally in the environment and may indicate whether other, potentially harmful, bacteria are present in the water. Monitoring for chlorine residuals in the distribution system is one way of insuring that the water has been chlorinated and will likely be free of potentially harmful bacteria and safe to drink. Although total coliform bacteria and chlorine residuals were not properly and consistently monitored at certain distribution areas during this period, chlorine residuals were monitored daily at every entry point into the distribution system from each and every city source. At no point during the time period in question was water delivered into the distribution system with a chlorine residual of less than 0.2 mg/L which is within the required regulatory standards of 0.2 mg/L to 4.0 mg/L.

What should you do?

There is nothing you need to do at this time as the problem has been corrected.

What does this mean?

Public water systems (such as the City of Rio Rancho) are required to collect total coliform samples according to a written plan that has been approved by the State. These sampling plans identify sampling sites and a sample collection schedule that are representative of water throughout the distribution system. Total coliforms are a group of related bacteria that are (with few exceptions) not harmful to humans and are used to determine if potential pathogens are present in the distribution system. EPA considers total coliforms a useful indicator

of other pathogens and a proper means to determine the adequacy of water treatment and the integrity of the distribution system. Although the City of Rio Rancho does not believe that this situation posed a direct risk to public health, we also acknowledge that because the sample results between January 3, 2013 and July 10, 2017 cannot be verified, the risk to the public during that period cannot be adequately quantified.

What is being done?

As of July 10, 2017, additional steps have been implemented to ensure timely and accurate monitoring and reporting so that the City complies with Federal and State drinking water regulations. Since July 10, 2017, total coliform bacteria and chlorine residual monitoring has been conducted routinely each month according to New Mexico drinking water regulations. Specifically, 90 samples were collected each month from throughout the distribution system. These samples have been tested for total coliform bacteria and chlorine residual concentrations. All samples have tested negative for total coliform bacteria and chlorine residuals have been consistently maintained well within the required limits of 0.2 mg/L to 4.0 mg/L.

Additionally, we failed to complete required sampling for Total Trihalomethanes (TTHM) and Haloacetic acids (HAA5) on time and therefore were in violation of monitoring and reporting requirements. These quarterly samples are required to be collected in January, April, July and October each year. Because we did not take the required samples in January 2018, we did not know whether the contaminants were present in your drinking water, and we are unable to tell you whether your health was at risk during that time. In response to the missed sampling event, in April 2018 we returned to compliance and the sample results showed that we are meeting the required drinking water standards.



NEW!

Free Landfill Days

Now available for Rio Rancho residents: free monthly disposal at the Rio Rancho Landfill anytime during regular business hours. You can dispose of one pickup truck-load per month – just show proof of residency like a driver's license, utility bill, or Waste Management invoice.

PLEASE DO NOT put glass in your household recycling cart. The Rio Rancho Landfill now has a drop off site for glass bottles during normal business hours (7 am to 5 pm weekdays and 7:30 am to noon Saturdays).

The Rio Rancho Landfill is located off of Northern Boulevard at 1132 Carpenter St. NE (formerly 33rd St. NE).

Questions?

Call 505.433.6052 or visit home.wm.com/rio-rancho

At-Your-Door Special Collection

Old electronics, paint, motor oil, pool chemicals, batteries and other household hazardous waste can now be picked up at your door for Waste Management customers. It's easy...

- Just call **800.449.7587** (Monday through Friday, 6 am to 6 pm) or visit www.wmatyourdoor.com to schedule your pickup
- You should **receive a collection kit** with instructions
- Gather and **place your items outside** your garage or in the front by 7 am on pickup day

There is no additional charge for this service; it is included in your trash bills.

Acceptable Materials Include:

- Automotive products like motor oil, oil filters, and batteries
- Garden chemicals like pesticides, herbicides, and weed killers
- Paint products like oil-based and latex-based paints, spray paint, and wood stains
- Household cleaners
- Swimming pool chemicals
- Electronics like computers, televisions, monitors, and more
- Household batteries
- Fluorescent tubes and compact fluorescent lamps (CFLs)
- Thermometers and thermostats that contain mercury



We all recycle...but do we recycle right?

Rethink Recycling and Do It Right!

FACT: 25% of the items we put in our recycling carts should not be there. Referred to as “contamination,” they include common items such as:

- Plastic bags
- Greasy pizza boxes
- Dirty food containers
- Styrofoam® cups and to-go containers
- Packing peanuts

FACT: When food, liquid, or trash is put in the recycle cart, it can ruin a whole load of good recyclable material. Workers and machines try to sort the good from the bad at the local materials recovery facility (MRF) but it can be tough pulling the trash out of the recyclable items on the conveyor belt.

FACT: All the trash in your recycle cart increases the cost of the recycling process and the cost of your curbside collection service.

Just doing three things will make a huge difference. Remember – *Recycle Right! When in Doubt – Throw it out!*

Maybe it's time to rethink recycling.

Make the promise. Doing just these three things will make a huge difference.



Recycle all empty plastic bottles, cans and paper.



Keep food and liquids out of my recycling.



Keep plastic bags out of the recycling bin.

The RDRR 3 simple rules represent what we are trying to accomplish – increase volume and improve quality – by keeping recyclables free from liquids and other contaminants, and recycling the right materials. *Note: the acceptable materials and messaging may vary slightly across the country.*

Wipes – to Flush or Not to Flush? Don't!

NEVER Flush Down the Toilet:



Costly sewage system clogs have multiplied as more disposable wipe products have hit the market in the past few years. Companies advertise their disposable wipes as “flushable” or “safe for sewer and septic systems,” but independent tests, such as those done by Consumer Reports, have found otherwise.

“We have found wipes to be a source of back-ups in the sewer system, causing sewer overflows, clogs in the lift stations and a source of trash at the wastewater treatment plants,” said Eddie De Lara, City Wastewater Operations Manager.

Another problem with so-called flushable wipes is that they are similar to wipe products specifically designed to be disposed of **in the trash**. Both

baby wipes and facial wipes are not even marked as flushable and there is language on the packaging warning customers **NOT** to flush. Both flushable and non-flushable wipes contribute to clogs in the sewer system.

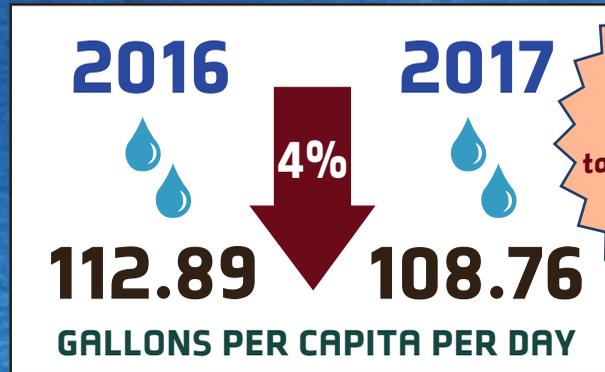
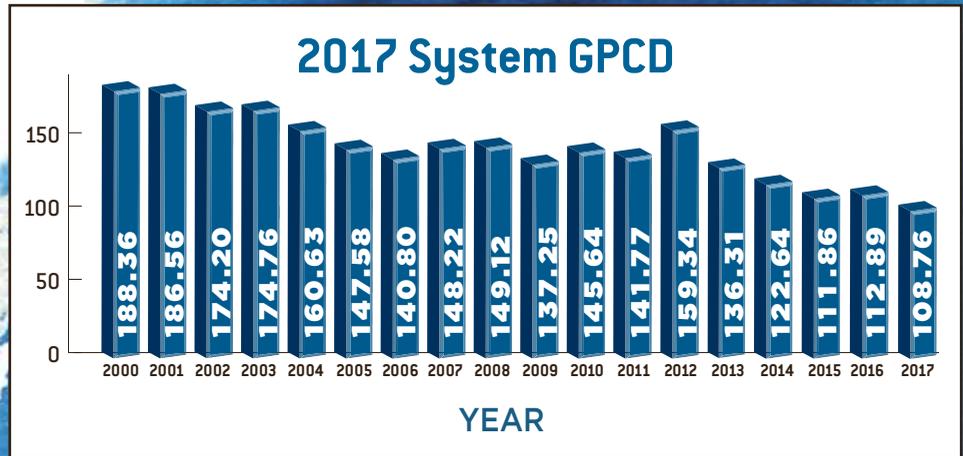
Avoid flushing any type of wipe, “flushable” or otherwise, down the toilet. This will prevent costly clogs and environmentally-damaging sewer overflows. Ideally it's best to avoid disposable wipes completely because they produce waste that ends up in the landfill. Instead, use a more sustainable product, such as your normal dissolves-quickly-in-water toilet paper. If you cannot let go of your wipes, make sure they are properly disposed of – in the trash!

Rio Rancho PURE

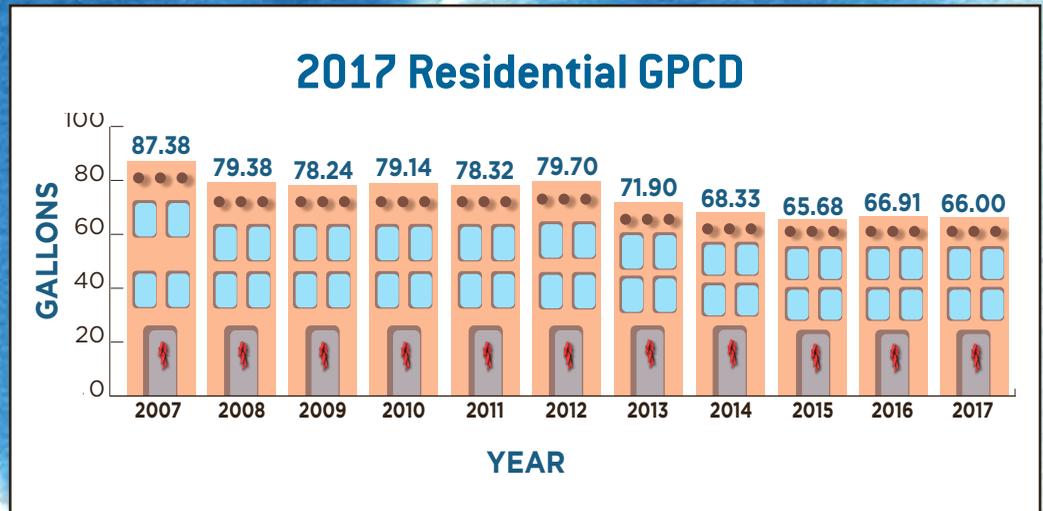
New Mexico's
FIRST
Water Purification
and
Aquifer Storage
Project

has injected
6,935,894
GALLONS

Back Into
the Aquifer
from July 2017
to December 2017
for Future Use.



Rio Rancho citizens and businesses continue to use water efficiently.
Thank You, Rio Rancho!





Meet Maria Salda: ~~Customer Service~~ “Success” Representative

If you have called the Water and Wastewater Services over the past couple of years, there is a good

likelihood that you may have spoken with Maria Salda.

Maria has been with the City for six years and she is one of the representatives with Spanish language capabilities. She came to the City with prior customer service skills from two call centers in Rio Rancho. When asked, Maria said that this position is great because she has less stress here because she can really provide assistance and

service to the customer and explain things and not keep the calls to a one-minute handle time. Maria’s favorite thing is one particular customer who calls in every month to check on her usage and the balance of her water bill. After the call, this funny customer always ends the call by telling a joke.

Water Your Trees – We Are In a Drought !

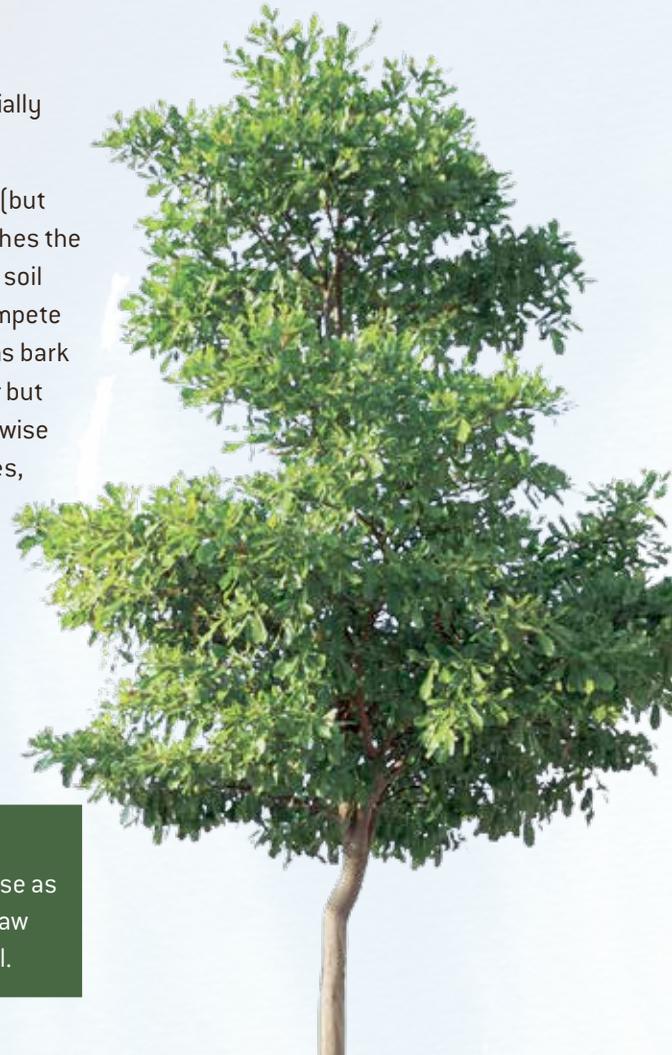
Water should be applied as often as once a week during the heat of the summer, especially during drought. Water should be applied at the tree’s drip line and beyond.

- Trees adapted to drier climates need far less irrigation than other species.
- If Mother Nature provides enough precipitation to wet the soil two to three feet deep, don’t apply additional water.
- If Mother Nature’s precipitation falls short of a full soaking, apply only enough additional water to wet the soil two to three feet deep.
- Apply water slowly so that it sinks deeply into the soil. Soaker hoses, drip emitters, bubblers, and hand-held hoses are preferable to sprinklers.
- Mulch the soil around a tree trunk (but not so closely that the mulch touches the trunk). A layer of mulch keeps the soil moist and reduces weeds that compete for water. Organic mulches, such as bark or wood chips, keep the soil cooler but can absorb water that could otherwise get to tree roots. Inorganic mulches, such as gravel, are a fine choice for native and adapted trees that can tolerate the increase in soil and air temperature.

*(Water Use and Conservation Bureau,
New Mexico Office Of The State
Engineer)*

Mulching Mishap

There was an error in the winter newsletter mulching article: Wood bark is great to use as mulch **on the surface** of the ground and does not deplete the nitrogen as reported. Raw wood/sawdust/bark **tilled in as a soil amendment** can deplete nitrogen from the soil.



City of Rio Rancho
Utilities Department
3200 Civic Center Circle NE
Rio Rancho, NM 87144

PRESORTED STD
U.S. POSTAGE
PAID
ALBUQUERQUE, NM
Permit No. 1104

Important Info

All phone numbers have a
(505) area code.

- Utilities Administration 896-8715
- Utilities Billing 891-5020
- Report Leaks 891-5019
- Water/Wastewater Emergency
(After Hours) 975-1581
- Line Spots, NM811 811
- Water Conservation 896-8715
- Engineering 891-5016
- Environmental Programs 896-8737
- Water Waste 896-8715

www.rnm.gov

***** ECRWSS *****

Postal Customer Rio Rancho, New Mexico

Este informe contiene información muy importante
sobre la calidad de su agua potable. Por favor lea
este informe o comuníquese con alguien que pueda
traducir la información.



Violations

The City is required to ensure that your drinking water is regularly monitored for specific contaminants. Results of regular monitoring indicate whether or not our drinking water meets specific health standards. From January 3, 2013 to July 10, 2017, the City's contractor did not properly monitor and/or complete all required testing for total coliform and chlorine residuals at certain areas within the distribution system. Therefore the City cannot guarantee the drinking water met required standards during that time. The violation was discovered through an internal audit and was immediately self-reported to the New Mexico Environment Department.

Coliforms are bacteria which exist naturally in the environment and may indicate whether other, potentially harmful, bacteria are present in the water. Monitoring for chlorine residuals in the distribution system is one way of insuring that the water has been chlorinated and will likely be free of potentially harmful bacteria and safe to drink. Although total coliform bacteria and chlorine residuals were not properly and consistently monitored at certain distribution areas during this period, chlorine residuals were monitored daily at every entry point into the distribution system from each and every city source. At no point during the time period in question was water delivered into the distribution system with a chlorine residual of less than 0.2 mg/L which is within the required regulatory standards of 0.2 mg/L to 4.0 mg/L.

What should you do?

There is nothing you need to do at this time as the problem has been corrected.

What does this mean?

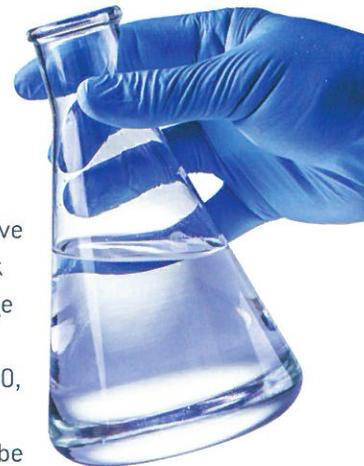
Public water systems (such as the City of Rio Rancho) are required to collect total coliform samples according to a written plan that has been approved by the State. These sampling plans identify sampling sites and a sample collection schedule that are representative of water throughout the distribution system. Total coliforms are a group of related bacteria that are (with few exceptions) not harmful to humans and are used to determine if potential pathogens are present in the distribution system. EPA considers total coliforms a useful indicator

of other pathogens and a proper means to determine the adequacy of water treatment and the integrity of the distribution system. Although the City of Rio Rancho does not believe that this situation posed a direct risk to public health, we also acknowledge that because the sample results between January 3, 2013 and July 10, 2017 cannot be verified, the risk to the public during that period cannot be adequately quantified.

What is being done?

As of July 10, 2017, additional steps have been implemented to ensure timely and accurate monitoring and reporting so that the City complies with Federal and State drinking water regulations. Since July 10, 2017, total coliform bacteria and chlorine residual monitoring has been conducted routinely each month according to New Mexico drinking water regulations. Specifically, 90 samples were collected each month from throughout the distribution system. These samples have been tested for total coliform bacteria and chlorine residual concentrations. All samples have tested negative for total coliform bacteria and chlorine residuals have been consistently maintained well within the required limits of 0.2 mg/L to 4.0 mg/L.

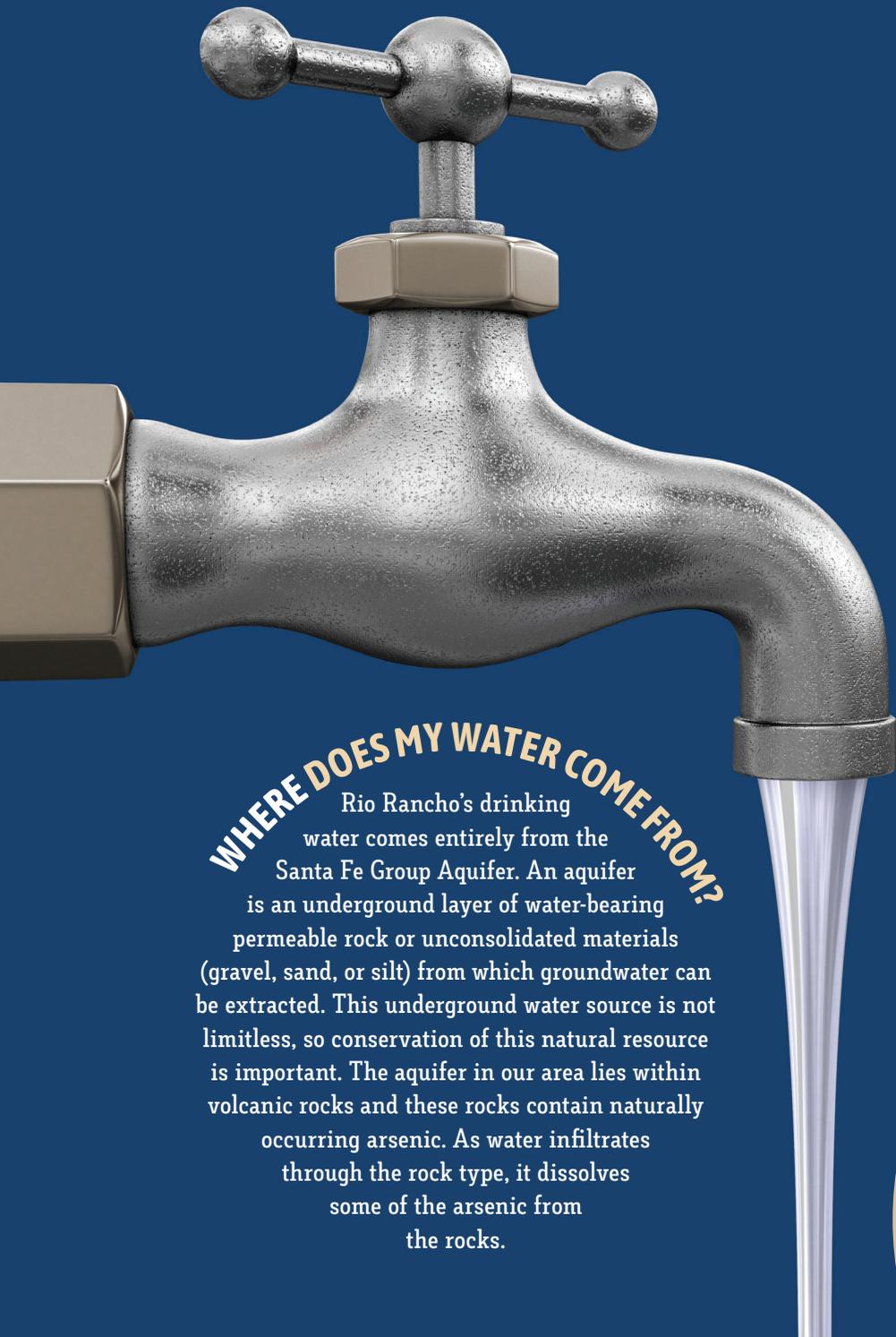
Additionally, we failed to complete required sampling for Total Trihalomethanes (TTHM) and Haloacetic acids (HAA5) on time and therefore were in violation of monitoring and reporting requirements. These quarterly samples are required to be collected in January, April, July and October each year. Because we did not take the required samples in January 2018, we did not know whether the contaminants were present in your drinking water, and we are unable to tell you whether your health was at risk during that time. In response to the missed sampling event, in April 2018 we returned to compliance and the sample results showed that we are meeting the required drinking water standards.





2019 CONSUMER CONFIDENCE REPORT





WHERE DOES MY WATER COME FROM?

Rio Rancho's drinking water comes entirely from the Santa Fe Group Aquifer. An aquifer is an underground layer of water-bearing permeable rock or unconsolidated materials (gravel, sand, or silt) from which groundwater can be extracted. This underground water source is not limitless, so conservation of this natural resource is important. The aquifer in our area lies within volcanic rocks and these rocks contain naturally occurring arsenic. As water infiltrates through the rock type, it dissolves some of the arsenic from the rocks.

We are pleased to present this year's Annual Water Quality Report (Consumer Confidence Report) as required by the Safe Drinking Water Act (SDWA). This report is designed to provide details about where your water comes from, what it contains, and how it compares to standards set by regulatory agencies. This report is a snapshot of last year's water quality.

We are committed to providing you with information because informed customers are our best allies.

HOW IS MY WATER TREATED?

Your water is treated by disinfection. Disinfection involves the addition of chlorine or other disinfectant to kill dangerous bacteria and microorganisms that may be in the water. Disinfection is considered to be one of the major public health advances of the 20th century.

**U.S. Environmental
Protection Agency (EPA)
Safe Drinking Water Hotline:
800.426.4791**

**Rio Rancho
Environmental Programs:
505.896.8737**

FROM THE MAYOR



THE CITY OF RIO RANCHO takes great pride in the quality of the drinking water provided to its citizens and businesses.

The City’s Utilities Department regularly tests your drinking water to ensure that the quality is better than the U.S. Environmental Protection Agency’s requirements.

This report gives you valuable information about the quality of our drinking water, ideas for water conservation and efficiency, and a look at our 2019 water use.

Please take time to read this informative report, brought to you by your Utilities Department. I encourage your participation, input and feedback, and vision for a healthy water future.

Mayor Gregg Hull

GET INVOLVED IN CITY WATER MATTERS

The City encourages you to get involved in water matters. For more information, please call 505.896.8715 or visit www.rrnm.gov

TABLE OF CONTENTS

- About Our Drinking Water Inside Front Cover
- EPA Hotline, RR Water Production Phone Numbers Inside Front Cover
- From the Mayor 1
- Get Involved 1
- Your Dollars at Work 2
- Susceptibility Analysis 3
- People With Sensitivities 3
- Why Are There Contaminants in my Drinking Water? 4
- Water Quality Report Definitions 5
- Test Results 6-7
- Every Drop Counts Award 8
- Know Your Plumbing 8
- Is Your Toilet Leaking? 9
- Water Loss Control 10
- Winter Quarter Average 2019 10
- Only Toilet Paper 11
- 2019 Water Use Stats 12
- Rio Rancho Pure Inside Back Cover
- Important Numbers Back Cover

SUSCEPTIBILITY ANALYSIS

The Susceptibility Analysis of the Rio Rancho Water Utilities reveals that the utility is well maintained and operated, and the sources of drinking water are generally protected from potential sources of contamination. The susceptibility rank of the entire water system is MODERATELY LOW, which is a good rating.

Call New Mexico Environment Department at 877.654.8720 if you have questions.

DO I NEED TO TAKE SPECIAL PRECAUTIONS?

Some people may be more vulnerable to contaminants in drinking water than the general population.

Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/ AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers.

EPA/Centers for Disease Control (CDC) guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the Safe Water Drinking Hotline at 800.426.4791.

In order to ensure that tap water is safe to drink, the Environmental Protection Agency (EPA) prescribes regulations that limit the amount of certain contaminants in water provided by public water systems. The Food and Drug Administration (FDA) regulations establish limits for contaminants in bottled water which must provide the same protection for public health.





WHY ARE THERE CONTAMINANTS IN MY DRINKING WATER?

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency's (EPA) Safe Drinking Water Hotline (800-426-4791).

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in source water before treatment include:

- Microbial contaminants, such as viruses and bacteria, which may come from wildlife, septic systems, sewage treatment plants, and agricultural livestock operations.
- Inorganic contaminants, such as salts and metals, which can be naturally-occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming.
- Pesticides & herbicides, which may come from a variety of sources such as agriculture, urban stormwater runoff, and residential use.
- Organic chemical contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff, and septic systems.
- Radioactive contaminants, which are naturally occurring or can be the result of oil and gas production and mining activities.



DEFINITIONS USED IN THIS WATER QUALITY REPORT

AL: Action Level – The concentration of a contaminant, which, if exceeded, triggers treatment or other requirements that a water system must follow.

LRAA: Locational Running Annual Average – The average of sample analytical results for samples taken at a particular monitoring location during the previous four calendar quarters.

MCL: Maximum Contaminant Level – The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.

MCLG: Maximum Contaminant Level Goal – The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.

MRDL: Maximum Residual Disinfectant Level – The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

MRDLG: Maximum Residual Disinfectant Level Goal – The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

MRL: Minimum Reporting Levels – The smallest measured concentration of a substance that can be reliably measured by using a given analytical method.

N/A: Not Applicable.

ND: Not Detected.

pCi/L: Picocuries per Liter – A measure of radioactivity.

ppb: Parts per Billion or Micrograms per Liter – Approximately equal to adding ONE drop of water from an eyedropper to a 10,000-gallon swimming pool.

ppm: Parts per Million or Milligrams per Liter – Approximately equal to adding ONE drop of water from an eyedropper in 10 gallons of water (It takes one million individual drops to fill a 10-gallon aquarium using an eyedropper.).

RAA: Running Annual Average – The level detected is the highest running annual average, computed quarterly, of monthly averages of all samples collected.

Range of Detection – Highest and lowest levels of a substance found in treated drinking water.

Substance	MCL	MCLG	Our Water	Range of Detection	Sample Year	Violation	Typical Source of Contamination
Alpha emitters (pCi/L)	15	0	3.9	N/A	2018	No	Erosion of natural deposits
Beta/photon emitters (pCi/L)	50	0	5.7	N/A	2018	No	Decay of natural and man-made deposits. (The EPA considers 50 pCi/L to be the level of concern for Beta particles)
Radium (combined 226/228) (pCi/L)	5	0	0.33	N/A	2018	No	Erosion of natural deposits
Uranium (ppb)	30	0	5	N/A	2018	No	Erosion of natural deposits

Substance	MCL or MRDL	MCLG or MRDLG	Our Water	Range of Detection	Sample Year	Violation	Typical Source of Contamination
Chlorine (as Cl ₂) (ppm)	4	4	0.72 (RAA)	0.03-1.6	2019	No	Water additive used to control microbes
HAA5* (ppb)	60	N/A	2.45 (LRAA)	ND-4.5	2019	No	By-product of drinking water chlorination
TTHMs* (ppb)	80	N/A	9.5 (LRAA)	ND-13	2019	No	By-product of drinking water disinfection

Substance	MRL	Range of Detection	Sample Year
HAA5 (ppb)	0.44	ND-0.8	2019
HAA6Br (ppb)	0.65	ND-1.3	2019
HAA9 (ppb)	0.65	ND-1.3	2019
Germanium (ppb)	0.67	ND-1.6	2019
Manganese (ppb)	0.56	ND-2.2	2019

ADDITIONAL MONITORING

As part of an ongoing evaluation program the EPA has required us to monitor some additional contaminants/chemicals. Information collected through the monitoring of these contaminants/chemicals will help to ensure that future decisions on drinking water standards are based on sound science. HAA5 was included in this monitoring and this result is a “snapshot” in time and not an LRRA.

*HAA5: Haloacetic acids
TTHMs: Total Trihalomethanes

LEAD/COPPER

Every three years, the City is required to test for lead and copper from the tap in homes of a certain age range.

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water comes primarily from materials and components associated with metal service lines and home plumbing. The Rio Rancho Utilities Department is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes using water for drinking or cooking.

ARSENIC

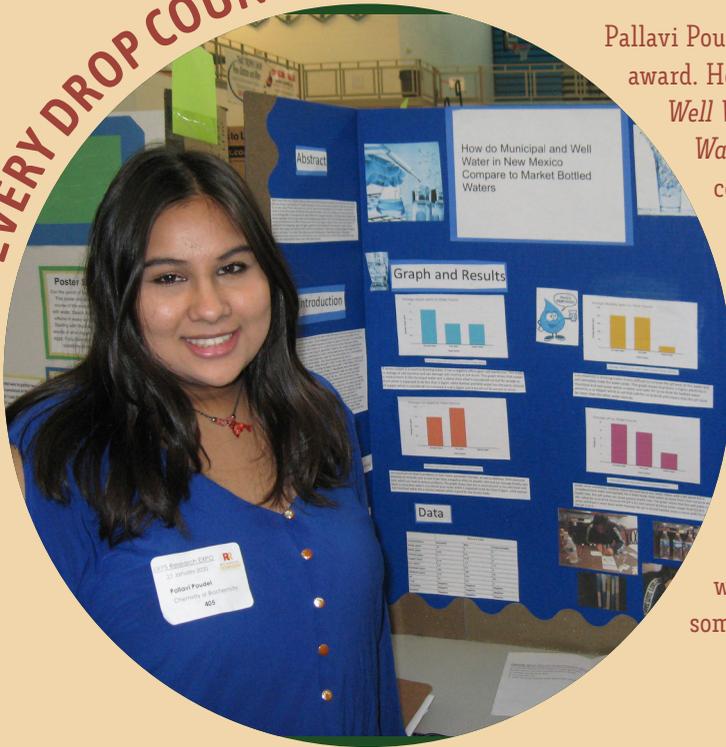
While your drinking water meets EPA's standard for arsenic, it does contain low levels of arsenic. EPA's standard balances the current understanding of arsenic's possible health effects against the cost of removing arsenic from drinking water. EPA continues to research the health effects of low levels of arsenic, which is a mineral known to cause cancer in humans at high concentrations and is linked to other health effects such as skin damage and circulatory problems.

Substance	Action Level (AL)	MCLG	Our Water	Number of Sites Exceeding AL	Sample Year	Violation	Typical Source of Contamination
Copper - AL at consumer taps (ppm)	1.3	1.3	0.19	0	2017	No	Corrosion of household plumbing systems
Lead - AL at consumer taps (ppb)	15	0	1	0	2017	No	Corrosion of household plumbing systems

If you are concerned about lead in your drinking water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline at 800.426.4791, or at www.epa.gov/safewater/lead

Substance	MCL	MCLG	Our Water	Range of Detection	Sample Year	Violation	Typical Source of Contamination
Arsenic (ppb)	10	0	7	N/A	2018	No	Erosion of natural deposits
Barium (ppm)	2	2	0.05	N/A	2018	No	Erosion of natural deposits
Chromium (ppb)	100	100	6	N/A	2018	No	Erosion of natural deposits
Fluoride (ppm)	4	4	1.1	N/A	2018	No	Erosion of natural deposits
Nitrate [measured as Nitrogen] (ppm)	10	10	4.1	ND-4.1	2019	No	Runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits

EVERY DROP COUNTS



Pallavi Poudel is the 2020 winner of the Every Drop Counts award. Her science expo project, *How Do Municipal and Well Water From New Mexico Compare to Market Bottled Waters?*, was an investigation and experiment comparing municipal water from Rio Rancho High School with well water from Española and bottled water she purchased.

Pallavi tested all three samples for Chlorine, Iron, Hardness, Pesticides, Bacteria, pH, Alkalinity, Copper, Nitrate/Nitrite, and Lead. Pallavi hypothesized that the bottled water would contain the least amount of contaminants of the three samples. She was surprised that she was incorrect as the bottled water contained the highest concentrations of some the contaminants she tested.

We will reschedule the public meetings intended to gather citizen input to update our Water Resources Management Plan.

Victoria Garcia, Water Conservation Specialist, performs conservation audits at customers' homes. She discovered that most homeowners are unaware of their day-to-day plumbing.

"I was called out to a property and walked into the customer's home. First stop was the guest bathroom, which was located at the front of the home. As soon as I walked in, I could hear the toilet running. The customer said that his toilet has always made that noise, so he thought it was normal. I gave him a brochure from the Office of the State Engineer that explained how to find and fix leaks. He was able to repair both toilets."

Just a reminder...once the toilet tank fills up after flushing, you should not hear any sounds. Toilets should be silent. If you do hear what sounds like running water for any length of time, you should check for leaks.

KNOW YOUR PLUMBING!



Is your Toilet Leaking? Give it the Dye Test

You might think your toilet isn't leaking, but there is one sure-fire way to find out. Lift the lid off the toilet tank and put 10-15 drops of dark-colored food dye into the tank. If you don't have food dye, you can pick up toilet dye tablets at City Hall (second floor). After fifteen minutes, check the water in the toilet bowl. If there is any sign of dye, your toilet is leaking.

If the tank's water level looks fine but the dye test shows that the toilet leaks, the two most common culprits are the valve seat, which may need to be cleaned, and the flapper (or tank ball), which may need to be adjusted, cleaned, or replaced.

ADJUST THE FLAPPER (TANK BALL)

- Ensure the flapper fits properly on the valve seat.
- Turn off the water at the shutoff valve (just underneath the toilet tank) by turning the valve clockwise until it stops. Then flush the toilet to drain the tank. See if the flapper falls straight onto the flush valve opening.
- Adjust the flapper: loosen the thumbscrew that fastens the guide arm to the overflow pipe.
- Reposition the arm and the lift wire so that the tank ball is right above the flush valve (or adjust the flapper so that it will fall directly onto the valve seat).

CLEAN THE FLAPPER (TANK BALL) AND VALVE SEAT

If the flapper (or tank ball) is sitting correctly in the valve seat but water is still leaking into the bowl, the problem may be a build-up

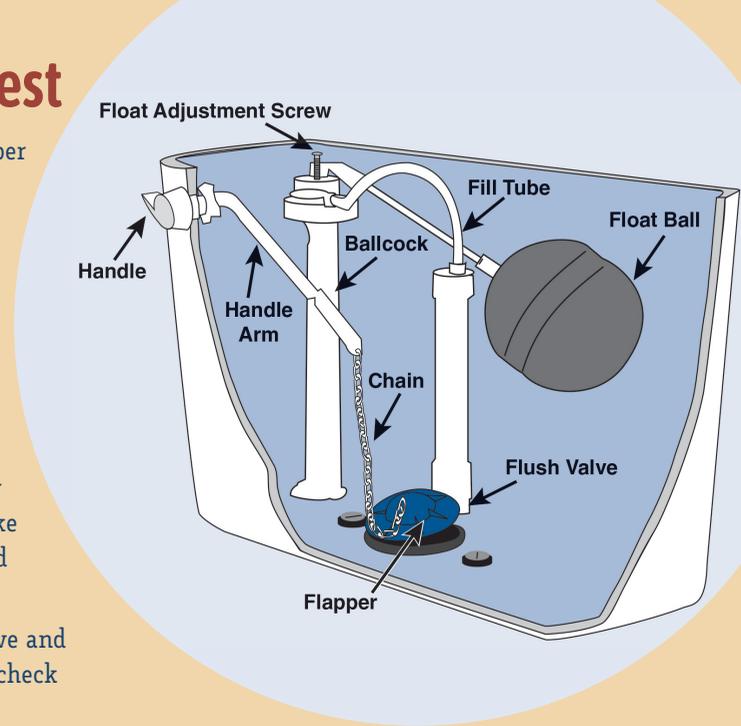
of mineral deposits on the flapper and/or valve seat.

- Turn off the water at the shutoff valve located just underneath the toilet tank (turn the valve clockwise until it stops). Then flush the toilet to drain the tank.
- Clean the valve seat and the flapper with fine steel wool or a plastic cleansing pad to make sure they are both smooth and free of mineral deposits.
- Turn on the water shutoff valve and conduct the dye test again to check for leaks.

REPLACE THE FLAPPER (TANK BALL)

If you've checked to make sure the flapper is correctly positioned in the valve seat and both parts are clean but you still have a leak, the flapper is probably worn out and won't seal properly. To replace the flapper:

- Turn off the water at the shutoff valve located just underneath the toilet tank (turn the valve clockwise until it stops). Then flush the toilet to drain the tank.
- Remove your old flapper and take it with you to the hardware or plumbing store so you can buy a replacement.
- Before installing the new flapper, clean the valve seat with fine steel wool or a plastic cleansing pad to make sure it is smooth.
- Install the new flapper. Then run the dye test again to make sure you have fixed the leak.



Note: Make sure the replacement flapper matches the model and water-use requirements of the existing flapper. Not all generic flappers work equally well. Some toilets rely on a specific flapper to create the low-flow flush.

IF THE TOILET STILL LEAKS

If you still have a leak, or the toilet is making a high whine or whistle sound when the tank is filling up, consider replacing the ball cock, the mechanism that controls the flow of water into the toilet tank. Replacement ball cocks are sold at hardware, plumbing, and home improvement stores.

<<Information from "Don't Waste a Drop" published by the NM Office of the State Engineer.>>

ENHANCING THE WATER LOSS CONTROL PROGRAM

The City recently contracted with a company named Fracta to assist the Utilities Department to better target leak detection, primarily before the water reaches the street surface.

Fracta uses cutting-edge Artificial Intelligence (AI), specifically Machine Learning, to assess the condition and risk of drinking water distribution mains. By shifting asset operation and management from reaction to prevention, the company helps avoid disruptive water main breaks, and better targets leak detection and water valve maintenance efforts.

This new way of looking at water main data for an entire water distribution system enables water engineers, financial planners and executive management to make fast, accurate, and affordable asset management decisions about their buried water main infrastructure.

The City provided Fracta with a large number of data points for analysis including: GIS information, leak locations over the most recent five-year period, water pipe size and material type, etc. Once imported into their system, the data was compared to over 1,000 geographical and environmental variables that potentially impact the condition of a water main. Fracta “trains” and validates their Machine Learning algorithm that then calculates the correlation between the parameters and historical failures and builds a model of the system. The output of the Machine Learning analysis is an accurate prediction for Likelihood of Failure (LOF) for all water main segments in the distribution system. Once LOF is determined, Fracta calculates the Consequence of Failure (COF) value using parameters and values derived from basic water main segment data, as well as environmental variables. The values calculated for each water main segment are then categorized and transformed into dollar amounts based on Rio Rancho Utilities cost structures.

This information will allow Rio Rancho Utilities to plan for repair or replacement of segments of water main pipes.



WINTER QUARTER AVERAGE 2020

The class average usage per residential household will remain at 4,000 gallons.

For 2020, it is 3.81 gallons (for 2019, it was 3.88 gallons). This shows that households are using a little bit less than they did the prior year - we round up/down to get our average.

Additionally, multi-family class average will drop from 17,000 to 16,000 gallons for 2020.

ONLY THROW TOILET PAPER in the TOILET!



- Baby Wipes
- Disinfectant Wipes
- Sanitary Pads
- Tampons
- Condoms
- Contact Lenses
- Bandages
- Cotton Balls
- Makeup Pads
- Cotton Swabs
- Diapers

These materials **WILL NOT** disintegrate like toilet tissue. They can cause clogs, and can back up pipes – in your home, and in your neighborhood!

NEVER THROW THESE in the TOILET!



2019 SYSTEM GPCD

GALLONS PER CAPITA PER DAY

2018



105.85
GPCD

6.75%



2019



98.70
GPCD

2019 RESIDENTIAL GPCD



GREAT JOB, RIO RANCHO!!

The City's annual gallons per day per person calculations are completed and we have dropped to a whopping 98.7 gallons of water per person (gpcd) per day for the entire water system. This is a **6.75% decrease** from 2018 (105.85 gpcd in 2018).

Single family residential water use has also dropped from 63.14 to 62.53.



Rio Rancho **PURE**

New Mexico's **FIRST**
Water Purification and
Aquifer Storage Project
has injected

88,840,031
GALLONS

Back Into the Aquifer
from July 2017
through December 2019
for Future Use



City of Rio Rancho
Utilities Department
3200 Civic Center Circle NE
Rio Rancho, NM 87144

PRESORTED STD
U.S. POSTAGE
PAID
ALBUQUERQUE, NM
Permit No. 1104

Important Info

All phone numbers have a
(505) area code.

- Engineering..... 891.5016
- Environmental Programs 896.8737
- Line Spots, NM811.....811
- Report Leaks..... 891.5019
..... waterleaks@rrnm.gov
- Utilities Administration..... 896.8715
- Utilities Billing 891.5020
- Water Conservation 896.8715
- Waste Management..... 892.1200
- Water Waste 896.8715

www.rrnm.gov

***** ECRWSS *****

POSTAL CUSTOMER RIO RANCHO, NEW MEXICO

Este informe contiene información muy importante sobre la calidad de su agua potable. Por favor lea este informe o comuníquese con alguien que pueda traducir la información.



Appendix C

PSOC Table for City Monitor Wells and Off-Line Wells

Well	Buffer Zone	PSOC Code	Description	Count
WELL # 2	A	IOG	Gas pipeline	1
	A		Septic tank	1
	B	IOG	Gas pipeline	1
	B		Septic tank	27
	C	IOG	Gas pipeline	1
	C	MRP	Primary road, highway, or arterial	1
	C		Fire Station (Station 4)	1
	C		Septic tank	85
	D	AHD	Park	5
	D	CFA	Aboveground storage tank facility	1
	D	CFB	Underground storage tank facility	2
	D	CFB/LUST	Leaking underground storage tank site - Rio Rancho Shell	1
	D	IOG	Gas pipeline	1
	D	MPS	Lift station	2
	D	MRP	Primary road, highway, or arterial	6
	D		Arroyo	1
	D		Groundwater permit (ceased): Intel Corporation (DP-225 & DP-400); Martin Luther King Elementary (DP-445)	2
	D		Private well: OSE database	17
	D		Septic tank	1,253
	WELL # 4	A	IOG	Gas pipeline
B		CGC	Golf course	1
B		IOG	Gas pipeline	1
B		MRP	Primary road, highway, or arterial	1
C		IOG	Gas pipeline	1
C		MRP	Primary road, highway, or arterial	1
D		AHD	Park	7
D		CFB	Underground storage tank facility	3
D		IOG	Gas pipeline	1
D		MPS	Lift station	1
D		MRP	Primary road, highway, or arterial	8
D			Arroyo	2
D			Fire Station (Station 1)	1
D			Groundwater permit (active): Club Rio Rancho (DP-1629)	1
D			Groundwater permit (terminated): Rio Rancho (City of) Reuse Project (DP-179)	1
D			Private well: OSE database	12
D			Septic tank	287

Well	Buffer Zone	PSOC Code	Description	Count
WELL # 8	B	IOG	Gas pipeline	1
	B	MRP	Primary road, highway, or arterial	1
	B		Septic tank	6
	C	IOG	Gas pipeline	1
	C		Septic tank	27
	D	AHD	Park	1
	D	IOG	Gas pipeline	1
	D	IUD	Illegal dump	1
	D		Arroyo	2
	D		Private well: OSE database	10
D		Septic tank	655	
WELL # 14	B		Septic tank	1
	C		Private well: OSE database	4
	C		Septic tank	15
	D	IUD	Illegal dump	1
	D	MRP	Primary road, highway, or arterial	1
	D		Arroyo	3
	D		Private well: OSE database	6
	D		Septic tank	128
WELL # 18	B	IOG	Gas pipeline	1
	C	IOG	Gas pipeline	1
	C	IUD	Illegal dump	1
	C		Arroyo	1
	C		Private well: OSE database	1
	D	IOG	Gas pipeline	1
	D	IUD	Illegal dump	1
	D		Arroyo	2
	D		Private well: OSE database	14
	D		Septic tank	9
WELL # 23	A		Arroyo	1
	A		Uranium	1
	D	AHD	Park	1
	D	IOG	Gas pipeline	1
	D		Arroyo	2
	D		Private well: OSE database	21
	D		Septic tank	7

Appendix D

NMED Lists of Potential Sources of Contamination and Contaminants of Concern

Map Code	Land Use	Description	Contaminants of Concern*
<i>AGRICULTURAL LAND USE</i>			
AAP	Animal Processing or Rendering Plants	Commercial Operations/Waste Storage/Disposal Facility	Nitrates, Pathogens, Organic/Inorganic Chemicals
ACS	Farm/Ranch Agrochemical Storage Facilities or Sites	Farm/Ranch Storage Site	Pesticides, Herbicides, Fertilizers
ADC	Drainage Canals, Ditches or Acequias-Unlined, Wells (Private, Stock wells, and Irrigation)	Runoff and Infiltration	Pesticides, Herbicides, Fertilizers, Nitrate, Pathogens
ADF	Livestock Production-Dairies	Livestock Wastes, Runoff and Infiltration	Nitrate, Phosphate, Chloride, Pathogens, Pharmaceuticals
AFI	Farming-Irrigated Croplands	Runoff and Infiltration	Nitrate, Ammonia, Chloride, Fertilizers, Pesticides, Herbicides
AFL	Confined Animal Feeding Operations	Runoff and Infiltration of Livestock Wastes	Nitrate, Phosphate, Chloride, Pathogens, Pharmaceuticals
AFM	Farm Machinery Storage or Maintenance Areas	Farm Machinery Maintenance Areas	Automotive Wastes, Welding Wastes, Fuels, Oils, Lubricants
AFN	Farming-Non-irrigated Croplands	Runoff and Infiltration Operations	Nitrate, Ammonia, Chloride, Fertilizers, Pesticides, Herbicides
AHC	Horticultural/Gardens/Nurseries/Greenhouses	Operations/Storage	Pesticides, Herbicides, Fertilizers
AHF	Hay/Feed and Veterinary Product Storage Sites	Farm/Ranch Storage Site	Fungicides, Pesticides, Nitrates, Pharmaceuticals
AMA	Manure or Livestock Waste-Land Application Areas	Land Application of Manure	Nitrate, Ammonia, Phosphate, Chloride, Pathogens, Pharmaceuticals
AMS	Manure or Livestock Waste-Storage Facilities or Sites	Lined and Unlined Manure Storage Facilities	Nitrate, Ammonia, Phosphate, Chloride, Pathogens, Pharmaceuticals
AOA	Livestock Production-Other Animal	Livestock Wastes	Nitrate, Ammonia, Phosphate, Chloride, Pathogens, Pharmaceuticals
APF	Livestock Production -Poultry	Poultry Sewage Wastes	Nitrate, Ammonia, Phosphate, Chloride, Pathogens, Pharmaceuticals
APP	Processing Plants or Mills- Hay, Grain, or Produce	Operations, Waste Storage and Disposal	Organic/Inorganic Chemicals, Lubricants, Machinery Wastes
ARL	Animal Rangeland	Rangeland and Pasturage	Nitrate, Ammonia, Phosphate, Chloride, Pesticides, Pathogens
ASC	Bulk Agrochemical Storage-Petroleum/Chemicals	Storage-500 gallons or more	Petroleum Products, Inorganic/Organic Chemicals
ASF	Bulk Agrochemical Storage-Fertilizers	Feed Mill, Agricultural Co-op	Fertilizers
ASG	Bulk Agricultural Product Storage-Grain or Produce	Grain Elevator, Warehouse or Storage Site	Fungicides, Oils, Lubricants, Machinery Wastes
ASH	Livestock Production -Sheep	Livestock Sewage Wastes	Nitrate, Ammonia, Phosphate, Chloride, Pathogens, Pharmaceuticals

Map Code	Land Use	Description	Contaminants of Concern*
ASP	Bulk Agrochemical Storage-Pesticides	Feed Mill, Agricultural Co-op	Pesticides
ASW	Livestock Production -Swine	Livestock Sewage Wastes	Nitrate, Ammonia, Phosphate, Chloride, Pathogens, Pharmaceuticals
<i>COMMERCIAL LAND USE</i>			
CAI	Airports (Active/Inactive)	Operations/Maintenance/Construction	Aircraft Fuels, Deicers, Batteries, Diesel Fuel, Chlorinated Solvents, Automobile Wastes, Heating Oil, Building Wastes, Sewage, Septage, Pathogens, Pesticides, Fertilizers
CAR	Automotive Repair Shops	Operations/Maintenance/Storage	Solvents, Metals, Automotive Waste, Oils, Gasoline
CAW	Abandoned/Improperly Closed Wells	Storage/Disposal	Organic/Inorganic Chemicals, Brines, Waste Oil, Treated Sewage Effluent, Storm Water Runoff, Process Waste Water, Metals, Pathogens, Nitrate
CBS	Automotive Body Shops	Operations/Maintenance	Paints, Solvents
CBY	Boat Yards/Marinas	Operations/Maintenance	Gasoline, Diesel Fuels, Septage, Wood Treatment Chemicals, Paints, Varnishes, Automotive Wastes, Solvents, Building Wastes
CCG	Camp Grounds - Unsewered	Untreated Domestic Wastewater	Septage, Gasoline, Pesticides, Organic/Inorganic Chemicals
CCE	Cemeteries	Operations/Maintenance	Leachate, Arsenic, Pesticides, Fertilizers
CCW	Car Washes	Unsewered, Without Total Recycling System	Soaps, Detergents, Waxes, Organic/Inorganic Chemicals
CCY	Construction/Demolition Yard/Staging Areas	Storage/Maintenance	Gasoline, Diesel Fuels, Wood Treatment Chemicals, Paints, Varnishes, Automotive Wastes, Solvents, Building Wastes, Explosives, Oil
CDC	Dry Cleaning Shops	Operations/Maintenance	Chlorinated Solvents, Organic/Inorganic Chemicals
CFA	Fuel Storage Tanks-Above Ground	Non-Service Station Tanks	Gasoline, Diesel Fuel, Organic/Inorganic Chemicals
CFB	Fuel Storage Tanks-Below Ground	Non-Service Station Tanks	Gasoline, Diesel Fuel, Organic/Inorganic Chemicals
CFC	Funeral Homes/Crematories	Operations	Biohazard Waste, Organic/Inorganic Chemicals, Septage
CFR	Furniture Repair/Refinishing	Operations	Paints, Solvents, Organic Chemicals
CGC	Golf Courses	Operations/Maintenance	Fertilizers, Pesticides, Gasoline, Automotive Wastes, Batteries, Septage
CHG	Historic Gasoline Service Stations	Above/Below Ground Storage Tanks/Operations	Gasoline, Oils, Solvents, Automotive Wastes, Septage
CHM	Home Manufacturing	Operations/Maintenance/Storage	Paints, Solvents, Organic/Inorganic Chemicals
CHN	Hospitals/Nursing Homes - Unsewered	Wastewater Discharge to Septic Tank/Leach Field	Biohazard Waste, Organic/Inorganic Chemicals, Septage, Radiological Waste

Map Code	Land Use	Description	Contaminants of Concern*
CHW	Hardware/Lumber/Parts Stores	Operations/Storage	Pesticides, Fertilizers, Organic/Inorganic Chemicals
CLD	Laundromats - Unsewered	Wastewater Discharge	Detergents, Soaps, Septage
CPL	Parking Lots/Malls	Operations	Runoff: Pesticides, Fertilizer, Pathogens, Nitrate, Phosphate, Oil, Gasoline, Diesel Fuel
CPP	Photo Processing Laboratories	Operations/Storage	Organic/Inorganic Chemicals
CPR	Printing Shops	Operations/Storage	Solvents, Inks, Dyes, Organic/Inorganic Chemicals
CPS	Paint Stores	Storage	Paint, Solvents
CRL	Research Laboratories	Operations/Maintenance/Storage	Biohazard Waste, Radiological Materials and Waste, Metals, Organic/Inorganic Chemicals
CRV	RV/Mini Storage	Storage	Gasoline, Diesel Fuels, Pesticides, Fertilizers, Oil, Automotive Wastes, Organic/Inorganic Chemicals, Acids, Bases, Batteries, Household Chemicals
CRY	Railroad Yards and Tracks	Operations/Maintenance/Storage	Diesel Fuel, Pesticides, Organic/Inorganic Chemicals
CSS	Gasoline Service Stations	Above/Below Ground Storage Tanks/Operations	Gasoline, Oils, Solvents, Automotive Wastes, Septage
CST	Commercial Septic Tanks/Leachfields/Leachpits/Cesspools	Storage/Disposal	Septage, Septic Effluent, Pathogens, Nitrate, Ammonia, Chloride
CVS	Veterinary Facilities	Operations/Maintenance	Biohazard Waste, Organic/Inorganic Chemicals, Septage, Radiological Waste
INDUSTRIAL LAND USE			
IAS	Asphalt Plants	Production/Storage	Petroleum Derivatives
ICC	Cement/Concrete Plants	Operations/Maintenance/Storage	Organic/Inorganic Chemicals, Oils, Natural Gas, Propane,
ICE	Communications Equipment Manufacturers	Production/Maintenance/Storage	Solvents, Organic/Inorganic Chemicals, Oils, Waste Oils, Metals
ICL	Chemical Landfills	Storage/Disposal	Leachate of Organic/Inorganic Chemicals, Acids, Bases, Metals, Solvents, Gasoline, Diesel Fuel, Pesticides, PCBs
ICP	Chemical Production Plants	Production/Maintenance/Storage	Organic/Inorganic Chemicals, Solvents, Oils, Metals
IEE	Electronic/Electrical Equipment Manufacturers	Production/Maintenance/Storage	Solvents, Organic/Inorganic Chemicals, Oils, Waste Oils, Metals, Acids, Bases
IFM	Furniture and Fixture Manufacturers	Production/Maintenance/Storage	Paints, Solvents, Organic/Inorganic Chemicals
IFW	Foundry/Smelting Plants	Production/Maintenance/Storage	Organic/Inorganic Chemicals, Metals, Solvents, Acids, Bases, Oils

APPENDIX D1: POTENTIAL SOURCES OF CONTAMINATION

Map Code	Land Use	Description	Contaminants of Concern*
IGO	Gas/Oil Wells-Active/Abandoned/Test, Wells Geothermal and Industrial	Production	Oil, Natural Gas, Organic/Inorganic Chemicals, Acids, Bases, Drilling Wastes
IHD	Historic Dumps/Landfills	Storage/Disposal	Leachate of Organic/Inorganic Chemicals, Acids, Bases, Metals, Solvents, Gasoline, Diesel Fuel, Pesticides, PCBs, Automotive Wastes
IHM	Historic Mining Operations	Production Waste/Storage	Metals, Inorganic Chemicals, Acids, Bases, Radiological Materials
IMI	Primary Metal Industries	Steel/Metal Works, Rolling/Wire Mills	Metals, Inorganic Chemicals, Acids, Bases
IMO	Mining Operations (Surface And Subsurface)	Production Waste/Storage	Metals, Inorganic Chemicals, Acids, Bases, Radiological Materials
IMP	Metal Plating/Processing Facilities	Operations/Maintenance/Storage	Organic/Inorganic Chemicals, Acids, Bases, Metals
IMW	Machine/Metal Working Shops	Operations/Maintenance/Storage	Cutting Oils, Metals, Solvents, Organic/Inorganic Chemicals, Detergents
IOG	Oil/Gas Pipelines	Transport	Oils, Gasoline, Volatile Organic Chemicals, Natural Gas, Propane
IPL	Plastics Manufacturing/Molder	Operations/Maintenance/Storage	Solvents, Oils, Organic/Inorganic Chemicals, Acids, Bases
IPM	Paper Mills	Operations/Maintenance/Storage	Acids, Metals, Organic/Inorganic Chemicals
IPP	Petroleum Production/Refining/ Bulk Plants	Operations/Maintenance/Storage	Oils, Gasoline, Diesel Fuels, Organic Chemicals, Oil Drilling/Refining Wastes
IPU	Public Utilities	Power Generating Stations	PCBs, Solvents, Diesel Fuel, Propane, Natural Gas, Oil, Acids, Bases, Organic/Inorganic Chemicals, Metals
IRG	RCRA Waste Generators - Other	Storage/Disposal	Organic/Inorganic Chemicals, Solvents, Metals, PCBs, Acids, Bases, Radiological Materials
IRW	Radioactive Waste Disposal Sites	Storage/Disposal	High and Low Level Radiological Wastes
ISD	Sumps/Dry Wells	Storage/Disposal	Storm Water Runoff, Organic/Inorganic Chemicals, Solvents, Process Wastewater, Pesticides, Oils
ISF	Superfund Sites	Storage/Disposal	Organic/Inorganic Chemicals, Solvents, Metals, PCBs, Acids, Bases, Radiological Materials
ISM	Primary Wood Industries	Saw Mills, Planers, Wood Treatment	Organic/Inorganic Chemicals, Metals, Solvents
IST	Stone, Tile, Glass Manufacturing	Operations/Maintenance/Storage	Solvents, Oils, Metals, Organic/Inorganic Chemicals
ITS	Treatment/Storage/Disposal Ponds/Lagoons	Treatment/Storage	Organic/Inorganic Chemicals, Metals, Acids, Bases, Sewage
ITT	Transport/Distribution, Warehouses, Truck Terminals	Operations/Maintenance/Storage	Gasoline, Diesel Fuels, Automotive Wastes, Metals, Organic/Inorganic Chemicals, Acids, Bases
IUD	Unregulated Dumps/Excavated Sites, Snow Dumps	Storage/Collection/Disposal	Organic/Inorganic Chemicals, Automotive Wastes, Oil, Gasoline, Runoff from Adjacent Sites

Map Code	Land Use	Description	Contaminants of Concern*
IUI	Underground Injection (UIC) Wells	Storage/Disposal	Organic/Inorganic Chemicals, Brines, Waste Oil, Treated Sewage Effluent, Storm Water Runoff, Process Wastewater, Metals, Pathogens, Nitrate
IUR	Utility/Transportation Right of Ways, major transportation corridor	Power Lines, Gas/Oil Pipelines	Pesticides, Gasoline, Diesel Fuels, Automotive Wastes, Organic/Inorganic Chemicals, PCBs, Sewage, Metals, Storm water Runoff, Pathogens
MUNICIPAL/RESIDENTIAL LAND USE			
MFS	Fire Station/Training Facility	Operations/Maintenance/Storage	Gasoline, Diesel Fuels, Pesticides, Automotive Wastes, Oil
MHD	High Density Housing/Mobile Home Parks	Operations/Maintenance/Storage	Gasoline, Household Chemicals, Pesticides, Storm water Runoff: Pathogens, Nitrate, Phosphate
MHM	Highway/Road Maintenance Yards	Operations/Maintenance/Storage	Gasoline, Diesel Fuels, Solvents, Road Salt, Asphalt, Pesticides, Automotive Wastes,
MHR	Highway Rest Areas	Operations/Maintenance/Storage/Disposal	Automotive Wastes, Septage, Gasoline, Diesel Fuels, Pesticides
MIN	Incinerators - Commercial or Municipal	Operations/Disposal	Metals, Organic/Inorganic Chemicals
MLF	Municipal Waste Landfills	Storage/Disposal	Leachate, Organic/Inorganic Chemicals, Pesticides, Metals, Oils
MMF	Military Facilities	Operations/Maintenance/Storage/Disposal	Gasoline, Aircraft Fuels, Diesel Fuels, Automotive Wastes, Metals, Organic/Inorganic Chemicals, Explosives, Radiological Materials, Pesticides, Sewage/Septage, Oils, Solvents, Fertilizers, Batteries, Deicers
MMP	Motor Pools	Operations/Maintenance/Storage/Disposal	Gasoline, Diesel Fuel, Oils, Waste Oils, Automotive Waste, Batteries, Metals
MPR	Parks/Recreation Facilities/Campgrounds	Operations/Maintenance/Storage/Disposal	Pesticides, Organic/Inorganic Chemicals, Septage, Gasoline, Diesel Fuel, Automotive Wastes, Storm water Runoff: Pathogens, Nitrate, Phosphate
MPS	Sewage Pump Stations	Operations/Storage	Sewage, Pathogens, Nitrate, Metals, Organic/Inorganic Chemicals
MPW	Polluted Surface Water Sources	Naturally Occurring/Anthropogenic	Sewage, Pathogens, Nitrate, Metals, Acids, Bases, Organic/Inorganic Chemicals
MRF	Recycling Facilities	Operations/Storage/Disposal	Metals, Organic/Inorganic Chemicals, Pesticides, Automotive Wastes, Oils
MRP	Primary Road, Highway, or Arterial	Public Street, Thoroughfare, Highway, or Main Road	Gasoline, Diesel Fuels, Metals, Storm Water Runoff, Hazardous Materials, Radiological Materials
MSC	Schools – Unsewered	Wastewater Discharge to Septic Tank/Leach Field	Septage, Septic Effluent, Pathogens, Nitrate, Ammonia, Chloride
MSD	Storm Drainage Collection Areas or Outlets- Unlined	Storage/Disposal	Runoff, Pesticides, Fertilizer, Pathogens, Nitrate, Phosphate, Oil
MSL	Sewer Lines	Transport	Sewage, Pathogens, Nitrate, Metals, Organic/Inorganic Chemicals
MSP	Wastewater Seepage/Retention Ponds (Unlined/Lined)	Storage/Disposal	Sewage Effluent, Nitrate, Ammonia, Pathogens, Organic/Inorganic Chemicals, Pesticides
MSS	Sewage Effluent/Sludge Land Application Areas	Storage/Disposal	Sewage/Sewage Sludge, Nitrate, Pathogens, Organic/Inorganic Chemicals, Metals

APPENDIX D1: POTENTIAL SOURCES OF CONTAMINATION

Map Code	Land Use	Description	Contaminants of Concern*
MST	Sewage Treatment Plants	Operations/Maintenance/Storage/Disposal	Sewage, Sewage Sludge, Metals, Pathogens, Organic/Inorganic Chemicals
MSW	Solid Waste Transfer Stations	Storage/Disposal	Metals, Organic/Inorganic Chemicals, Pesticides, Automotive Wastes, Oils
MWP	Water Treatment Plants and Water Supply Wells	Operations/Maintenance/Storage/Disposal	Organic/Inorganic Chemicals, Chlorine
RSF	Single Family Residences - Unsewered	Wastewater Discharge to Septic Tank/Leach Field or Cesspool	Septage, Pathogens, Nitrate, Ammonia, Chloride, Heavy Metals, Household Pesticides, Herbicides, Cleaning Agents and Solvents, Fuels
* Contaminants of Concern include substances that are commonly, but not always, associated with the Contaminant Source listed in column 2			

APPENDIX D2: CONTAMINANTS OF CONCERN

Name of Contaminant	MCL *	Potential Contaminant Source (by Contaminant Code)***	Health Effects
VOLATILE ORGANIC CHEMICALS			
Benzene	0.005	AAP, APP, CAI, CAR, CBS, CBY, CCY, CDC, CHW, CHM, CHN, CSY, CPP, CPR, CPS, CRL, CRY, CUS, CVS, ICC, ICE, ICL, ICP, IEE, IFW, IFM, IHD, ILS, IMI, IMW, IMP, IPL, IPM, IPP, IPU, IRG, ISD, ISF, ISM, IST, ITS, ITT, IUD, IUI, IUR, MMF, MMP, MSW	Anemia; decrease in blood platelets; nervous system disorders; immune system depression; increased risk of cancer
Carbon Tetrachloride	0.005	AAP, APP, CAI, CDC, CHM, CHN, CHW, CPP, CPR, CRL, CUS, CVS, ICE, ICL, ICP, IEE, IHD, ILS, IMI, IMP, IMW, IPL, IPM, IPP, IPU, IRG, ISD, ISF, ISM, IST, ITS, ITT+, IUD, MLF, MMF, MMP, MSC, MSW	Liver problems; kidney, lung damage; increased risk of cancer
Ortho-Dichlorobenzene	0.6	CAR, CBS, CBY, CCY, CDC, CFR, CHM, CHW, CPP, CPR, CPS, CRL, CRY, CUS, ICE, ICP, ICL, IEE, IFM, IHD, ILS, IMI, IMP, IMW, IPL, IPM, IPP, IPU, IRG, ISD, ISF, ISM, IST, ITS, ITT, IUD, MHM, MMF, MMP, MSC	Liver, kidney, nervous system or circulatory problems
Para-Dichlorobenzene	0.075	ACS, AFI, AFN, AHC, AHF, ASC, ASP, CAR, CDC, CPP, CHW, CPP, CPR, CPS, CRL, CRY, CUS, ICL, ICP, ILS, IMP, IMW, IPL, IPP, IPU, IRG, ISF, ITS, ITT, MMF, MMP, MSC	Eye, respiratory, gastrointestinal tract irritation; anemia; skin lesions; liver, kidney, spleen damage; blood changes
1, 2-Dichloroethane	0.005	ACS, AFI, AFN, AHC, AHF, ASC, ASG, ASP, CFR, CHN, CPP, CPR, CRL, CUS, CVS, ICL, ICP, IEE, IFM, ILS, ITT, IMW, IPL, IPP, IRG, ISD, ISF, IUD, MMF, MSC	Nervous system disorders; lung, kidney, liver, circulatory, gastrointestinal effects; increased risk of cancer
1,1-Dichloroethene	0.007	CPP, CPR, CRL, CUS, ICP, ICL, IHD, ILS, IMW, IPL, IPM, IPU, IRG, ISD, ISF, ISM, ITS, ITT, IUD, MSC	Liver, kidney damage; increased risk of cancer; fetal toxicity
Cis-1, 2-Dichloroethene	0.07	AAP, CAI, CAR, CBS, CCY, CFR, CHG, CHM, CPP, CPR, CPS, CRL, CRY, CSS, CSY, ICP, ICL, IEE, IFM, IHD, ILS, IMI, IMP, IMW, IPL, IPM, IPP, IPU, IRG, ISD, ISF, ISM, ITS, ITT, IUD, IUI, MMF, MMP, MSP, MST	Nervous system disorders; liver, circulatory system damage
Trans-1, 2-Dichloroethene	0.1	AAP, CAI, CAR, CBS, CCY, CFR, CHG, CHM, CPP, CPR, CPS, CRL, CRY, CSS, CSY, IEE, IFM, ICP, ICL, IHD, ILS, IMI, IMP, IMW, IPL, IPM, IPP, IPU, IRG, ISD, ISF, ISM, ITS, ITT, IUD, IUI, MMF, MMP, MSP, MST	Nervous system disorders; liver, circulatory system damage
Dichloromethane	0.005	AAP, APP, ACS, AFI, AFN, AHC, AHF, ASC, ASG, ASP, CAI, CAR, CBS, CBY, CCE, CCY, CFC, CFR, CHN, CHW, CHM, CPP, CPR, CPS, CRY, CRL, CSS, CUS, CVS, ICC, ICE, ICP, ICL, IEE, IFM, IHD, ILS, IMI, IMP, IMW, IPL, IPM, IPP, IPU, IRG, ISD, ISF, ISM, IST, ITS, ITT, IUD, MHM, MMF, MMP, MSC, MSP, MSW	Nervous system, liver, blood damage; increased risk of cancer
1,2-Dichloropropane	0.1	ACS, AFI, AFN, AHC, AHF, ASC, ASG, ASP, CAW, CPP, CPR, CRL, CUS, ICL, ICP, IHD, ILS, IPM, IPP, IRG, ISD, ISF, ISM, ITT, IUD, IUI, MLF, MSP	Liver, kidney, adrenal glands, bladder, gastrointestinal tract, respiratory tract damage; increased risk of cancer

APPENDIX D2: CONTAMINANTS OF CONCERN

Name of Contaminant	MCL *	Potential Contaminant Source (by Contaminant Code)***	Health Effects
Ethylbenzene	0.1	CAI, CFR, CHM, CRL, CUS, ICC, ICP, ICL, IEE, IFM, IHD, ILS, IMI, IMP, IMW, IPL, IPM, IPP, IRG, ISD, ISF, ISM, ITS, ITT, IUD, IUI, MSC, MSP	Eye, liver, kidney, central nervous system damage; respiratory irritation
Chlorobenzene	0.005	CAR, CBS, CDC, CHW, CHM, CPP, CPR, CRL, CUS, ICP, ICL, IEE, IHD, ILS, IMI, IMP, IMW, IPL, IPP, IPU, IRG, ISD, ISF, ITS, ITT, IUD, IUI, MMF, MSC, MSP	Liver, kidney, central nervous system damage
Styrene	1	CHM, CPP, CPR, CRL, CUS, ICC, ICP, ICL, IEE, IHD, ILS, IMI, IMP, IMW, IPL, IPM, IPP, IRG, ISD, ISF, ISM, ITS, ITT, IUD, IUI, MSP	Liver, kidney, circulatory problems; nerve damage; increased risk of cancer
Tetrachloroethene	0.005	AAP, APP, CAI, CAR, CBS, CCY, CDC, CHM, CHN, CHW, CPP, CPR, CRL, CRY, CSS, CSY, CUS, CVS, ICC, ICL, ICP, IEE, IHD, ILS, IMI, IMO, IMP, IMW, IPL, IPM, IPP, IPU, IRG, ISD, ISF, ISM, ITS, ITT, IUD, IUI, MMF, MMP, MSC, MSP, MWP	Liver, kidney, circulatory problems; nerve damage; increased risk of cancer
Toluene	1	AAP, APP, CFR, CHW, CHM, CHN, CPP, CPR, CRL, CUS, CVS, ICC, ICP, ICL, IEE, IFM, IHD, ILS, IMI, IMP, IMW, IPL, IPM, IPP, IPU, IRG, ISD, ISF, ISM, ITS, ITT, IUD, MMF, MSC, MSP, MWP	Nervous system, liver, kidney damage
1,2,4-Trichlorobenzene	0.07	CRL, CUS, ICL, ICP, IHD, ILS, IPM, IPP, IRG, ISD, ISF, ISM, ITS, IUD	Liver, kidney, adrenal gland changes
1,1,1-Trichloroethane	0.2	AAP, APP, CAR, CAI, CBS, CBY, CCY, CDC, CFR, CHM, CHN, CHW, CPP, CPR, CRL, CUS, CVS, ICP, ICL, IEE, IFM, IHD, IHM, ILS, IMI, IMO, IMP, IMW, IPM, IPP, IRG, ISD, ISF, ISM, ITS, ITT, IUD, MHM, MMF, MMP, MSC, MSP, MWP	Liver, nervous system, circulatory problems
1,1,2-Trichloroethane	0.005	AAP, CDC, CPP, CPR, CRL, CUS, ICP, ICL, IEE, IFW, IHD, ILS, IMI, IMP, IMW, IPL, IPP, IRG, ISD, ISF, ITS, IUD, MSP	Liver, kidney, gastrointestinal tract, immune system problems; lung damage; increased risk of cancer
Trichloroethene	0.005	AAP, AFM, APP, CAI, CAR, CBS, CBY, CFR, CHG, CHM, CHW, CPP, CPR, CRL, CRY, CSY, CUS, ICE, ICL, ICP, IEE, IFM, IHD, ILS, IMI, IMP, IMW, IPL, IPM, IPP, IPU, IRG, ISD, ISF, ISM, ITS, ITT, IUD, IUI, MHM, MMF, MMP, MSC, MSP	Liver damage; increased risk of cancer
Vinyl Chloride	0.002	CRL, ICP, ICL, IEE, IHD, IMI, IMP, IMW, IPL, IPP, IRG, ISF, IST, ITT, IUD,	Liver, nervous system damage; increased risk of cancer

APPENDIX D2: CONTAMINANTS OF CONCERN

Name of Contaminant	MCL *	Potential Contaminant Source (by Contaminant Code)***	Health Effects
Xylenes (Total)	10	AAP, APP, ASC, CAI, CAR, CBS, CBY, CCY, CFR, CHM, CHN, CHW, CPP, CPR, CPS, CRL, CUS, CVS, IAS, ICC, ICL, ICP, IEE, IFM, IHD, ILS, IMI, IMP, IMW, IPL, IPM, IPP, IPU, IRG, ISD, ISF, ISM, IST, ITT, IUD, MHM, MMF, MSC, MSP	Central nervous system, liver, kidney damage
SYNTHETIC ORGANIC CHEMICALS: PESTICIDES			
Alachlor	0.002	ACS, ADC, AFI, AFN, AHC, ARL, ASC, ASP, CCE, CCG, CGC, CHW, CRL, CRY, CUS, ICL, ICP, IHD, ILS, IPP, IRG, ISD, ISF, ITS, ITT, IUD, IUI, IUR, MHM, MHR, MMF, MPR, MSC, MSD, MSP	Eye, skin irritation; liver, kidney, spleen, nose, eye damage; increased risk of cancer
Aldicarb	0.003	ACS, ADC, AFI, AFN, AHC, ASC, ASP, CAW, CGC, CHW, CRL, CUS, ICL, ICP, IHD, ILS, IPP, IRG, ISD, ISF, ITS, ITT, IUD, MPR, MPW, MSC, MSP	Gastrointestinal, central nervous system, eye problems
Aldicarb Sulfone	0.003	ACS, ADC, AFI, AFN, AHC, ASC, ASP, CAW, CGC, CHW, CRL, CUS, ICL, ICP, IHD, ILS, IPP, IRG, ISD, ISF, ITS, ITT, IUD, MPR, MPW, MSC, MSP	Gastrointestinal, central nervous system, eye problems
Aldicarb Sulfoxide	0.003	ACS, ADC, AFI, AFN, AHC, ASC, ASP, CAW, CGC, CHW, CRL, CUS, ICL, ICP, IHD, ILS, IPP, IRG, ISD, ISF, ITS, ITT, IUD, MPR, MPW, MSC, MSP	Gastrointestinal, central nervous system, eye problems
Atrazine	0.003	ACS, ADC, AFI, AFN, AHC, ARL, ASC, ASP, CAI, CAW, CCE, CCG, CFC, CGC, CHW, CRL, CRY, CUS, ICL, ICP, IHD, ILS, IPP, IPU, IRG, ISD, ISF, ITS, ITT, IUD, IUI, IUR, MHD, MHM, MLF, MMF, MPR, MPW, MSC, MSD, MSP, RMS	Cardiovascular system, kidney, adrenal gland damage; increased risk of cancer
Carbofuran	0.04	ACS, ADC, AFI, AFN, AHC, ASC, ASP, CAI, CAW, CCE, CCG, CGC, CHW, CPL, CRL, CST, CUS, ICL, ICP, IHD, ILS, IPP, IPU, IRG, ISD, ISF, ITS, ITT, IUD, IUI, IUR, MHR, MLF, MMF, MPR, MSC, MSD, MSP, RMS	Central nervous system, reproductive system damage
Chlordane	0.002	ACS, ADC, AFI, AFN, AHC, ASC, ASP, CAI, CAW, CBY, CCY, CRL, CST, CUS, ICP, ICL, IHD, ILS, IPP, IPU, IRG, ISD, ISF, ITS, ITT, IUD, IUR, MHM, MLF, MMF, MPR, MRF, MSC, MSD, MSP, RMS	Central nervous system, blood disorders; liver, kidney, heart, lung, spleen, adrenal gland damage; increased risk of cancer
2, 4-Dichlorophenoxyacetic acid (2,4-D)	0.07	ACS, ADC, AFI, AFN, AHC, ARL, ASC, ASP, CAI, CAW, CCE, CCG, CCY, CGC, CHW, CRL, CRY, CST, CUS, ICL, ICP, IHD, ILS, IPP, IPU, IRG, ISD, ISF, ITS, ITT, IUD, IUR, MHM, MHR, MLF, MMF, MPR, MPW, MSC, MSD, MSP	Nervous system, kidney, liver damage
Dalapon	0.2	ACS, ADC, AFI, AFN, AHC, ARL, ASC, ASP, CAI, CAW, CCE, CCG, CCY, CGC, CHW, CRL, CRY, CSY, CUS, ICL, ICP, IHD, ILS, IPP, IPU, IRG, ISD, ISF, ITS, ITT, IUD, IUI, IUR, MHD, MHM, MHR, MLF, MMF, MPR, MPW, MSC, MSD, MSP, RMS	Kidney changes

APPENDIX D2: CONTAMINANTS OF CONCERN

Name of Contaminant	MCL *	Potential Contaminant Source (by Contaminant Code)***	Health Effects
Dibromochloropropane	0.0002	ACS, ADC, AFI, AFN, AHC, ASC, ASP, CAI, CAW, CCE, CGC, CHW, CRL, CUS, ICL, ICP, IHD, ILS, IPP, IPU, IRG, ISD, ISF, ITS, ITT, IUD, IUR, MHM, MMF, MSC, MSD, MSP	Kidney, liver, reproductive system damage; increased risk of cancer
Dinoseb	0.007	ACS, ADC, AFI, AFN, AHC, ARL, ASC, ASP, CHW, CRL, ICL, ICP, IHD, IRG, ISD, ISF, ITT, IUD	Reproductive system problems
Diquat	0.02	ACS, ADC, AFI, AFN, AHC, AHF, ARL, ASC, ASG, ASP, CAW, CGC, CRL, CUS, ICL, ICP, IHD, ILS, IPP, IPU, ISD, ISF, ITS, ITT, IUD, IUR, MHM, MMF, MPW, MSD, MSP	Cataracts
Endothall	0.1	ACS, ADC, AFI, AFN, AHC, AHF, ARL, ASC, ASG, ASP, CAI, CAW, CBY, CCE, CCG, CCY, CGC, CHW, CPL, CRL, CRY, CST, CUS, ICL, ICP, IHD, ILS, IPP, IPU, IRG, ISD, ISF, ITS, ITT, IUD, IUR, MHM, MHR, MLF, MMF, MPR, MPW, MSC, MSD, MSP	Stomach, intestinal problems
Endrin	0.002	ACS, ADC, AFI, AFN, AHC, AHF, ARL, ASC, ASG, ASP, CAW, CRL, CRV, CRY, CST, CUS, ICL, ICP, IHD, ILS, IPP, IPU, IRG, ISD, ISF, ITS, ITT, IUD, IUR, MHM, MMF	Central nervous system problems; liver damage
Ethylene Dibromide (EDB)	0.00005	ACS, ADC, AHC, APP, ASC, ASG, ASP, CAI, CAW, CFR, CHW, CPP, CPR, CPS, CRL, CUS, ICL, ICP, IFM, IHD, ILS, IPL, IPP, IRG, ISD, ISF, ITS, ITT, IUD, MMF, MSP	Liver, stomach, adrenal gland, reproductive system, respiratory, nervous system, heart, kidney damage; increased risk of cancer
Glyphosate	0.7	ACS, ADC, AFI, AFN, AHC, AHF, ARL, ASC, ASP, CAI, CAW, CCE, CCG, CCY, CGC, CHW, CPL, CRL, CRY, CUS, ICL, ICP, IHD, ILS, IPP, IPU, IRG, ISD, ISF, ITS, IUD, IUI, IUR, MHM, MHR, MLF, MMF, MPR, MPW, MSC, MSD, MSP, RMS	Respiratory problems; kidney, reproductive system damage
Heptachlor	0.0004	CAI, CCY, CGC, CPL, CRL, CRV, CRY, ICE, ICL, ICP, IHD, IPP, IPU, ISF, ITT, IUD, IUR, MHM, MMF, MSC	Central nervous system, liver damage; increased risk of cancer
Heptachlor Epoxide	0.0002	CAI, CCY, CGC, CPL, CRL, CRV, CRY, ICE, ICL, ICP, IHD, IPP, IPU, ISF, ITT, IUD, IUR, MHM, MMF, MSC	Central nervous system, liver damage; increased risk of cancer
Hexachlorobenzene	0.001	ACS, ADC, ASC, ASG, ASP, CPP, CPR, CRL, CUS, ICL, ICP, IHD, ILS, IMW, IPL, IPP, IRG, ISF, ITS, ITT, IUD, MMF	Skin lesions; nerve, liver, kidney damage; reproductive system problems; endocrine gland tumors; increased risk of cancer

APPENDIX D2: CONTAMINANTS OF CONCERN

Name of Contaminant	MCL *	Potential Contaminant Source (by Contaminant Code)***	Health Effects
Hexachlorocyclopentadiene	0.05	CRL, CUS, ICL, ICP, IHD, ILS, IPL, IPP, IRG, ISF, ITS, ITT, IUD	Gastrointestinal problems; liver, kidney, heart damage
Lindane	0.0002	ACS, ADC, ADF, AFI, AFL, AFN, AHC, ARL, ASC, ASP, CCY, CHW, CPP, CPR, CRL, CVS, ICL, ICP, IHD, IPM, IPP, IRG, ISF, ISM, ITS, ITT, IUD, MHM, MMF, MSC, MSP	Liver, kidney damage; pulmonary problems
Methoxychlor	0.04	ACS, ADC, ADF, AFI, AFL, AFN, AHC, AHF, ASC, ASG, ASH, ASP, ASW, CBY, CCG, CGC, CHW, CRL, CUS, ICL, ICP, IHD, ILS, IPP, IPU, IRG, ISD, ISF, ITS, ITT, IUD, IUR, MHD, MHR, MMF, MPR, MSC, MSD	Central nervous system, gastrointestinal tract problems; liver, kidney, heart damage
Oxamyl (Vydate)	0.2	ACS, ADC, AFI, AFN, AHC, ASC, ASP, CAW, CCE, CGC, CHW, CRL, ICL, ICP, IHD, IPP, IPU, IRG, ISD, ISF, ITS, ITT, IUD, IUI, IUR, MHM, MLF, MMF, MSC, MSP	Central nervous system problems
Pentachlorophenol	0.001	ACS, ADC, AFI, AFN, AHC, ASC, ASP, CBY, CCY, CFR, CHW, CRL, CRY, ICL, ICP, IFM, IHD, IPM, IPP, IPU, IRG, ISF, ISM, ITT, IUD, MHM, MLF, MMF	Central nervous system damage, liver, kidney, reproductive system damage; increased risk of cancer
Picloram	0.5	ACS, ADC, AFI, AFN, AHC, ARL, ASC, ASP, CAI, CAW, CCE, CCG, CCY, CGC, CHW, CPL, CRL, CRY, ICL, ICP, IHD, IPP, IPU, IRG, ISD, ISF, ITS, ITT, IUD, IUI, IUR, MHD, MHM, MHR, MLF, MMF, MPR, MSC, MSD, MSP, RMS	Central nervous system, liver damage
Simazine	0.004	ACS, ADC, AFI, AFN, AHC, ARL, ASC, ASP, CAI, CAW, CBY, CCG, CCE, CCY, CGC, CHW, CPL, CRL, CRY, CSY, ICL, ICP, IHD, IPP, IPU, IRG, ISD, ISF, ITS, ITT, IUD, IUI, IUR, MHD, MHM, MHR, MLF, MMF, MPR, MPW, MSC, MSD, MSP	Reproductive system, blood, kidney, liver, thyroid damage; gene mutation; increased risk of cancer
2,3,7,8-TCDD (Dioxin)	3x10-8	CAI, CRL, ICL, ICP, IEE, IHD, IPP, IPU, ISF, IUD, IUR, MIN, MMF, MSW	Reproductive system problems; birth defects; increased risk of cancer
Toxaphene	0.003	ACS, ADC, AFI, AFL, AFN, APF, ARL, ASC, ASP, CRL, ICL, ICP, IHD, IPP, ISF, IUD	Central nervous system, thyroid problems; liver, kidney degeneration; increased risk of cancer
2,4,5-TP (Silvex)	0.05	ACS, ADC, ARL, ASC, ASP, CBY, CCE, CGC, CRL, CRY, ICL, ICP, IHD, IPP, IPU, ISF, ITT, IUD, IUR, MHM, MLF, MMF	Liver, kidney damage; central nervous system problems

APPENDIX D2: CONTAMINANTS OF CONCERN

Name of Contaminant	MCL *	Potential Contaminant Source (by Contaminant Code)***	Health Effects
Benzo (a) pyrene	0.0002	AFM, CAI, CAR, CBS, CCY, CFC, CRL, CRY, IAS, ICC, ICL, ICP, IFW, IHD, IMI, IMP, IPL, IPP, IPU, IRG, ISF, IST, ITT, MFS, MHM, MIN, MLF, MMF, MMP, MSC	Anemia; immune system depression; reproductive, developmental problems; increased risk of cancer
Di (2-ethylhexyl) adipate	0.4	AAP, CAI, CAR, CBY, CCY, CHW, CPS, CRL, CST, ICL, ICP, IHD, IMI, IMP, IMW, IPL, IPP, IPU, IRG, ISF, ITS, ITT, IUD, MIN, MLF, MMF, MMP, MSL, MSP, MSS, MST	Liver, reproductive system damage; increased risk of cancer
Di (2-ethylhexyl) phthalate	0.006	AAP, APP, CHM, CHW, CPP, CPR, CRL, CSY, ICE, ICL, ICP, IEE, IHD, IMP, IMW, IPL, IPP, IRG, ISF, IST, ITT, IUD, MHM, MIN, MLF, MMF, MRF, MSW	Liver, reproductive system damage; increased risk of cancer
Polychlorinated Biphenyls (PCB's)	0.0005	ACS, ASC, CAI, CCY, CHM, CRL, CRY, CST, CSY, ICL, ICP, IEE, IHD, IMI, IMP, IMW, IPL, IPM, IPP, IPU, IRG, ISF, ISM, ITS, IUD, IUR, MHM, MIN, MLF, MMF, MSS, MST, MSW	Skin problems, thymus gland, reproductive system, immune system problems; liver function changes; increased risk of cancer
INORGANIC CHEMICALS			
Antimony	0.006	CRL, CSY, ICL, ICP, IEE, IFW, IHD, IMI, IMP, IPL, IPP, IRG, ISF, IST, IUD, MIN, MLF, MSW	Blood changes; increased risk of cancer
Arsenic	0.05	AAP, ACS, ADC, AFI, AFN, AHC, APP, ASC, ASP, CAI, CAR, CBS, CCE, CCY, CFC, CGC, CHM, CHN, CPP, CPR, CRL, CRV, CSY, CVS, ICL, ICP, IEE, IHD, IMI, IMP, IMW, IPM, IPP, IRG, ISF, ISM, IUD, IPU, MLF, MMF, MSC, MSW	Skin damage; circulatory problems; increased risk of cancer
Asbestos	7 MLF (million fibers/Liter)	CAI, CAR, CBS, CBY, CCY, CHM, CHN, CHW, CRL, CRV, CRY, CSY, ICC, ICL, ICP, IHD, IHM, IMI, IMO, IMW, IPU, IRG, ISF, IST, ITT, IUD, MHD, MHM, MIN, MLF, MMF, MMP, MSC, MSW, MWP	Lung disease, increased risk of cancer
Barium	2	CAI, CAR, CAW, CBS, CCY, CFR, CHM, CHN, CHW, CPP, CPR, CRL, CRV, CRY, CSY, CVS, ICC, ICL, ICP, IEE, IFW, IFM, IGO, IHD, IHM, IMI, IPL, IPM, IPP, IPU, IRG, ISF, ISM, IST, ITT, IUD, IUI, IUR, MHM, MIN, MLF, MMF, MMP, MSC, MSW	Gastrointestinal problems; high blood pressure
Beryllium	0.004	CRL, CSY, ICL, ICP, IEE, IFW, IHD, IHM, IMI, IMO, IMP, IMW, IPP, IPU, IRG, IRW, ISF, IST, IUD, MIN, MLF, MMF, MSW	Lung, bone damage; increased risk of cancer
Cadmium	0.005	AAP, APP, CAI, CAR, CBS, CBY, CCY, CHG, CHM, CHW, CPP, CPR, CPS, CRL, CRY, CSS, CSY, ICC, ICE, ICL, ICP, IEE, IFW, IHD, IHM, IMI, IMO, IMP, IMW, IPL, IPM, IPP, IPU, IRG, ISF, ISM, IST, ITT, IUD, IUR, MHM, MIN, MLF, MMF, MMP, MSC, MSP, MSS, MST, MSW, MWP	Gastrointestinal problems; kidney, liver, bone, blood damage

APPENDIX D2: CONTAMINANTS OF CONCERN

Name of Contaminant	MCL *	Potential Contaminant Source (by Contaminant Code)***	Health Effects
Chromium	0.1	CPP, CPR, CRL, CSY, ICC, ICL, ICP, IEE, IFW, IHD, IHM, IMI, IMO, IMP, IMW, IPP, IPU, IRG, ISF, IST, ITS, ITT, IUD, MIN, MLF, MMF, MPW, MSC, MSP, MSS, MST	Skin problems; liver, kidney, circulatory, nerve damage.
Copper	1.3 TT** Action Level	AAP, ACS, ADC, AHC, APF, APP, ASC, ASP, CAR, CBS, CCY, CHM, CHN, CHW, CPP, CPR, CRL, CRY, CST, CSY, CVS, ICL, ICP, IEE, IFM, IFW, IHD, IHM, IMI, IMO, IMP, IMW, IPL, IPM, IPP, IPU, IRG, ISF, ISM, IST, ITS, ITT, IUD, MIN, MLF, MMF, MSP, MSS, MST, MSW	Gastrointestinal problems; liver, kidney damage; anemia
Cyanide	0.2	ACS, ADC, AFI, AFN, AHC, ASC, ASP, CCY, CHN, CHW, CPP, CPR, CPS, CRL, CST, CUS, CVS, ICL, ICP, IEE, IFW, IHD, ILS, IMI, IMP, IMW, IPL, IPM, IPP, IPU, IRG, ISD, ISF, ISM, IST, ITS, ITT, IUD, MHM, MLF, MMF, MPW, MSC, MSS, MST	Thyroid problems; nerve damage
Fluoride	4	ACS, ADC, ASC, ASF, CCY, ICC, ICL, ICP, IFW, IHM, IMI, IMO, IMP, IST, IUD, MWP	Tooth mottling; bone disease
Lead	0.015 TT**	CAI, CAR, CBS, CBY, CCY, CFR, CHG, CHM, CHN, CHW, CPP, CPR, CPS, CRL, CRY, CSY, ICC, ICL, ICP, IEE, IFM, IFW, IHD, IHM, IMI, IMO, IMP, IMW, IPL, IPM, IPP, IPU, IRG, ISF, ISM, IST, ITS, ITT, IUD, IUR, MHD, MHM, MIN, MLF, MMF, MMP, MRF, MSC, MSP, MSS, MST, MSW, MWP, RMS	Blood, neurological development problems; kidney disease; stroke; increased risk of cancer
Mercury	0.002	AAP, ACS, ADC, AFI, AFN, AHC, APP, ASC, ASP, CAI, CAR, CBS, CBY, CCY, CFR, CHM, CHN, CHW, CPP, CPR, CRL, CRV, CRY, CST, CSY, CUS, CVS, ICE, ICL, ICP, IEE, IFM, IFW, IHD, IHM, ILS, IMI, IMO, IMP, IMW, IPL, IPM, IPP, IPU, IRG, ISF, ISM, IST, ITS, ITT, IUD, IUR, MHM, MIN, MLF, MMF, MPW, MRF, MSC, MSP, MSS, MST, MSW	Kidney damage
Nickel	0.1	CAI, CAR, CBS, CBY, CCY, CPP, CPR, CRL, CST, CSY, CUS, ICE, ICL, ICP, IEE, IFW, IHD, IHM, ILS, IMI, IMO, IMP, IMW, IPL, IPM, IPP, IPU, IRG, ISF, IST, ITS, ITT, IUD, MHM, MIN, MLF, MMF, MMP, MPW, MRF, MSC, MSP, MSS, MST, MSW	Gastrointestinal irritation; nerve, liver, kidney, reproductive system damage
Nitrate	10	AAP, ACS, ADC, ADF, AFI, AFL, AFN, AHC, AMA, AMS, AOA, APF, APP, ARL, ASC, ASF, ASH, ASW, CAI, CAW, CBB, CBY, CCE, CCG, CCW, CCY, CFC, CGC, CHG, CHN, CPL, CPP, CPR, CRL, CST, CVS, ICL, ICP, IHD, IHM, IMI, IMO, IMP, IMW, IPL, IPM, IPP, IPU, ISD, ISF, ISM, ITS, ITT, IUD, IUR, MHD, MHM, MLF, MMF, MPR, MPS, MPW, MSC, MSD, MSL, MSP, MSS, MST, MSW, MWP, RMS	Methemoglobinemia; spleen damage
Nitrite	1	AAP, ACS, ADC, ADF, AFI, AFL, AFN, AHC, AMA, AMS, AOA, APF, APP, ARL, ASC, ASF, ASH, ASW, CAI, CAW, CBB, CBY, CCG, CCE, CCW, CCY, CFC, CGC, CHG, CHN, CPL, CPP, CPR, CRL, CST, CVS, ICL, ICP, IHD, IHM, IMI, IMO, IMP, IMW, IPL, IPM, IPP, IPU, ISD, ISF, ISM, ITS, ITT, IUD, IUR, MHD, MHM, MLF, MMF, MPR, MPS, MPW, MSC, MSD, MSL, MSP, MSS, MST, MSW, MWP, RMS	Methemoglobinemia; spleen damage
Selenium	0.05	ADC, AFI, AFN, ARL, CPP, CPR, CRL, ICC, ICL, ICP, IEE, IFW, IHD, IHM, IMI, IMO, IMP, IMW, IPL, IPM, IPP, IPU, IRG, ISF, IST, IUD, MHM, MIN, MLF, MMF, MPW, MSC, MSS, MST, MSW	Peripheral nervous system, kidney, liver, circulatory system damage

APPENDIX D2: CONTAMINANTS OF CONCERN

Name of Contaminant	MCL *	Potential Contaminant Source (by Contaminant Code)***	Health Effects
Thallium	0.002	CHN, CPP, CRL, ICC, ICE, ICL, ICP, IEE, IFW, IHD, IHM, IMI, IMO, IMP, IPL, IPP, IPU, IRG, ISF, IUD, IUR, MIN, MLF, MMF, MSS, MST, MSW	Blood chemistry changes; nerve, liver, kidney, intestinal, reproductive system damage
RADIONUCLIDES			
Beta Particles and Photon Emitters	4 Millirems per year	CAW, CHN, CRL, IGO, IHM, IMO, IRG, IRW, ISF, MMF, MWP	Increased risk of cancer
Gross Alpha Particle Activity	15 Picocuries per Liter	CAW, CHN, CRL, IGO, IHM, IMO, IRG, IRW, ISF, MMF, MWP	Increased risk of cancer
Radium 226 and Radium 228 (Combined)	5 Picocuries per year	CAW, CHN, CRL, IGO, IHM, IMO, IRG, IRW, ISF, MMF, MWP	Increased risk of cancer
MICROBIOLOGICAL (Pathogenic organisms)			
Cryptosporidium parvum		AAP, ADC, ADF, AFL, AMA, AMS, AOA, APF, APP, ARL, ASH, ASW, CAW, CBY, CCG, CFC, CHN, CPL, CRV, CSS, CST, CVS, ISD, ITS, IUI, IUR, MHD, MHR, MMF, MPR, MPS, MPW, MSC, MSD, MSL, MSP, MSS, MST, MWP, RMS	Cryptosporidiosis (a gastroenteric disease)
Giardia lamblia	TT**	AAP, ADC, ADF, AFL, AMA, AMS, AOA, APF, APP, ARL, ASH, ASW, CAW, CBY, CCG, CFC, CHN, CPL, CRV, CSS, CST, CVS, ISD, ITS, IUI, IUR, MHD, MHR, MMF, MPR, MPS, MPW, MSC, MSD, MSL, MSP, MSS, MST, MWP, RMS	Giardiasis (a gastroenteric disease)
Legionella sp.	TT**	ADC, CBY, ITS, MPW, MSD, MSP, MWP	Legionnaire's Disease; pneumonia
Total Coliforms (Including	5 Percent (See NOTE 1)	AAP, ADC, ADF, AFL, AMA, AMS, AOA, APF, APP, ARL, ASH, ASW, CAW, CBY, CCG, CFC, CHN, CPL, CRV, CSS, CST, CVS, ISD, ITS, IUI, IUR, MHD, MHR, MMF, MPR, MPS, MPW, MSC, MSD, MSL, MSP, MSS, MST, MWP, RMS	Used as an indicator that other potentially harmful bacteria may be present (see NOTE 2)
Fecal Coliform & E. coli)			
Turbidity	TT**	ADC, CBY, CCG, CCW, CCY, CGC, CPL, CRV, CRY, ICC, IHD, IHM, IMO, IPM, IUD, IUR, MHD, MHM, MHR, MIN, MLF, MMF, MPR, MPW, MRF, MSC, MSD, MSL, MSP, MSS, MST, MSW, RMS	Turbidity has no health effects but can interfere with disinfection and provide a medium for bacterial growth. It may indicate the presence of microbes

APPENDIX D2: CONTAMINANTS OF CONCERN

Name of Contaminant	MCL *	Potential Contaminant Source (by Contaminant Code)***	Health Effects
Viruses (Enteric)	TT**	AAP, ADC, ADF, AFL, AMA, AMS, AOA, APF, APP, ARL, ASH, ASW, CAW, CBY, CCG, CFC, CHN, CPL, CRV, CSS, CST, CVS, ISD, ITS, IUI, IUR, MHD, MHR, MMF, MPR, MPS, MPW, MSC, MSD, MSL, MSP, MSS, MST, MWP, RMS	Gastroenteric disease

Appendix E
Sampling Schedules

Water System Detail Information

Water System No.:	NM3509623	Federal Type:	C
Water System Name:	RIO RANCHO WATER & WW SERVICES	Federal Source:	GW
Principal County Served:	SANDOVAL	System Status:	A
Principal City Served:	RIO RANCHO	Activity Date:	06-01-1977

[Expanded Sample Schedules / FANLs / Plans](#)

Routine TCR Sample Schedules

Begin/End Date	Seasonal Period	Requirements
09-01-2011 - Continuous	1/1 - 12/31	90 RT/MN
07-01-2008 - 08-31-2011	1/1 - 12/31	80 RT/MN
01-01-1991 - 06-30-2008	1/1 - 12/31	60 RT/MN

RP TCR Schedules From  To  

Repeat TCR Sample Schedules

Begin Date	End Date	Requirements	Original Sample ID/Date
------------	----------	--------------	-------------------------

GWR Triggered Source Sample Schedules (Last 6 Months)

Facility	Schedule	Begin Date	End Date	Initial MP Begin Date
----------	----------	------------	----------	-----------------------

GWR Follow-up Triggered Source Sample Schedules (Last 6 Months)

Facility	Schedule	Begin Date	End Date
----------	----------	------------	----------

Group Non-TCR Sample Schedules

Facility	Begin End Date	Seas.	Init. MP Begin Dt	Req's	Analyte Group
09623000	10-01-2012 Continuous	1/1 1/31	10-01-2012	4 RT/QT	DBP2 - DBP STAGE 2
09623000	01-01-2011 Continuous	6/1 9/30	01-01-2011	30 RT/3Y	PBCU - LEAD AND COPPER
09623021	01-01-2002 Continuous		01-01-2002	1 RT/3Y	HM - HEAVY METALS

09623021	01-01-2008 Continuous		01-01-2008	1 RT/6Y	NRAD - NEW RAD RULE
09623021	01-01-2014 Continuous		01-01-2014	2 RT/3Y	RSOC - REGULATED SOCS
09623021	01-01-2002 Continuous		01-01-2002	1 RT/3Y	VOCI - VOLATILE ORGANICS
09623024	01-01-2008 Continuous		01-01-2008	1 RT/3Y	HM - HEAVY METALS
09623024	01-01-2008 Continuous		01-01-2008	1 RT/9Y	NRAD - NEW RAD RULE
09623024	01-01-2014 Continuous		01-01-2014	2 RT/3Y	RSOC - REGULATED SOCS
09623024	01-01-2008 Continuous		01-01-2008	1 RT/3Y	VOCI - VOLATILE ORGANICS
09623025	01-01-2011 Continuous		01-01-2011	1 RT/3Y	HM - HEAVY METALS
09623025	01-01-2008 Continuous		01-01-2008	1 RT/6Y	NRAD - NEW RAD RULE
09623025	01-01-2014 Continuous		01-01-2014	2 RT/3Y	RSOC - REGULATED SOCS
09623025	01-01-2011 Continuous		01-01-2011	1 RT/3Y	VOCI - VOLATILE ORGANICS
09623027	01-01-2014 Continuous		01-01-2014	1 RT/3Y	HM - HEAVY METALS
09623027	01-01-2014 Continuous		01-01-2014	1 RT/3Y	NRAD - NEW RAD RULE
09623027	01-01-2014 Continuous		01-01-2014	1 RT/3Y	RSOC - REGULATED SOCS
09623027	01-01-2014 Continuous		01-01-2014	1 RT/3Y	VOCI - VOLATILE ORGANICS
09623028	01-01-2011 Continuous		01-01-2011	1 RT/3Y	HM - HEAVY METALS
09623028	01-01-2008 Continuous		01-01-2008	1 RT/6Y	NRAD - NEW RAD RULE
09623028	01-01-2014 Continuous		01-01-2014	2 RT/3Y	RSOC - REGULATED SOCS
09623028	01-01-2011 Continuous		01-01-2011	1 RT/3Y	VOCI - VOLATILE ORGANICS
09623030	01-01-2002 Continuous		01-01-2002	1 RT/3Y	HM - HEAVY METALS
09623030	01-01-2008 Continuous		01-01-2008	1 RT/6Y	NRAD - NEW RAD RULE
09623030	01-01-2014 Continuous		01-01-2014	2 RT/3Y	RSOC - REGULATED SOCS

09623030	01-01-2002 Continuous		01-01-2002	1 RT/3Y	VOC1 - VOLATILE ORGANICS
09623031	01-01-2011 Continuous		01-01-2011	1 RT/3Y	HM - HEAVY METALS
09623031	01-01-2008 Continuous		01-01-2008	1 RT/6Y	NRAD - NEW RAD RULE
09623031	01-01-2014 Continuous		01-01-2014	2 RT/3Y	RSOC - REGULATED SOCS
09623031	01-01-2002 Continuous		01-01-2002	1 RT/3Y	VOC1 - VOLATILE ORGANICS
09623032	01-01-2017 Continuous		01-01-2017	1 RT/3Y	HM - HEAVY METALS
09623032	01-01-2002 12-31-2016		01-01-2002	1 RT/3Y	HM - HEAVY METALS
09623032	01-01-2008 Continuous		01-01-2008	1 RT/6Y	NRAD - NEW RAD RULE
09623032	01-01-2014 Continuous		01-01-2014	2 RT/3Y	RSOC - REGULATED SOCS
09623032	01-01-2002 Continuous		01-01-2002	1 RT/3Y	VOC1 - VOLATILE ORGANICS
09623035	01-01-2002 Continuous		01-01-2002	1 RT/3Y	HM - HEAVY METALS
09623035	01-01-2008 Continuous		01-01-2008	1 RT/6Y	NRAD - NEW RAD RULE
09623035	01-01-2014 Continuous		01-01-2014	2 RT/3Y	RSOC - REGULATED SOCS
09623035	01-01-2002 Continuous		01-01-2002	1 RT/3Y	VOC1 - VOLATILE ORGANICS
09623041	01-01-2005 Continuous		01-01-2005	1 RT/3Y	HM - HEAVY METALS
09623041	01-01-2011 Continuous		01-01-2011	1 RT/6Y	NRAD - NEW RAD RULE
09623041	01-01-2014 Continuous		01-01-2014	2 RT/3Y	RSOC - REGULATED SOCS
09623041	01-01-2014 Continuous		01-01-2014	1 RT/3Y	VOC1 - VOLATILE ORGANICS

Individual Non-TCR Sample Schedules

Facility	Begin End Date	Seas	Init MP Begin Dt	Req.	Analyte
09623021	01-01-2002 Continuous		01-01-2002	1 RT/3Y	1024-CYANIDE

09623021	01-01-2002 Continuous		01-01-2002	1 RT/3Y	1025-FLUORIDE
09623021	01-01-2002 Continuous		01-01-2002	1 RT/YR	1038-NITRATE-NITRITE
09623024	01-01-2008 Continuous		01-01-2008	1 RT/3Y	1024-CYANIDE
09623024	01-01-2008 Continuous		01-01-2008	1 RT/3Y	1025-FLUORIDE
09623024	01-01-2008 Continuous		01-01-2008	1 RT/YR	1038-NITRATE-NITRITE
09623025	01-01-2002 Continuous		01-01-2002	1 RT/3Y	1024-CYANIDE
09623025	01-01-2002 Continuous		01-01-2002	1 RT/3Y	1025-FLUORIDE
09623025	01-01-2002 Continuous		01-01-2002	1 RT/YR	1038-NITRATE-NITRITE
09623027	01-01-2014 Continuous		01-01-2014	1 RT/3Y	1024-CYANIDE
09623027	01-01-2014 Continuous		01-01-2014	1 RT/3Y	1025-FLUORIDE
09623027	01-01-2014 Continuous		01-01-2014	1 RT/YR	1038-NITRATE-NITRITE
09623028	01-01-2011 Continuous		01-01-2011	1 RT/3Y	1024-CYANIDE
09623028	01-01-2011 Continuous		01-01-2011	1 RT/3Y	1025-FLUORIDE
09623028	01-01-2011 Continuous		01-01-2011	1 RT/YR	1038-NITRATE-NITRITE
09623030	01-01-2002 Continuous		01-01-2002	1 RT/3Y	1024-CYANIDE
09623030	01-01-2002 Continuous		01-01-2002	1 RT/3Y	1025-FLUORIDE
09623030	01-01-2002 Continuous		01-01-2002	1 RT/YR	1038-NITRATE-NITRITE
09623031	01-01-2002 Continuous		01-01-2002	1 RT/3Y	1024-CYANIDE
09623031	01-01-2002 Continuous		01-01-2002	1 RT/3Y	1025-FLUORIDE
09623031	01-01-2002 Continuous		01-01-2002	1 RT/YR	1038-NITRATE-NITRITE
09623032	01-01-2002 Continuous		01-01-2002	1 RT/3Y	1024-CYANIDE
09623032	01-01-2002 Continuous		01-01-2002	1 RT/3Y	1025-FLUORIDE

09623032	01-01-2002 Continuous		01-01-2002	1 RT/YR	1038-NITRATE-NITRITE
09623035	01-01-2002 Continuous		01-01-2002	1 RT/3Y	1024-CYANIDE
09623035	01-01-2002 Continuous		01-01-2002	1 RT/3Y	1025-FLUORIDE
09623035	01-01-2002 Continuous		01-01-2002	1 RT/YR	1038-NITRATE-NITRITE
09623041	01-01-2005 Continuous		01-01-2005	1 RT/3Y	1024-CYANIDE
09623041	01-01-2005 Continuous		01-01-2005	1 RT/3Y	1025-FLUORIDE
09623041	01-01-2007 Continuous		01-01-2007	1 RT/YR	1038-NITRATE-NITRITE

Facility Analyte Levels(FANLS)

Site	Analyte	Level Type	Value	Units	Days/Month	Samples/Day	Begin Date	End Date	MDBP Type
09623000	0999	MAX	4.0	MG/L	0	0	01-01-2011	Continuous	MRDL

Sample Plans

Rule	Analyte/Analyte Group	Eff. Begin	Eff. End	App. Date	For Comp.
------	-----------------------	------------	----------	-----------	-----------

Appendix F
Public Involvement

Meeting Materials



CITY OF RIO RANCHO
Source Water Protection Plan Update 2020
Meeting Notes

Date: December 16, 2020

Location: MS Teams meeting

Purpose: Meeting of the Source Water Protection Team

Invitees:

NAME	ORG	EMAIL	Attended?
Marian Wrage	City	MWRAGE@rrnm.gov	X
Jennifer Hill	DBSA	jhill@geo-logic.com	X
Kelly Baker	DBSA	kbaker@geo-logic.com	X
Scott Bulgrin	Sandia Pueblo	sbulgrin@sandiapueblo.nsn.us	
Carrie Weitz	Intel	Carrie.a.weitz@intel.com	X
Elaine Cimino	resident/Common Ground Rising	ecimino10@gmail.com	X
Dave Gatterman	SSCAFCA	dgatterman@scafca.com	X
Eugene Pettes	City	XPETTES@RRNM.GOV	
Steven Glass	Ciudad Soil & conservation district	jstvglass@gmail.com	X
Samuel Janes	Town of Bernalillo	sjanes@townofbernalillo.org	
Koryn Misbach	City	kmisbach@rrnm.gov	X
Charles Fernandez	City	CFERNANDEZ@RRNM.GOV	
Steve Gallegos	City	SGALLEGOS@RRNM.GOV	X
Jim Chiasson	City	jchiasson@rrnm.gov	X
David Peterson	Jacobs	David.Peterson@jacobs.com	
Diane Agnew	ABCWUA	dagnew@abcwua.org	
Kate Mendoza	ABCWUA	kmendoza@abcwua.org	X
Julian Bonnell	Jacobs	Julian.Bonnell@jacobs.com	
Tom Ruhl	resident/Common Ground Rising	taruhl@gmail.com	
Pat Gallegos	Jacobs	PGALLEGOS@RRNM.GOV	
Dan Darnell	Waste Mgnt	ddarnell@wm.com	X
Kostas James	Waste Mgnt	KJames1@wm.com	
Joseph Benney	Corrales	JBenney@corrales-nm.org	
Laurie Stout	Corrales	LStout@corrales-nm.org	
D Burn	Sandoval County	dburn@sandovalcountynm.gov	
Larry Mikkelsen	Town of Bernalillo	lmikkelsen@townofbernalillo.org	
Simon Parra	City	SPARRA@RRNM.GOV	X
Brian Freeman	Intel		X



Notes

The meeting was held for the biannual update of the Source Water Protection Plan for the City of Rio Rancho.

DBS&A prepared the original plan in 2017. It was updated in 2019, and will be updated again in 2021 with feedback from this group.

DBS&A reviewed the contents of the plan and in particular the susceptibility analysis which examines the sensitivity of water sources to potential sources of contamination and also the vulnerability of those sources to PSOCs. The sensitivity is a factor of well construction, depth and hydrogeologic conditions. The vulnerability is related to the number of PSOCs within the source water protection area.

We would like to update the members of the Source Water Protection Team listed in the plan. Let us know if the contact for your organization has changed or if your organization is not listed and would like to be. We are asking for feedback on the map of PSOC's within the SWP areas. This map is used to inventory PSOC's by municipal well, and subsequently to assign vulnerability rankings. The map has been updated with the latest NMED geodatabase which includes state maintained information such as discharge permits, and fuel storage tanks. To this, we add features such as arroyos and ponds. We have mapped septic tank based on structures that appear in aerial imagery that are not in close proximity to City sewer. We have mapped private wells based on the Office of the State Engineer database of registered wells. We ask that team members mark up the map and return if they have PSOC's they know of that should be shown.

Elaine Cimino provided an article prior to the meeting concerning dumping of salt from brine wells drilled near the Rio Puerco at the landfill that is owned and operated by Waste Management in Rio Rancho. She said that brine water was also dumped into the sewer system in 2019. Reportedly, 51 loads of this waste were received by the landfill in 2017. She mentioned that there should be monitoring of the landfill to protect surrounding schools and residential development.

Dan Darnell from Waste Management responded to Ms. Cimino. He is the public sector manager for the State of New Mexico for WM. He said WM disagrees with the facts and assertions of the report. He also noted they are nearing the end of the permit (2028) but will be required to continue to monitor that site for 30 years. They have monitors in place and believe the liner is in good condition. He also noted that the landfill was at its current location prior to schools and subdivisions being built in the area.

Marian asked for comments on the plan and information on PSOCs to be submitted to Jennifer Hill at DBS&A or Marian Wrage at the City of Rio Rancho by December 31, 2020. DBS&A will update the plan with this information and plans to issue a draft report for review to this



Daniel B. Stephens & Associates, Inc.

group in January of 2021. The City needs to provide additional information and data for the draft report.

We will provide a two week review period on the draft report and then finalize.

Public Comments and Responses

2021 Update

City of Rio Rancho (CoRR)

Source Water Protection Plan

Public Water System # NM3537326

Memo: Additional Comments to Final SWPP Draft Elaine Cimino

March 1, 2021

When the draft report was first sent in January 2021, I issued a report that I would like to be added into the final SWPP document, as I did not see it within the Final Draft 2021 update.

Comments and recommendations:

- 1.) According to the Office of the State Engineer (OSE) there has not been a hydrological study on the CoRR municipal wells since 2003. The land development within and surrounding the City and the potential for impacts to the source water of perched aquifers within the region has grown substantially. The SWPP needs more than little circles drawn on a map to gage feet or a mile from the wellhead. This is not sufficient with current level of threat to the drinking water supply. The hydrological study must include municipal well capture zones that could possibly extend outside the cone of depression for each well. This is crucial science and data collecting to bring any further creditability to this process of protecting source water and planning. Without this data the plan lacks creditably in showing that the source water is indeed being protected. There was a request in 2018 that the plan for the hydrological study of the Upper middle Rio Grande be completed from the USGS and NM TECH. this was discussed during ordinance hearings at the County. The CoRR should be a part of the study.
 - a. Add Hydrological study and any capture zone data the City currently has regarding the City Municipal Wells.
- 2.) The report submitted by Elaine Cimino added to this plan and a request that testing be implemented for radioactive contaminants of the Leachate at the landfill, the monitoring wells examined to ensure proficiency, siting, and screen depth, monitoring of air quality at schools around the landfill, and test soil.
- 3.) That testing of the municipal wells be done to look for the elements found in the Rio West brine wells. NMED has recently requested that IMH Larry Bain and Gary Lee comply with a reopening of the corrective active report (CAR) on the Rio West Brine Wells. (See Attached letter)
- 4.) In addition to radioactive elements that are known to be in the radioactive TENORM salts dump in the municipal landfill, there are known, PFAS, PFOS and Other 'forever chemicals.' [In a recent study the Rio Grande was cited for levels of PFAS and PFOS.](#) (See attached USGS-NMED Data Spread Sheet) We are requesting that the CoRR Test in the area of concern where water soil and air may contain these Forever chemicals.

“Moreover, while U.S. Environmental Protection Agency studies and recommendations have focused on just two types of PFAS—perfluorooctanoic acid (PFOA) and perfluoro-octane sulfonic acid (PFOS)—the new study seeks evidence of 26 other members of the toxic family, as well. By and large, the numbers popping up in the USGS water samples are small.

“More than two years ago, the military found PFAS in the waters below Cannon and Holloman Air Force bases in Clovis and outside Alamogordo—and tied the contamination to the use of firefighting foams. Now, the Pentagon is investigating whether PFAS are leaking from five other military installations in the state, including Fort Wingate, the Army National Guard armories in Rio Rancho and Roswell, the Army Aviation Support Facility in Santa Fe, and White Sands Missile Range. “ (DOD is doing a site investigation of the Rio Rancho Armory (and the other four places in the state that are on their list, in addition to Cannon and Holloman it is expected this next year) This should be sited in the SWPP.

You can view a longer conversation about this issue [here](#).

- 5.) The City or Rio Rancho should be looking for the source of this type of contamination in all municipal wells especially as [2021 drought will be severe and getting worse](#) in years to come as more reliance of the aquifer will cause more depletion allowing contaminants to concentrate.
<https://www.washingtonpost.com/weather/2021/01/07/drought-expands-north-america/?arc404=true>
- 6.) In the Interest of transparency, the City should make available in the SWPP any current testing, any additional testing over and above what is required by law, to insure to the public that the CoRR are taking these concerns seriously. There are substantial costs involved in drinking water protection. It will be important to acquire state and federal funding for these projects and to make sure those responsible for the radiation poisoning are held accountable.

As a resident of Rio Rancho, these recommendations and requests are the first steps to finding and certifying the extent of the contamination of the air, water and soil and what are the impacts to residents and business in the area. It is important that we do everything possible to protect source drinking water, being that the health of residents is a foremost concern, and those living in the immediate areas of contamination of these threats are notified and that the contaminants are mitigated or it will severely curtail sustainable development and economic recovery.



Michelle Lujan Grisham
Governor

Howie C. Morales
Lieutenant Governor

**NEW MEXICO
ENVIRONMENT DEPARTMENT**

Ground Water Quality Bureau

1190 St. Francis Drive / PO Box 5469
Santa Fe, NM 87502-5469
Phone (505) 827-2900 Fax (505) 827-2965
www.env.nm.gov



James C. Kenney
Cabinet Secretary

Jennifer J. Pruett
Deputy Secretary

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

February 26, 2021

Lawrence Bain
ITH Partners, LLC
7117 North 68th Place
Paradise Valley, AZ 85253
ldb@ithpartners.com

for
IMH Financial Corporation
7001 North Scottsdale Road, Suite 2050
Scottsdale, AZ 85253
legal@imhfc.com

RE: Corrective Action Work Plan required - Rio West Brine Artesian Brine Spill, Sandoval County, New Mexico

Dear Mr. Bain:

The New Mexico Environment Department (NMED) has received a Correction to Corrective Action Report (CAR), dated May 20, 2020, for the unauthorized discharge referenced above (Spill). The Spill occurred in November 2016 at latitude 35.285782° North, longitude - 106.914581° East, near Alamo Ranch, Sandoval County, New Mexico, and consisted of approximately 11 acre-feet of brine water from the deep artesian exploration well EXP-06. The corrected CAR presents new information to indicate that metals contamination may be present at concentrations requiring corrective action. Considering this new information, NMED hereby rescinds the “no further action” provided in the NMED CAR approval letter dated March 15, 2019 and requires IMH Financial Corporation (IMH) to submit a new corrective action work plan to address the additional concerns.

In 2018, pursuant to Section 1203.A of the New Mexico Ground and Surface Water Protection Regulations (20.6.2 NMAC), R.T. Hicks, on behalf of Recorp Investments, Inc., performed the following corrective actions in response to the Spill:

1. excavation of four soil characterization trenches within and adjacent to the former EXP-06 drilling pit;

2. advancement of eleven borings advanced within One Arroyo and tributary within the release area;
3. shallow soil sample collection via hand augers within and adjacent to the EXP-05 pit;
4. collection of 101 soil samples for laboratory analysis of chlorides to profile vertical impact, with 15 samples also analyzed for fluoride, sulfate, arsenic, boron, selenium, perchlorate, radium and conductivity.

In accordance with the reporting requirements of Section 1203.A(7) of 20.6.2 NMAC, in January 2019, R.T. Hicks submitted to NMED a CAR documenting completion of the corrective action, which NMED subsequently approved March 15, 2019. According to the 2019 CAR, multiple soil samples collected at the EXP-05 and EXP-06 well heads contained concentrations of arsenic in excess of the Residential Cancer Soil Screening Level. The January 2019 CAR states, “[this material] *was removed to an approved landfill.*” According to the corrected CAR, submitted to NMED by R.T. Hicks in May 2020, the soils were, in fact, “*used to rehabilitate the wellhead production pads,*” and not disposed offsite as originally indicated. Based on this information, NMED rescinds the March 15, 2019 CAR approval letter and requires IMH to take additional corrective action to investigate and potentially remediate arsenic in soil in the well pad areas of EXP-05 and EXP-06. Please submit a corrective action work plan to address these concerns for NMED review and approval within 30 days of receipt of this letter.

NMED is taking all necessary precautions to reduce the spread of COVID-19. Given the current public health emergency, all activities must be conducted in accordance with the Governor’s current Executive Orders and Public Health Orders. Please help to keep New Mexicans safe by visiting the New Mexico Department of Health’s website to learn how you can play a role in stopping the spread of COVID-19 (<https://cv.nmhealth.org>). If you believe the current COVID-19 restrictions impact your ability to safely complete one or more required tasks noted herein, please inform NMED GWQB immediately so that alternate arrangements, if appropriate, may be discussed.

NMED reserves all rights to take enforcement actions due to submission of false information.

NMED strongly encourages you to confer with NMED during the preparation of the required corrective action work plan. If you have any questions, please contact Justin Ball, State Cleanup Program Team Leader, at (505) 670-1428 or justin.ball@state.nm.us.

Sincerely,

Michelle Hunter, Chief
Ground Water Quality Bureau

cc: David Hamilton, R.T. Hicks Consultants, david@rthicksconsult.com
Gary Lee, P.E., glee@uam-llc.com

Mr. Bain
February 26, 2021
Page 3 of 3

Eddie Paulsgrove, skysoldier3446@gmail.com
Andrew Knight, NMED-OGC
Chuck Akeley, NMED-SWB
Karen Menetrey, NMED-ROS
Justin Ball, NMED-ROS-SCP
Avery Young, NMED-PPS
ROS Reading File

**USGS PFAS Sampling Results – Groundwater
August-September 2020**

Water System Name / Well Name	USGS Site ID	County	Date	PFSA (ng/L)				PFCA (ng/L)										FOSA (ng/L)	FOSAA (ng/L)		FTSA (ng/L)			Replacement/Other (ng/L)				PFOA+ PFOS (ng/L)	ΣPFAS (ng/L)							
				PFBS	PFPeS	PFHxS	PFHpS	PFOS	PFNS	PFDS	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnDA	PFDoDA	PFTDA	PFTeDA	PFOSA	N-MeFOSAA	N-EtFOSAA	4:2 FTS	6:2 FTS	8:2 FTS			9Cl-PF3ONS	11Cl-PF3OUdS	ADONA	HFPO-DA			
Las Cruces Municipal Water System / Well 59	321804106484001	Doña Ana	2020-09-29					1.8 E																										--	--	
Las Cruces Municipal Water System / Well 32	321806106461501	Doña Ana	2020-09-29																														--	--		
Alamogordo Domestic Water System / Prather 2 South	324711105585201	Otero	2020-09-18																														--	--		
Alamogordo Domestic Water System / Prather 1 North	324752105585301	Otero	2020-09-17																														--	--		
Alamogordo Domestic Water System / Well 5	325827105562201	Otero	2020-09-17																															--	10.9	
Causey Water System / Well 1	335247103080201	Roosevelt	2020-09-08																														--	--		
Socorro Water System / South Industrial Park Well	340204106550301	Socorro	2020-09-28																														--	--		
Portales Water System / Sandhill 3	341333103195001	Roosevelt	2020-08-26					1.3 E																									--	--		
Portales Water System / Blackwater 11	341349103083401	Roosevelt	2020-08-26																															--	--	
Oasis State Park / Well 2	341530103211301	Roosevelt	2020-08-25					1.2 E																										--	--	
San Acacia MDWCA / Well 3	341643106541601	Socorro	2020-09-28																															--	--	
Melrose Water System / Well 2	342528103390901	Curry	2020-08-25			2.0 E		1.4 E																										--	--	
Ned Houk Park Area 11 / Well 1	343053103111201	Curry	2020-09-09																															--	--	
Grady Water System / Well 1	344916103190001	Curry	2020-09-25									4.3	2.7																					--	7.0	
ABCWUA / Burton 4	350343106363301	Bernalillo	2020-09-25																															--	--	
Corrales Municipal Complex / Well 1	351325106370101	Sandoval	2020-09-29																															--	--	
La Mesa Water Coop / Well 5	351944106283601	Sandoval	2020-09-11																															--	--	
Santa Fe Water System / Osage	354022105584701	Santa Fe	2020-09-15					1.1 E						1.1 E																				--	--	
Santa Fe Water System / Agua Fria	354041105581301	Santa Fe	2020-09-15																																--	--
Capulin Volcano National Monument / Well 1	364643103583701	Union	2020-08-11																																--	--

E: estimated concentration falling between the laboratory reporting limit and method detection limit. These values are not included in summed concentrations (last two columns).

NOTE: ng/L (nanograms per liter) is equivalent to parts per trillion.

**USGS PFAS Sampling Results – Surface Water
August-September 2020**

USGS Stream Gage Name and Location	USGS Site ID	County	Date	PFSA (ng/L)							PFCA (ng/L)										FOSA (ng/L)	FOSAA (ng/L)		FTSA (ng/L)			Replacement/Other (ng/L)				PFOA+PFOS (ng/L)	ΣPFAS (ng/L)					
				PFBS	PFPeS	PFHxS	PFHpS	PFOS	PFNS	PFDS	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnDA	PFDoDA	PFTtDA	PFTeDA	PFOSA	N-MeFOSAA	N-EtFOSAA	4:2 FTS	6:2 FTS	8:2 FTS	9Cl-PF3ONS	11Cl-PF3OUdS	ADONA			HFPO-DA				
Canadian River near Sanchez, NM	07221500	San Miguel	2020-09-02	2.6				0.9 E				11.4	1.9																						--	15.9	
Canadian River below Conchas Dam, NM	07224500	San Miguel	2020-09-29	1.4 E				1.2 E				6.9			1.0 E																				--	6.9	
Rio Grande below Taos Junction Bridge, NM	08276500	Taos	2020-08-26																																--	--	
Rio Chama below Abiquiu Reservoir	08287000	Rio Arriba	2020-08-20	1.7 E																															--	--	
Rio Grande above Buckman Diversion, NM	08313150	Santa Fe	2020-08-28	1.0 E																															--	--	
Rio Grande above Buckman Diversion, NM	08313150	Santa Fe	2020-09-17																																--	2.3	
Rio Grande above Buckman Diversion, NM	08313150	Santa Fe	2020-09-28	1.8 E																															--	--	
Rio Grande at Alameda Bridge, NM	08329918	Bernalillo	2020-08-19									2.0 E	2.2																						--	2.2	
Rio Grande at Alameda Bridge, NM	08329918	Bernalillo	2020-09-16	2.8									0.9 E																						--	2.8	
Rio Grande at Valle de Oro, NM	08330830	Bernalillo	2020-08-31									5.8	2.9																						--	8.7	
Rio Grande at Valle de Oro, NM	08330830	Bernalillo	2020-09-16	93.0		1.2 E		2.6				12.3	27.9	12.5	1.7 E	4.9																			7.5	153.2	
Rio Puerco near Bernardo, NM	08353000	Socorro	2020-09-13	2.3 E				3.1				23.9	3.2	1.4 E	1.8 E																				3.1	30.2	
Rio Grande Floodway at San Marcial, NM	08358400	Socorro	2020-08-24	4.9		1.5 E		2.9				4.1 E	2.4																						2.9	10.2	
Rio Grande at El Paso, TX	08364000	Doña Ana/El Paso Cty, TX	2020-08-25	4.3		1.7 E		3.7				3.1 E	2.4	1.4 E		1.2 E																			3.7	10.4	
Rio Grande at El Paso, TX	08364000	Doña Ana/El Paso Cty, TX	2020-09-15	10.1		1.7		2.0				4.7	3.5	1.8 E		1.4 E																			2.0	22.0	
Pecos River near Puerto de Luna, NM	08383500	Guadalupe	2020-08-27																																--	--	
Pecos River near Puerto de Luna, NM	08383500	Guadalupe	2020-09-24																																	--	--
Pecos River near Artesia, NM	08396500	Eddy	2020-08-26	2.6		1.5 E		2.1 E				4.0 E	2.3	1.5 E		1.5 E																			--	4.9	
Pecos River near Artesia, NM	08396500	Eddy	2020-09-16	1.3 E								3.5 E	1.0 E																							--	--
Pecos River near Red Bluff, NM	08407500	Eddy	2020-08-26			1.1 E		1.5 E				1.9 E	2.0	1.0 E																						--	2.0
San Juan River near Archuleta, NM	09355500	San Juan	2020-08-12																																	--	--
San Juan River near Archuleta, NM	09355500	San Juan	2020-09-22	2.7																																--	2.7
Animas River at Farmington, NM	09364500	San Juan	2020-08-13	2.1 E																																--	--
Animas River at Farmington, NM	09364500	San Juan	2020-09-23	3.1		1.0 E		1.5 E					1.7 E																							--	3.1
San Juan River near Fruitland, NM	09367540	San Juan	2020-08-12	2.0 E																																--	--
San Juan River near Fruitland, NM	09367540	San Juan	2020-09-23	2.0									1.4 E																							--	2.0
Gila River near Gila, NM	09430500	Grant	2020-09-10	18.5								30.0	2.1	0.9 E	2.0																					--	52.6

E: estimated concentration falling between the laboratory reporting limit and method detection limit. These values are not included in summed concentrations (last two columns).

NOTE: ng/L (nanograms per liter) is equivalent to parts per trillion.

City of Rio Rancho

Source Water Protection Plan Update 2021

Response to Comments Received from Elaine Cimino, Common Ground Rising

Comment 1 : *According to the Office of the State Engineer (OSE) there has not been a hydrological study on the CoRR municipal wells since 2003. The land development within and surrounding the City and the potential for impacts to the source water of perched aquifers within the region has grown substantially. The SWPP needs more than little circles drawn on a map to gage feet or a mile from the wellhead. This is not sufficient with current level of threat to the drinking water supply. The hydrological study must include municipal well capture zones that could possibly extend outside the cone of depression for each well. This is crucial science and data collecting to bring any further creditability to this process of protecting source water and planning. Without this data the plan lacks creditably in showing that the source water is indeed being protected. There was a request in 2018 that the plan for the hydrological study of the Upper middle Rio Grande be completed from the USGS and NM TECH. this was discussed during ordinance hearings at the County. The CoRR should be a part of the study. 1) Add Hydrological study and any capture zone data the City currently has regarding the City Municipal Wells.*

Response 1 : Source Water Protection Plans (SWPPs) are a big-picture tool used to assess the potential risk municipal wells have to contamination. The City of Rio Rancho has updated its SWP Plan regularly in order to reassess and address risks posed by the City's continued growth and development.

The Source Water Protection Areas (SWPAs) have been delineated according to the recommended method outlined in NMED's *New Mexico Source Water and Wellhead Protection Toolkit*. This recommended method has been applied to SWPPs throughout the state of New Mexico. This method is outlined in Section 8 of this Plan and is included here for reference:

Per NMED recommendations in the *New Mexico Source Water and Wellhead Protection Toolkit* (NMED DWB, 2013), the source water protection area (SWPA) is defined as the area within a 1-mile radius of each groundwater well. In this plan, the delineated source area is further subdivided into four buffer zones:

- Zone A: radius of 0 to 200 feet from the water source
- Zone B: radius of 201 to 500 feet from the water source
- Zone C: radius of 501 to 1,000 feet from the water source
- Zone D: radius of 1,001 to 5,280 feet (1-mile) from the water source

To date, there has not been a hydrologic study done to determine the capture zones for the City of Rio Rancho's municipal wells, and that task is outside the scope of work of this study. The City is currently working with the USGS and the City of Albuquerque on a hydrological study of the area with the main objectives of determining depth to water and total volume of water in the aquifer.

Comment 2: *The report submitted by Elaine Cimino added to this plan and a request that testing be implemented for radioactive contaminants of the Leachate at the landfill, the monitoring wells examined to ensure proficiency, siting, and screen depth, monitoring of air quality at schools around the landfill, and test soil.*

Response 2: The report submitted by Elaine Cimino is attached in Appendix G. The further requests listed are outside of the scope of work for a SWPP and most are outside of the purview of the City's Water Department. See also responses for Comments #3-6. The City and Landfill currently do extensive testing of groundwater quality and the results are publicly available.

Comment 3: *That testing of the municipal wells be done to look for the elements found in the Rio West brine wells. NMED has recently requested that IMH Larry Bain and Gary Lee comply with a reopening of the corrective active report (CAR) on the Rio West Brine Wells. (See Attached letter)*

Response #3: The City of Rio Rancho regularly tests all of their supply wells for all regulated contaminants. The results of these tests are available at:

- New Mexico Drinking Water Watch: <https://dww.water.net.env.nm.gov/NMDWW/>
- The City's annual Consumer Confidence Report (CCR). CCRs from 2017 to 2019 are attached as Appendix B of this plan.

Comment 4: *In addition to radioactive elements that are known to be in the radioactive TENORM salts dump in the municipal landfill, there are known, PFAS, PFOS and Other 'forever chemicals.' In a recent study the Rio Grande was cited for levels of PFAS and PFOS. (See attached USGS-NMED Data Spread Sheet) We are requesting that the CoRR Test in the area of concern where water soil and air may contain these Forever chemicals.*

Response #4: The City is committed to providing safe and clean water to its customers. It regularly tests for all regulated contaminants. See response to Comment #3 for additional information.

Comment 5: *The City or Rio Rancho should be looking for the source of this type of contamination in all municipal wells especially as 2021 drought will be severe and getting worse in years to come as more reliance of the aquifer will cause more depletion allowing contaminants to concentrate.*

<https://www.washingtonpost.com/weather/2021/01/07/drought-expands-north-america/?arc404=true>

Response #5: The City has a long-term water supply plan to ensure the safe and adequate supply of drinking water to all customers now and in the future (see the City's website for the Water Resource Management Plan updated in 2021). Furthermore, the City is partnering with the USGS on a hydrologic study of the aquifer to further inform future planning efforts. The City regularly tests its supply wells for all regulated contaminants to ensure the quality of water supplied to customers.

Comment 6: *In the Interest of transparency, the City should make available in the SWPP any current testing, any additional testing over and above what is required by law, to insure to the public that the*

CoRR are taking these concerns seriously. There are substantial costs involved in drinking water protection. It will be important to acquire state and federal funding for these projects and to make sure those responsible for the radiation poisoning are held accountable.

Response #6

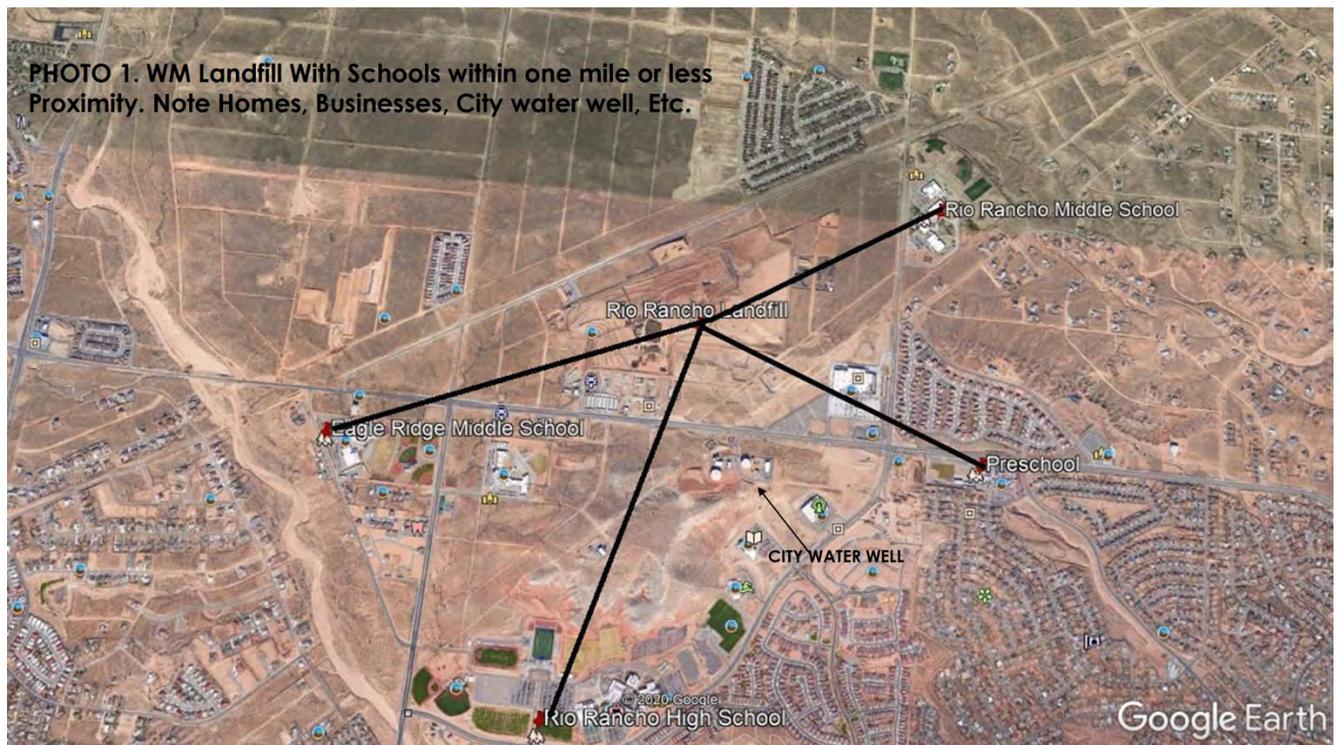
The City of Rio Rancho regularly tests all of their supply wells for all regulated contaminants and the results are publicly available at the NM Drinking Water Watch website and in the City's annual CCR. The CCRs from 2009 to 2019 are available on the City's website. CCRs for 2017 to 2019 are attached to this report as Appendix B.

Appendix G

Common Ground Rising Report and WM Response

Source Water Protection Plan and Remediation request of the Rio Rancho Landfill

Elaine Cimino - Common Ground Rising Residents Group in the City of Rio Rancho
December 16, 2020



TO: Marian Wrangle
Environmental Program Manager SWPP
Utilities Department

*“The **Source Water Protection program** is designed to **protect drinking water sources** from contamination. The **Program** provides the management tool for current and future approaches to prevent **source water** contamination, thereby protecting the **drinking water** system and customer health.”*

Radioactive TENORM Waste Dumped in the Rio Rancho Landfill

In 2018 and in 2019 there were two major incidents of radioactive waste dumped into the Rio Rancho Landfill and into the Rio Rancho Sewer by-pass to Alameda Drain and into the Rio Grande. This was from the now defunct Rio West - Sandoval County Desalination Project Brine Wells west of Rio Rancho in the Rio Puerco. Through a series of Information requests to the city and state over the past 3 years, we were able to access the scope of the missteps of the state, county, city, their contractor Waste Management, and hedge fund subsidiary IMH/JP Morgan Chase.

In 2018 the brine well evaporation ponds were reconstructed and the 288 tons of TENORM salts in 51 truck loads were transported to the Rio Rancho Landfill.

NMED has confirmed that the dump occurred.

The Landfill’s written manifest confirms that 51 truckloads (over 288 tons) of TENORM material was dumped.

Radium -- The Total Radium calculated to be in the radioactive material is 7.08 pCi/g. This exceeds the standard maximum contaminant levels of 5 pCi/G established by the Environmental Protection Agency (EPA) and the Department of Energy (DOE). [EPA Facts About Radium Information; Paper; DOE, Order 458.1, Radiation Protection of the Public and the Environment; Feb. 2017]

Standard maximum contaminant levels are determined by the U.S. Government in order to warn the public that anything over the determined amount is dangerous to humans.

Therefore, the radioactive material dumped in the landfill definitely poses a danger to human health.

Arsenic – Arsenic is a carcinogen and a poison. The standard maximum contaminant level of the radioactive material is 7.07 mg/kg. [New Mexico Soil Screening Guidelines: Residential – Cancer; 2017).

The arsenic content in the radioactive material is 52.83 mg/kg. That is seven times higher than the standard maximum contaminant level. In fact, the arsenic levels in the dumped radioactive material exceed industrial occupational safety levels.

Standard maximum contaminant levels are set by the U.S. Government in order to warn the public that anything over that amount is dangerous to humans.

Therefore, the arsenic material dumped in the landfill definitely poses a danger to human health.

The briny water extracted from the two wells (artesian in nature) contained radium far in excess of standard maximum contaminant levels set by the federal government and the State of New Mexico.* This meets the EPA's definition of NORM (naturally-occurring radiological material). [NORM is defined as, "Materials which may contain any of the primordial, radionuclides or radioactive elements as they occur in nature, such as radium, uranium, thorium potassium, and their radioactive decay products.] The briny water from the two wells was pumped into evaporative ponds (pits) by the onsite operator. The water was then allowed to evaporate.

After the water evaporated, the radium ions attached to the salt. That process resulted in a much higher concentration of radium in the solid waste than when it was in the water alone. This material now meets the definition of TENORM (Technologically Enhanced Naturally-Occurring Radioactive Material), which is NORM that has been concentrated or relocated. [TENORM is defined as, "Naturally occurring radioactive materials that have been concentrated or exposed to the accessible environment as a result of human activities, such as manufacturing, mineral extraction, or water processing."]

TENORM is RADIOACTIVE WASTE. According to the EPA Radioactive waste is extremely dangerous and is not allowed to be dumped in the Rio Rancho Landfill. Therefore, the radioactive waste that was illegally dumped into the landfill definitely poses a danger to human health.

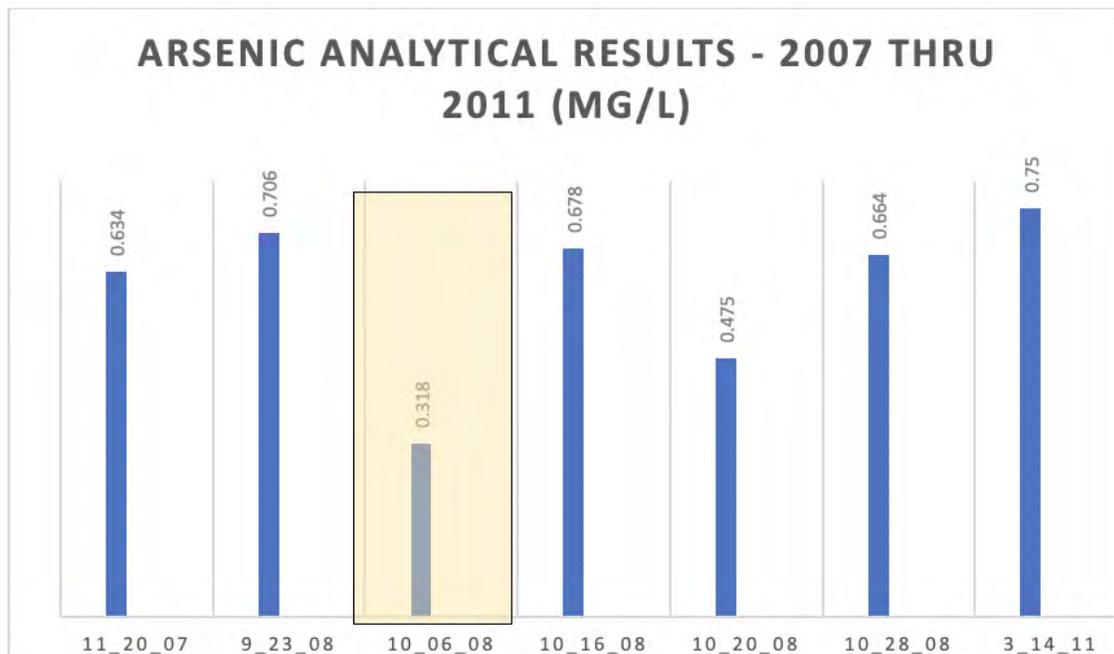
October 28, 2020 the Solid Waste Bureau cited Waste Management (See letter attached) for

1. Improper acceptance and disposal of sludge (special waste).
2. During the period of March 2-15, 2018, the operator of the Rio Rancho Landfill accepted approximately 51 loads of sludge – a special waste, in contrast to the landfill's waste acceptance protocol, included as part of the permit, Special Waste Disposal Management Plan, Vol. IV, Att. 711-1, Sec. 3.0, Special Waste Identification Program. WMI failed to deem this waste a special waste and profile it accordingly with the required laboratory analyses of the sludge.
3. Acceptance of sludge without NMED approval. On or before March 2, 2018, WMI accepted approximately 51 loads of sludge at the Rio Rancho Landfill without first obtaining and incorporating into the operating record a NMED-approved, generator-specific DMP for the sludge in accordance with the permit's Sludge Disposal Management Plan, Vol. IV, Att. 709-1, Sec. 2.0, Sludge Acceptance Criteria.
4. The failure to assure corrective action or continued non-compliance may result in additional enforcement action. NMED reserves its right to take additional enforcement

action for the violations identified in this Notice of Violation, including the issuance of an Administrative Compliance Order compelling compliance and assessing a civil penalty of up to \$5,000 per day, per violation.

The problem now is that NMED is stating that the radioactive waste was below the Maximum Contaminant Levels (MCLs). The EPA and our residents' group, Common Ground Rising, is in agreement that NMED was incorrect in their assessment. What NMED did was take the lowest test result. They need to look at the test results over time, which indicates that the radioactive levels exceed the Public Health Standards.

BRINY WELL GROUNDWATER ANALYTICAL RESULTS 2007 - 2011



* only 10_06_08 data does not exceed "Industrial/Occupational – Cancer" NMED Soil Screening Level

Background on Brine wells

There were a series of leaks from 2007 to 2018 that drained highly contaminated brine water down two arroyos in the Rio Puerco from a defunct desalination project that had two wells of highly corrosive water. This drained onto the Pueblo of Laguna and state lands and into the Rio Puerco. There was a corrective action order in which NMED told IMH engineer, Gary Lee, and IMH that they did not have to test and/or remediate the brine because the test results IMH gave NMED showed a low amount. NMED exempted IMH from having to remediate the area. IMH repaired the wells and had also filed at the same time for a discharge permit to continue pumping the corrosive and radioactive brine water. NMED did not approve the discharge permit. Ownership of those wells was being contested in the courts in NM and Arizona. Sandoval County was a partner in the water resource once the Brine water was able to pump. They wanted to profit off their investment share of the water by selling to fracking operators in order to recover the \$6M they invested in the project because it required no

further clean water processing. Prior to the IMH application for the discharge permit, NMED issued a series of temporary permits so it did not have to have a public commenting period that would have exposed what the county, city and IMH intended to do with the water. This was during the time that they were submitting changes to the oil and gas ordinance that was written by attorneys for industry and had stiff opposition from the community and region because of the impacts to the regional aquifer, air quality, and soils. It was during the discharge permit public commenting period that our Information requests showed that Michelle Hunter, Groundwater Bureau Chief, allowed by permissions the contaminated raw brine well water use for roads and construction dust control in the area of the two evaporation ponds and the roads out to the Rio Puerco. This was the original Paseo del Vulcan extension, in which state lands were traded to the county for Rio West subdivision on the taxpayers' dime. These roads and the area are now contaminated.

- ***However, there is the health issue regarding the radioactive and corrosive contaminants exposures to people working on these projects, the equipment used, the illegal transport and the trail of radioactive waste that left the site and traveled from 66th Street down Northern Blvd to the Landfill, and dumped into the landfill illegally.***

Our group of local residents is concerned because of information found in a series of requests that have shown the landfill is past its life span. This means the leachate liner under the landfill may have cracks and may be leaking into the aquifer. This leachate is being used for dust control on site at the landfill; therefore, particulates are wind driven. This means that not only the aquifer water could be contaminated, but the soil and the air is also contaminated. There are potential serious public health impacts that would need to be addressed.

- **We are requesting that the landfill and this specific contamination be entered into the Source Water Protection Plan documents and that independent testing be administered.**
- **We would want to see the Radium 224 and 228 is INDEPENDENTLY tested for in the leachate and in the surrounding municipal and domestic wells.**
- **We would want to see the surrounding schools, as well as closer proximity subdivisions, receive air monitoring devices to test air quality and to specifically test for the sludge and other contaminants that will impact public health of the residents, school children and staff, and businesses in the area. (Please see Potential for Human Exposure Radium Study)**

Illegal dumping into the Rio Grande from the Pump test in August of 2019

NM-OSE allowed a pump test despite the misrepresentation and deceptive tactics that had a pattern and practice over a 9-year period with NMED and the local community. Our group was filing complaints with NMED over the arbitrary decisions that were being made. The application for the discharge permit was temporarily denied by NMED but who was observing the pump test.

IMH used 3 Baker tank trucks. These tank trucks, haul produce water to injection wells, and were used to move the highly contaminated and radioactive brine discharged from the wells.



The plan was that IMH was re-inject the produced water. However, these wells are artesian wells and are under intense thermal pressure with high total dissolved solids. The thermal water is 150 degrees + or -.

In August of 2019 when the pump test was performed. There were 3 trucks that had 5,000 gals. each to be disposed. IMH Engineer Gary Lee, RT Hicks and Alpha Southwest trucking decided to dispose of one of the trucks produced discharge into the Rio Rancho Sewer System plant #2 that went into the wastewater treatment plant that dumps effluent into the Rio Grande through the Alameda Drain. According to email communication IMH downplayed the toxicity and told the city that it was brine water and never mentioned the contamination levels nor did the city ask from what we can tell.

The Plant acted as a by-pass to the Alameda drain and into the Rio Grande. At the time Albuquerque Bernalillo County Water utility was drawing drinking water from the Rio. The City of Rio Rancho was contacted and told of the illicit dumping.

Then in Sept 2019 IMH contractors Gary Lee and Alpha Trucking showed up to dispose of baker tank truck #2 with IMH pump test produced discharge. They said they had 5,000 gallons and the City of Rio Rancho said no.

IMH filed a report with NMED saying that the produced water was reinjected and that 5000 gallons were disposed of. There were still 10,000 gallons unaccounted for as to where the dumping occurred no one ever investigated it or produced a report on the additional 10,000 gallons.

Where did IMH ,RT Hicks, Alpha SW Trucking dump the contamination? Where did they report it? But what we do know they were deceptive by mischaracterizing the nature of the what they were hauling and dumping into the Rio Grande, willing to contaminate the workers, equipment and the environment along with the residents of the region. This radiation that has severe public health impacts and should never be randomly and illegally dumped.

Brine well water was exempted below 2500 feet by State Engineer John D'Antonio and the legislation in 2009. Now he got his second chance to do the work for the oil and gas industry John D'Antonio approved the 2019 pump test and NMED did not enforce what regulations they could to protect public health Regarding the illegal dumping of highly toxic waste. NMED was supposed to investigate but no one we spoke to said they have heard from them.

The Wells were drilled under several premises first a subdivision, then algae ponds, then a desalination project and now for fracking. There has been allegation of Fraud by IMH who was JPMorgan Chase, hedge fund investment subsidiary, making a call to investors to keep the wells running. The SEC has forbidden jP Morgan Chase from operating in four states. Yet they are applying for banking operation within NM. There have been many people according to court documents that were swindled out of their investments.

Now we need a series of actions as stated above to independently test and monitor. We need to start a statistical analysis on cancer diagnoses, including of thyroid, blood and bone cancers in the area. The people of Rio Rancho Deserve better as does the citizens of New Mexico.



Michelle Lujan Grisham
Governor

Howie C. Morales
Lt. Governor

**NEW MEXICO
ENVIRONMENT DEPARTMENT**

Solid Waste Bureau
1190 Saint Francis Drive, Room N-2150
PO Box 5469
Santa Fe, NM 87502-5469
Telephone (505) 827-0197
www.env.nm.gov/solid-waste/



James C. Kenney
Cabinet Secretary

Jennifer J. Pruett
Deputy Secretary

Certified Mail – Return Receipt Requested No. 7019 1640 0000 7894 4738

October 28, 2020

Douglas Shimic, District Manager
Waste Management of New Mexico, Inc.
P.O. Box 15700
Rio Rancho, New Mexico 87174

Re: Notice of Violation – Rio Rancho Landfill

Dear Mr. Shimic:

The New Mexico Environment Department's (NMED) Solid Waste Bureau (SWB) recently verified the acceptance and disposal of multiple loads of special waste at the Rio Rancho Landfill during the period of March 2, 2018 through March 15, 2018. Our investigation determined that the special waste received at the landfill was sludge from a water treatment system. The Rio Rancho Landfill is authorized to accept sludge in accordance with its special waste permit, No. SWM-012339(SP).

The sludge was a precipitate of treated water from two test wells originating from the Rio West Deep Saline Well Site, located approximately five miles west of Rio Rancho. The NMED's Ground Water Quality Bureau (GWQB) referred to the sludge as a solid evaporite material produced during pilot tests in 2009 and 2011 for the two wells when purge water from both wells was treated, discharged and managed in a synthetically-lined impoundment. The surface impoundment also received liquids produced by a desalination water treatment process to assess suitability of the aquifer as a future water supply. In 2017, the GWQB required clean out and repair of the liner.

Analysis of the ground water for the two wells indicates concentrations of arsenic, radium-226 and radium-228 elevated above ground water standards. In addition to these contaminants, the discharged water to the impoundment also contained a high concentration of total dissolved solids.

On or about March 2018, IMH Financial Corporation, landowner of the well site, hired a waste hauler, Alpha Southwest, Inc., to transport the sludge to the Rio Rancho Landfill for disposal. The SWB reviewed landfill disposal tickets provided to the GWQB documenting the disposal of 51 loads of probable sludge from the Rio West Deep Saline Well Site impoundment at the landfill during the period of March 2, 2018, through March 15, 2018. Although the disposal tickets contained areas in which to enter information for waste codes, manifests and profile, the entries were not completed, indicating acceptance of the sludge as solid waste, but not special waste.

On July 30, 2020, and August 10, 2020, Douglas Shimic, District Manager, Waste Management of New Mexico, Inc. (WMI), spoke telephonically with Chuck Akeley, Enforcement Manager, SWB, regarding the impoundment-related disposal tickets. Mr. Akeley electronically forwarded the disposal tickets to Mr. Shimic, who verified the tickets were valid customer copies and noted that the word "Salt" annotated on top of most of the tickets had not been placed there by the landfill, as the landfill's tickets did not have such annotation. Mr. Shimic stated that the landfill was unable to locate any other documents relating to the sludge disposal, including a waste profile or special waste manifests. He further stated that the loads were probably stockpiled and used for daily cover, and that there was no record of Alpha Southwest, Inc. being a registered commercial or special waste hauler with a WMI account.

Given the discharge of water treatment wastes to the large surface impoundment, the solid materials from the surface impoundment meet the definition of sludge in the Solid Waste Rules (SWR), 20.9.2 – 20.9.10 NMAC. The SWR, 20.9.2.7.S(7) NMAC, defines sludge as "any solid, semi-solid or liquid waste generated by a municipal, commercial, or industrial waste water treatment plant [or] water supply treatment plant...". The SWR, 20.9.2.7.S(13)(f) NMAC, defines sludge as a special waste, meaning the waste has unique management, transportation and disposal requirements. The aforementioned loads of sludge disposed at Rio Rancho Landfill during the period March 2, 2018, through March 15, 2018, were not assessed or characterized as a special waste in accordance with the landfill's waste acceptance protocol, including the completion of a waste profile based on generator knowledge. The resulting generator-specific disposal management plan (DMP) required by the SWR, 20.9.8.16.B NMAC, would have contained information assuring the sludge was sampled and analyzed for all relevant test parameters in accordance with the SWR, 20.9.8.16.C and D NMAC.

Based on the above information, the following violations are cited:

1. **Improper acceptance and disposal of sludge (special waste).** During the period of March 2-15, 2018, the operator of the Rio Rancho Landfill accepted approximately 51 loads of sludge – a special waste, in contrast to the landfill's waste acceptance protocol, included as part of the permit, Special Waste Disposal Management Plan, Vol. IV, Att. 711-1, Sec. 3.0, Special Waste Identification Program. WMI failed to deem this waste a special waste and profile it accordingly with the required laboratory analyses of the sludge.

The SWR, 20.9.3.20.A NMAC, states that any terms or conditions of the permit shall be enforceable to the same extent as a regulation of the Environmental Improvement Board.

The SWR, 20.9.2.10.B NMAC, further states that any person who generates, stores, process, transports or disposes of solid waste shall take reasonable measures to determine the characteristics of the waste being handled to assure that no prohibited act is being performed.

2. **Acceptance of sludge without NMED approval.** On or before March 2, 2018, WMI accepted approximately 51 loads of sludge at the Rio Rancho Landfill without first obtaining and incorporating into the operating record a NMED-approved, generator-specific DMP for the sludge in accordance with the permit's Sludge Disposal Management Plan, Vol. IV, Att. 709-1, Sec. 2.0, Sludge Acceptance Criteria.

The SWR, 20.9.3.20.A NMAC, states that any terms or conditions of the permit shall be enforceable to the same extent as a regulation of the Environmental Improvement Board.

The SWR, 20.9.8.16.B NMAC, states that the owner or operator of a solid waste facility authorized to accept sludge shall have an approved DMP, that shall, at a minimum, describe the methods used to obtain representative samples for analysis, analyze the sludge for the required parameters demonstrating it is non-hazardous and passes the paint filter liquids test, describe the anticipated volumes to be transported and total time period for disposal, and describe any plans for continuing landfill disposal – including the frequency of testing, transport to the landfill and length of storage prior to disposal.

The SWR, 20.9.2.10.A(1) NMAC, further states that no person shall store, process or dispose of solid waste except by means approved by the NMED Cabinet Secretary and in accordance with Environmental Improvement Board rules.

Pursuant to the NMED Delegation Order dated September 14, 2020, the Cabinet Secretary has delegated the authority to issue SWB Notices of Violation to the Chief of the SWB in the Resource Protection Division. Please respond in writing within 10 calendar days of receipt of this notice as to what action you have taken, or plan to take, to correct the violations and to prevent recurrence in the future. All documentation submitted to NMED's SWB related to this Notice of Violation must include the following certification, signed by you or a delegated responsible official:

"I certify under penalty of law that this document and all its attachments were prepared under my directions or supervision according to a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for the gathering of the information, the information submitted is, to the best of my knowledge and belief, true, accurate,

Douglas Shimic
Page 4 of 4
October 28, 2020

and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.”

Send your response to George W. Akeley, Jr. (Chuck), Manager, Enforcement Section, Solid Waste Bureau, NMED District I, 121 Tijeras Avenue NE, Suite 1000, Albuquerque, New Mexico 87102-3400.

The failure to assure corrective action or continued non-compliance may result in additional enforcement action. NMED reserves its right to take additional enforcement action for the violations identified in this Notice of Violation, including the issuance of an Administrative Compliance Order compelling compliance and assessing a civil penalty of up to \$5,000 per day, per violation.

If you have questions related to this Notice of Violation, please contact Mr. Akeley at (505) 670-3283 or chuck.akeley@state.nm.us.

Sincerely,

Joan M. Snider
Chief, Solid Waste Bureau

JMS:gwa:tdm

cc: Stephanie Stringer, Director, Resource Protection Division *[via electronic mail]*
Chuck Akeley, Manager, Enforcement Section, Solid Waste Bureau *[via electronic mail]*
Teri D. Monaghan, Enforcement Coordinator, Solid Waste Bureau *[via electronic mail]*

5. POTENTIAL FOR HUMAN EXPOSURE

5.1 OVERVIEW

Radium is a naturally-occurring metal that is almost ubiquitous in soils, water, geologic materials, plants, and foods at low concentrations. The utilization of radium, uranium, and fossil fuels has resulted in the redistribution of radium in the environment by way of air, water, and land releases. The concentration of radium in natural water is usually controlled by adsorption-desorption reactions with minerals and rocks and by the solubility of radium-containing minerals. In addition, radium is constantly being produced by the radioactive decay of its precursors, uranium, and thorium. Radium does not degrade other than by radioactive decay at rates which are specific to each of four naturally-occurring isotopes. The concentrations of radium-226 and radium-228 in drinking water are generally low, but there are specific geographic regions where high concentrations of radium occur due to geologic sources. Radium may be bioconcentrated and bioaccumulated by plants and animals, and it is transferred through food chains from lower trophic levels to humans.

The frequency of NPL hazardous waste sites in the United States at which radium has been found at higher than background levels can be seen in Figure 5-1.

5.2 RELEASES TO THE ENVIRONMENT

5.2.1 Air

The combustion of coal may be the most important mechanism for releasing radium into the atmosphere. The mean concentration of radium-226 in coal is on the order of 1 pCi/g (0.04 Bq/g). When combusted, radium may volatilize, then condense onto coal fly ash particles, which in turn may be released from power plants as fugitive emissions. The concentrations of radium-226 in fly ash have ranged from 1 to 10 pCi/g (0.04 to 0.4 Bq/g) (Coles et al. 1978; Eisenbud and Petrow 1964; Morris and Bobrowski 1979).

The radium-228 content of fly ash has varied from 1.8 to 3.1 pCi/g (0.07 to 0.12 Bq/g) (Eisenbud and Petrow 1964). If it is assumed that the total radium content of fly ash is 5 pCi/g (0.19 Bq/g), and that 1% of the ash generated at all coal-fired power plants in the United States escapes into the atmosphere, then an order-of-magnitude estimate of the amount of radium released each year would be 2.2 Ci (81,000,000 kBq) (Roy et al. 1981). Eisenbud and Petrow (1964) estimated that a single 1000-megawatt coal-fired power plant will discharge about 28 mCi (1,037,000 kBq) of total radium per year. Radium-226 has been detected in soils in industrial regions at levels up to 8.1 pCi/g (0.30 Bq/g) (Jaworowski and Gryzbowska 1977).

5. POTENTIAL FOR HUMAN EXPOSURE

Global releases of radium-226 by the combustion of coal have been estimated as 150 Ci (5,550,000,000 kBq) per year (Jaworowski et al. 1971). It has also been observed that radium-226 concentrations in glacial ice samples collected in Europe have increased by a factor of 100 during the last 80 years. The source of these elevated levels of radium may have been emissions from fossil fuels (Jaworowski et al. 1971).

Another potential source of atmospheric radium is particulate matter created by uranium mining and milling operations. However, no information was located on estimated releases or atmospheric concentrations.

5.2.2 Water

The most significant water-related releases of radium may be from the leaching of uranium mine tailings and from the release of ore-processing effluents generated by leaching, decantation, and filtration processes. Approximately 97 million tons of mine tailings that contain an estimated 60,000 Ci (2.2×10^9 kBq) of radium-226 have been stockpiled at the surface in the western United States (Kaufmann et al. 1976). It has been estimated that 10 million tons of uranium mine tailings are generated each year in Canada (Kalin 1988). Laboratory extraction studies (Havlik et al. 1968a, 1968b) have demonstrated that radium-226 may leach from solid wastes, particularly by acidic wastewaters. Surface runoff and leachate from uranium mine tailings have contained radium-226 ranging from 38 to 116 pCi/L (1.4 to 4.3 Bq/L) (Kalin 1988; Swanson 1985). Untreated uranium milling effluent has contained radium-226 at up to 2.2 μ Ci/L (81 kBq/L) (Sebesta et al. 1981). In the past, leachate from mine tailings containing radium-226 concentrations of 53 to 292 pCi/L (2 to 11 Bq/L) has been deep-well injected (Kaufmann et al. 1976). Approximately 2,000 to 3,000 Ci (74,000,000,000 to 111,000,000,000 kBq) of total radioactivity were released to the subsurface by two uranium mills in New Mexico. No information was located on the total amount of radium released to the environment by water-related discharges. As discussed in Section 5.4.2, however, concentrations of radium-226 and radium-228 found in surface and ground water sources have generally been low.

5.2.3 Soils

Land releases of radium are related to atmospheric fallout of coal fly ash (see Section 5.2.1). For example, elevated radium-226 concentrations in snow have been detected near a coal-fired power plant in Poland (Jaworowski et al. 1971). Other land releases may include the disposal of coal fly ash, lime slurry derived from water softening processes, and uranium mine tailings and associated wind-blown dusts.

5. POTENTIAL FOR HUMAN EXPOSURE

However, no information was located on the total amount of land-released radium.

5.3 ENVIRONMENTAL FATE

Radium may be transported in the atmosphere in association with particulate matter. It exists primarily as a divalent ion in water, and its concentration is usually controlled by adsorption-desorption mechanisms at solid-liquid interfaces and by the solubility of radium-containing minerals. Radium does not degrade in water other than by radioactive decay at rates that are specific to each isotope. Radium may be readily adsorbed by earth materials; consequently, it is usually not a mobile constituent in the environment. It may be bioconcentrated and bioaccumulated by plants and animals, and it is transferred in food chains from lower trophic levels to humans.

5.3.1 Transport and Partitioning

5.3.1.1 Air

Radium may be transported in the atmosphere by the movement of particulate matter derived from uranium and coal utilization (see Section 5.2.1). These fugitive emissions would be subject to atmospheric dispersion, gravitational settling and wash-out by rain.

No data were located on the residence time of radium in the atmosphere or its deposition rate. However, data for other elements adsorbed to particulate matter indicate that the residence time for fine particles is about 1 to 10 days (EPA 1982b; Keitz 1980). Radium may, therefore, be subject to long-range transport in the atmosphere.

5.3.1.2 Water

Radium in water exists primarily as a divalent ion (Ra^{2+}) and has chemical properties that are similar to barium, calcium, and strontium. The solubility of radium salts in water generally increases with increased pH levels. The solubilities of radium sulfate and carbonate are low; the solubility constants for crystalline RaSO_4 and RaCO_3 have been estimated as 5.495×10^{-11} mole/L and 5.01×10^{-9} mole/L, respectively (Langmuir and Riese 1985). Radium nitrate, chloride, and iodate are very soluble in water (Ames and Rai 1978). However, the concentration of radium in water is usually controlled by adsorption-desorption reactions at solid-liquid interfaces which are in turn influenced by pH (see Section 5.3.1.3) or by the dissolution and coprecipitation of minerals that contain radium (EPA 1985a; Langmuir and Riese 1985). The tendency for radium to coprecipitate with barite, and sparingly soluble barium sulfate, as $(\text{BaRa})\text{SO}_4$ is well known. Moreover, water treatment by adsorption and water-softening techniques are thought

5. POTENTIAL FOR HUMAN EXPOSURE

to be effective in reducing radium in untreated drinking water (Watson et al. 1984). Therefore, it is likely that radium in water does not migrate significantly from the area where it is released or generated (EPA 1985a). Limited field data also support the generalization that radium is not mobile in groundwater (Kaufmann et al. 1976; Swanson 1985).

5.3.1.3 Aquifers, Sediments, and Soils

Radium in water may be readily adsorbed by sediments, soils, and aquifer components. It has been experimentally demonstrated that radium can be adsorbed by soils and sediments (Benes and Strejc 1986; Landa and Reid 1982), ferric hydroxide and quartz (Benes et al. 1984; Valentine et al. 1987), kaolinite and montmorillonite (Benes et al. 1985), and muscovite and albite (Benes et al. 1986).

Partition coefficients such as adsorption constants (K_d) describe the tendency of chemicals to partition to solid phases from water. Adsorption constants for inorganic ions such as Ra^{2+} cannot be predicted a priori because they depend on the type of adsorbent, the pH of the water, and the presence of other ions in solution. K_d values for sand have varied from 18 to 1,742 mL/g in the pH range of 7.4 to 8.3 (Benes et al. 1984; Valentine et al. 1987). K_d values for clay minerals and other common rock-forming minerals have ranged from 2,937 to 90,378 mL/g in alkaline solutions (Benes et al. 1985, 1986). Similarly, K_d s for soils in alkaline solutions have ranged from 214 to 467 mL/g (Ames and Rai 1978). Adsorption constants based on field studies with lake sediments have varied from 205 to 15,833 mL/g (Swanson 1985). The magnitude of these adsorption constants indicate that partitioning to solid surfaces is a major removal mechanism of radium from water. Swanson (1985) concluded that about 90% of the radium-226 released by uranium-mine effluent to two small lakes was adsorbed by the lake sediments and algae-detrital material.

The removal of Ra^{2+} by adsorption has been attributed to ion exchange reactions, electrostatic interactions with potential determining ions at mineral surfaces, and surface-precipitation with $BaSO_4$. The adsorptive behavior of Ra^{2+} is similar to that of other divalent cationic metals in that it decreases with an increase in pH and is subject to competitive interactions with other ions in solution for adsorption sites. In the latter case, Ra^{2+} is more mobile in groundwater that has a high total dissolved solids (TDS) content. It also appears that the adsorption of Ra^{2+} by soils and rocks may not be a completely reversible reaction (Benes et al. 1984, 1985; Landa and Reid 1982). Hence, once adsorbed, radium may be partially resistant to removal, which would further reduce the potential for environmental release and human exposure.

5. POTENTIAL FOR HUMAN EXPOSURE

5.3.1.4 Plants and Animals

Transfer from soil to plants. Radium in the soil may be readily absorbed by plants, depending on the specific plant type and soil (Rayno 1983). Elevated concentrations of radium-226 above background levels have been detected in areas where radium and/or uranium was mined or processed (Kalin 1988; Rayno 1983; Tracy et al. 1983; Watson et al. 1984). The partitioning of radium-226 to plants from soils has been estimated by measuring the ratio of radium activity (or concentration) in the plant mass to that in the host soil. Soil-plant transfer coefficients or concentration factors have ranged from 1.1×10^{-3} to 6.5 (Rayno 1983; Tracy et al. 1983). Watson et al. (1984) concluded that a reasonable radium-226-concentration factor for fruits is 3×10^{-3} and that 0.1 describes the partitioning of radium-226 to forage and hay. An unweighted mean concentration factor for grain was 0.63. No information was located on soil-to-plant transfers for radium-228; however, its properties in this regard may be similar to those of radium-226.

Transfer from plants to cattle. There is a potential for human exposure to radium by the consumption of beef and milk derived from cattle who graze on forage grown in soils containing radium. The mean ratio of radium-226 in milk to that in the animal's diet has been estimated to be 3.8×10^{-3} (Watson et al. 1984). A similar ratio or transfer coefficient for flesh was 6.8×10^{-3} .

Transfer from water to aquatic organisms. Aquatic organisms such as fish, snails, clams, and algae can bioaccumulate radium from water. Bioconcentration factors (BCFs) for fish living in streams or lakes receiving uranium-processing waste effluent have ranged from 1 to 60 for flesh portions, and from 40 to 1,800 in bone samples (Markose et al. 1982; Swanson 1985). It has been proposed that bottom-feeding organisms ingest suspended solids containing adsorbed radium, then are in turn consumed by larger predatory fish.

5.3.2 Transformation and Degradation

5.3.2.1 Air

Pure metallic radium oxidizes when exposed to air, but radium compounds suspended in air are not subject to transformation or degradation mechanisms.

5. POTENTIAL FOR HUMAN EXPOSURE

5.3.2.2 Water

Radium in water exists as a stable divalent ion; it probably does not hydrolyze nor is it significantly influenced by oxidation-reduction reactions (Ames and Rai 1978). The solubility of radium salts is increased with increasing pH levels.

5.3.2.3 Soil

Radium in soils and sediment does not biodegrade nor participate in any chemical reactions that transform it into other forms. The only degradation mechanism operative in air, water, and soil is radioactive decay. Radium has 16 known isotopes (see Chapter 3), but only 4 occur naturally (Radium-223, -224, -226, and -228). The half-life of radium-226 is 1,620 years. The half-lives of radium-228, radium-223, and radium-224 are 5.77 years, 11.4 days, and 3.64 days, respectively.

5.4 LEVELS MONITORED OR ESTIMATED IN THE ENVIRONMENT

Radium is a naturally-occurring metal and is almost ubiquitous at low concentrations in air, water, soil, rocks, and food. The median concentrations of radium-226 and radium-228 in drinking water are generally low, but there are geographic areas where higher concentrations of radium are known to occur. The utilization of coal and uranium has resulted in re-distributing radium in the environment, but the overall effects appear to be small. Estimated levels of average human exposure to radium of non-occupational populations are presented in Table 5-1.

5.4.1 Air

Dust samples collected from the atmosphere of New York City were found to contain radium-226 at 8×10^{-5} pCi/m³ (3.0×10^{-6} Bq/m³) and radium-228 at 1.5×10^{-4} pCi/m³ (5.6×10^{-6} Bq/m³) (Eisenbud and Petrow 1964). No other published data on ambient concentrations of radium in the atmosphere were located.

5.4.2 Water

Radium is a naturally-occurring and fairly ubiquitous metal at low concentrations in water and rock-forming minerals. It has been estimated that the total mass of radium-226 in the earth's oceans is about 150 tons (Fremlin and Abu Jarad 1980). The occurrence of radium in ground, surface, and finished (treated) drinking water has been assessed (Aieta et al. 1987; Cech et al. 1988; EPA 1985a; Hess et al. 1985; Longtin 1988; Lucas 1985; Michel and Cothorn 1986; Watson et al. 1984). In general, shallow wells tend to have lower radium-226 concentrations than deeper wells, and the total content in municipal

TABLE 5-1. Estimated Levels of Average Human Exposure to Radium by Nonoccupational Populations

Isotope	Medium	Typical Concentration In Medium	Assumed Rate of Intake of Medium	Assumed Fraction Absorbed	Estimated Intake ^a (pCi/kg/day)	Estimated Intake ^a (mBq/kg/day)
Radium-226	Air	8×10^{-5} pCi/m ^{3b}	20 m ³ /day	0.2	5×10^{-6}	1.9×10^{-4}
Radium-228	Air	1.5×10^{-4} pCi/m ^{3b}	20 m ³ /day	0.2	9×10^{-6}	3.3×10^{-4}
Radium-226	Water	0.9 pCi/L ^c	2 L/day	0.2 ^d	0.005	0.19
	Water	10 pCi/L ^e	2 L/day	0.2	0.057	2.1
Radium-228	Water	1.4 pCi/L ^c	2 L/day	0.2	0.008	0.30
	Water	6.4 pCi/L ^f	2 L/day	0.2	0.037	1.4
Radium-226	Food	0.6 pCi/kg ^g	2 kg/day	0.2	0.003	0.11

^aAssuming a 70-kg adult.

^bEisenbud and Petrow (1964). Air samples collected in New York City.

^cMean concentration from Longtin (1988).

^dSee Section 2.3.1.2

^eMean concentration of noncompliance water (Hess et al. 1985).

^fEstimated mean of noncompliance water assuming that the ratio ²²⁸Ra/²²⁶Ra is 0.64 (Lucas 1985).

^gEstimated from Eisenbud (1973) and Bortoli and Gaglione (1972).

5. POTENTIAL FOR HUMAN EXPOSURE

(treated) water supplies is lower than that in raw well water (Watson et al. 1984). The radium content of surface water is usually very low. Radium-226 generally ranges from 0.1 to 0.5 pCi/L (0.004 to 0.019 Bq/L) (Hess et al. 1985). Based on 990 random samples of drinking water from ground water sources, the average population-weighted concentrations of radium-226 and radium-228 in the United States (excluding Hawaii) were about 0.91 pCi/L (0.034 Bq/L) and 1.41 pCi/L (0.052 Bq/L), respectively (Longtin 1988). Approximately 90% of these samples contained radium-226 at less than 1 pCi/L (0.04 Bq/L); similarly, about 90% contained radium-228 at less than 1 pCi/L (0.04 Bq/L). (These were not necessarily the same water sources.) However, there were approximately 200 public water supplies with radium-226 activities after treatment that were in excess of the regulatory maximum contaminant level (MCL) of 5 pCi (0.19 Bq) total radium/L (Hess et al. 1985). The mean radium-226 activity of the supplies in excess of the MCL was about 10 pCi/L (0.37 Bq/L).

A survey on the occurrence of radium-228 in municipal water supplies in Illinois, Iowa, Missouri, and Wisconsin indicated that the activity of this isotope may range from 0.3 to 32.0 pCi/L (11.1 to 1,180 mBq/L) (Lucas 1985), while Michel and Cothorn (1986) reported that typical concentrations are less than 1 pCi/L (37 mBq/L).

There are few data on the occurrence of radium-224 in water. It has been speculated that the activity of this isotope could approach 30 to 40 pCi/L (1,110 to 1,480 mBq/L) (EPA 1985a).

Data on the presence of radon in groundwater can be used as a guide to the presumably corresponding presence of radium in the same source. Based on descriptions of aquifer composition or lithology and data from state water-resource agencies, counties with potentially high levels of radon in groundwater have been identified by Michel (1987). These estimates indicate that the U.S. counties with the highest levels of radium would be found in many areas of the Western third of the country, including large areas of California, Nevada, Idaho, and Montana. Wisconsin and Minnesota would also have high levels. In the East, the Appalachian Mountain region including almost all of Maine and New Hampshire would have high levels, as well as a large section of central Florida. It is important to note that quantitative estimates are not available, and the potentially "high" values for radon and radium imply only a comparison to other areas, not necessarily a risk to human health or the environment.

5.4.3 Soil

The mean concentration of radium-226 in 356 surface soil samples collected from 0 to 6 cm in 33 states was 1.1 pCi/g (0.041 Bq/g) (Myrick et al. 1981). This mean concentration is very similar to those reported

5. POTENTIAL FOR HUMAN EXPOSURE

for typical igneous rocks (1.3 pCi/g or 0.048 Bq/g), sandstone (0.71 pCi/g or 0.026 Bq/g), shale (1.1 pCi/g or 0.041 Bq/g), and limestone (0.42 pCi/g or 0.016 Bq/g) (Eisenbud 1973). The concentration of radium-226 in soils in Northern Italy was reported to average 0.72 pCi/g [range: 0.08 to 3.8 pCi/g (0.003 to 0.14 Bq/g)] (DeBortoli and Gaglione 1972), excluding regions with extremely high levels of natural radioactivity (no data presented).

The concentrations of radium-226 in soils that were contaminated by mining or milling activities have ranged from less than 1 to 3,700 pCi/g (0.037 to 137 Bq/g) (Kalin 1988; Landa 1984; Tracy et al. 1983). No information was located on the occurrence of the other radium isotopes in soil or rocks.

The presence of uranium in soil can be used as an indication of occurrence of radium and radon in the same location. Based on geological reports and data synthesized from the National Uranium Resource Evaluation (NURE) program, areas with potentially high radon levels in soil gas have been identified by Michel (1987). These areas would have correspondingly high soil radium levels, although quantitative estimates are not available. These uranium "hot spots" occur with more frequency in the Western third of the United States, and include large areas of California and Idaho. High concentrations have been found in Wisconsin and Minnesota and a very dense area has been identified in western Missouri/eastern Kansas. In the East, high levels appear generally along the Appalachian mountains and near industrialized sites. High levels have also been found in the northern to central sections of Florida.

5.4.4 Other Media

Radium-226 may occur in many different foods, and reported activities have varied considerably. The mean radium-226 contents of diets in 11 cities in the United States were estimated to be 0.52 to 0.73 pCi/kg of food consumed (0.019 to 0.027 Bq/kg) (Eisenbud 1973). Estimates of the mean concentrations of radium-226 in milk and beef are 0.23 pCi/L (0.009 Bq/L) and 0.22 pCi/kg (0.008 Bq/kg) (fresh weight), respectively, in the United States (Watson et al. 1984). No information was located on the occurrence of radium-228 in food.

5.5 GENERAL POPULATION AND OCCUPATIONAL EXPOSURE

Major sources of exposure to radium by the general population are the consumption of drinking water and food (Table 5-1). Of the many radionuclides found in nature, radium is considered to be one of the most important because of its wide occurrence in groundwater, and because it, like calcium, is retained in bone tissues (Aieta et al. 1987). Bone cancer is the greatest health risk from exposure to radium.

5. POTENTIAL FOR HUMAN EXPOSURE

Based on assumptions about the concentration of radium in drinking water provided by utilities, the size of the population consuming this water, and the associated risk of cancer, Hess et al. (1985) estimated that the average concentration of radium in drinking water may cause cancer in 941 persons per year in the United States. The risk of exposure to radium in food is uncertain because of the variability in diets and in the radium-226 content of foods. It has been estimated that the yearly intake of radium-226 for food in New York City is on the order of 640 pCi (24 Bq) (Eisenbud 1973).

Levels of occupational exposure to radium are difficult to assess. Workers who are occupationally exposed to radium through the mining and processing of uranium are also probably exposed simultaneously to uranium itself, thorium, and radon by inhalation and probably dermal exposure. Nielson and Rogers (1981) suggested that inhalation exposures during uranium mining and milling operations involving crushing, grading, or blasting are the most significant routes of exposure. There is also some concern about ingesting dust at processing plants (Dixon 1985). It has also been suggested that inhalation of fugitive emissions from mine tailings could be locally significant (Ruttenber et al. 1984), but radium-specific data were not located.

5.6 POPULATIONS WITH POTENTIALLY HIGH EXPOSURES

The populations at greatest risk of exposure from the consumption of drinking water with a high radium content are located in the Piedmont and Coastal Plain province in New Jersey, North Carolina, South Carolina, and Georgia and parts of Minnesota, Iowa, Illinois, Missouri, and Wisconsin (Hess et al. 1985; Longtin 1988). It has been estimated that about 600,000 people consume water with radium-226 concentrations in excess of the MCL (5 pCi/L or 0.19 Bq/L) in Illinois, Iowa, Missouri, and Wisconsin. Isolated occurrences of high radium-226 have also been detected in Arizona, New Mexico, Texas, Mississippi, Florida, and Connecticut. There is also a high probability of exposure to high radium-228 concentrations in many of the states listed above in addition to parts of California, Colorado, Idaho, Montana, New Mexico, and Wyoming (Michel and Cothorn 1986).

It has been suggested that uranium miners and millers who are in chronic contact with dust are at risk. However, such workers are simultaneously exposed to several radionuclides and no generalization specific to radium can be made.

5.7 ADEQUACY OF THE DATABASE

Section 104(i)(5) of CERCLA, directs the Administrator of ATSDR (in consultation with the Administrator of EPA and agencies and programs of the Public Health Service) to assess whether adequate information on the

5. POTENTIAL FOR HUMAN EXPOSURE

health effects of radium is available. Where adequate information is not available, ATSDR, in conjunction with the National Toxicology Program (NTP), is required to assure the initiation of a program of research designed to determine the health effects (and techniques for developing methods to determine such health effects) of radium.

The following categories of data needs have been identified by a joint team of scientists from ATSDR, NTP, and EPA. They are defined as substance-specific informational needs that, if known, would reduce or eliminate the uncertainties of human health assessment. Each data need discussion highlights the availability, or absence, of the relevant exposure information. A statement that reflects the importance of identified data needs is also included. In the future, these data needs will be evaluated and prioritized, and a substance-specific research agenda will be proposed.

5.7.1 Identification of Data Needs

Physical and Chemical Properties. Although some of the physical and chemical properties of radium and radium compounds have not been determined, many of those that are needed to evaluate its behavior in the environment are known. The adsorption-desorption behavior of radium with geologic materials depends on the specific system under study and should be determined on a case-by-case basis. Also, thermodynamic and kinetic data for solid solution formation are scarce. Research in this area would facilitate modeling the fate of radium in water.

Production, Import, Use, and Disposal. Radium is apparently used only in small quantities (e.g., in laboratories) in the United States. The quantities discharged to the environment from this source are probably insignificant compared to naturally-occurring radium. However, data on actual amounts of radium currently in use and amounts disposed of as waste would be useful in estimating human exposure potential.

Environmental Fate. Studies of releases of radium that result from uranium mining and processing would be helpful to fully assess the total amount and environmental fate of radium released to the environment. Field data on the mobility of radium in groundwater would also be helpful in attempts to predict its potential for occurrence in sources of drinking water at remote sites.

Bioavailability from Environmental Media. Data on the absorption of radium from environmental media via inhalation, oral, and dermal exposure would be useful in determining potential risks for organisms (humans, animals and plants) that have been exposed to radium in air, soil, or natural waters.

5. POTENTIAL FOR HUMAN EXPOSURE

Food Chain Bioaccumulation. The existing information indicates that radium may be transferred through the food chain from lower trophic levels to humans. Additional monitoring studies in areas where radium occurs naturally at high concentrations in soil would be helpful to determine if this pathway is a significant route of exposure. The transfer of radium-228 from soils through the food chain has not been assessed.

Exposure Levels in Environmental Media. The concentration of radium-226 in drinking water has been the subject of numerous studies, and average values are reasonably well known. It appears that emphasis could be given to monitoring radium-226 concentrations in regions where high concentrations are expected to occur ("hot spots"), such as regions with high levels of natural radioactivity, in the vicinity of uranium mining and milling operations, and at NPL and other hazardous waste sites. Information on the occurrence of radium in the atmosphere would also be useful in helping to predict exposure via inhalation.

The occurrence of radium-228 has not been as well established, and additional data would be helpful, particularly in geologic regions where high concentrations are likely. There is virtually no information on the occurrence and levels of radium-223 and radium-224 in drinking water. The occurrence and levels of any of the isotopes of radium in food are highly variable, and additional data would facilitate exposure estimates.

Exposure Levels in Humans. There is no information available on the general background levels of radium in human tissue. Information on these levels, especially in the skeleton, would be especially useful as a means to monitor continuing exposure to radium.

Exposure Registries. A national exposure registry for persons exposed to radium was not located but would be useful in relating factors such as age, sex, season, geography, regulations, environment and other factors to measured exposure concentrations and health outcomes.

5.7.2 On-going Studies

The EPA is presently conducting a survey called the National Inorganics and Radionuclides Survey (NIRS). This study has been ongoing since 1981, and preliminary reports have been published. These data are still being analyzed for the establishment of revised interim drinking water regulations.

**RESPONSE TO SEPTEMBER 12, 2020 LETTER
FROM SECRETARY JAMES C. KENNY TO
RIO RANCHO MAYOR GREGGORY D. HULL**

“Statement in the letter”

Response

“ . . . regarding concerns about the alleged waste disposal issues. . . .”

There is nothing “alleged” about the radioactive waste disposal. More than enough evidence has been provided that the disposal definitely took place. Furthermore, evidence has been provided that documents the content of the material disposed as highly dangerous to human life. Therefore, the waste disposal “issues” are in no way “alleged.” The issues are very serious and must be taken seriously.

“ . . . it does not appear that there is a threat to human health or the environment from the disposal of the solid waste.”

It is not just “solid waste” that was disposed of in the landfill. This “solid waste” also includes radioactive waste and meets the EPA’s definition of “radioactive waste (TENORM),” which is definitely a threat to human health and the environment. Mixed in with the radioactive material were extraordinarily high (and dangerous) amounts of arsenic. The levels of radium and arsenic exceed any and all standard maximum contaminant levels established by both the federal government and the State of New Mexico. The threat is immediate and urgent.

“ . . . [no threat to human health] from the leachate within the lined landfill area.”

Such a statement is not based on any hard data. In order for the State of New Mexico to make such a statement, the leachate must be analyzed according to the best scientific methods. As of now, it has not been analyzed. The toxic material was dumped in the landfill in March 2018, two and a half years ago.

“ . . . landfills are designed and operated to manage solid wastes . . . “

The Rio Rancho landfill was not designed to accept or manage radioactive waste. NMED refuses to answer whether or not TENORM or NORM radioactive waste is allowable at this landfill. What is undisputable is that no valid permit or license, which is legally required, was granted by the State of New Mexico for this disposal into the Rio Rancho Landfill.

“ . . . if my staff identifies a factual basis for a public health or environmental threat . . . “

The Secretary’s staff has already identified and been made aware of the facts regarding the basis for a public health and an environmental threat.

NMED has confirmed that the dump occurred.

The Landfill’s written manifest confirms that 43 truckloads (288 tons) of this material was dumped.

The toxic material in question was analyzed in 2007 by Hall Environmental Lab of Albuquerque, NM. (NMED has this document).

Radium -- The Total Radium measured in the radioactive material is 7.08 pCi/g. [*Hall Environmental Lab, Analytical Water Quality Report, Dec 17, 2007*]

This exceeds the standard maximum contaminant levels of 5 pCi/G established by Environmental Protection Agency (EPA) and the Department of Energy (DOE). [*EPA Facts About Radium Information; Paper; DOE, Order 458.1, Radiation Protection of the Public and the Environment; Feb. 201*]

Therefore, the radioactive material dumped in the landfill is a threat to human health.

Arsenic – Arsenic is a carcinogen and a poison. The standard maximum contaminant level of the radioactive material is 7.07 mg/kg. [*New Mexico Soil Screening Guidelines, 2017*].

The arsenic content in the radioactive material is 52.83 mg/kg. [*Hall Environmental Lab, Analytical Water Quality Report, Dec 17, 2007*] That is seven times higher than the standard maximum contaminant level. In fact, the arsenic levels in the dumped radioactive material exceed industrial occupational safety levels.

Therefore, the dumped material is a threat to human health.



Michelle Lujan Grisham
Governor

Howie C. Morales
Lieutenant Governor

**NEW MEXICO
ENVIRONMENT DEPARTMENT**

Harold Runnels Building
1190 Saint Francis Drive, PO Box 5469
Santa Fe, NM 87502-5469
Telephone (505) 827-2855

www.env.nm.gov



James C. Kenney
Cabinet Secretary

Jennifer J. Pruett
Deputy Secretary

September 12, 2020

The Honorable Gregory D. Hull
Office of the Mayor
3200 Civic Center N.E.
Rio Rancho, NM 87144

Dear Mayor Hull,

I wanted to follow-up on our phone conversation on the afternoon of Thursday, September 10, 2020 and thank you once again for contacting the New Mexico Environment Department (NMED) regarding concerns about the alleged waste disposal issues regarding the Rio Rancho Landfill. I assure you that my Department takes these concerns seriously and that we are investigating these allegations.

As discussed during our phone call and based upon our preliminary analysis to date, it does not appear that there is a threat to human health or the environment from the disposal of the solid waste in the Rio Ranch landfill or from the distribution of leachate within the lined landfill area. As you know, landfills are designed and operated to manage solid wastes by keeping them away from groundwater, the surrounding environment and communities. However, I want to emphasize that our investigation is continuing and ongoing. NMED is conducting a thorough regulatory investigation of this matter with both the generator of the waste and the landfill itself. We will share the results of our investigation with you and the public upon completion. At any point in the investigation, if my staff identifies a factual basis for a public health or environmental threat, we will contact local officials and the public immediately.

If you or your staff need additional information, please do not hesitate to contact Mr. Alan Peura, NMED's Collaboration Coordinator, at (505) 629-6302 or by email at Alan.Peura@state.nm.us.

Sincerely,

James C. Kenney
Cabinet Secretary

CC: Alan Peura, Collaboration Coordinator, NMED



Radionuclides Rule: A Quick Reference Guide

Overview of the Rule

Title	Radionuclides Rule 66 FR 76708 December 7, 2000 Vol. 65, No. 236
Purpose	Reducing the exposure to radionuclides in drinking water will reduce the risk of cancer. This rule will also improve public health protection by reducing exposure to all radionuclides.
General Description	The rule retains the existing MCLs for combined radium-226 and radium-228, gross alpha particle radioactivity, and beta particle and photon activity. The rule regulates uranium for the first time.
Utilities Covered	Community water systems, all size categories.

Public Health Benefits

Implementation of the Radionuclides Rule will result in . . .	Reduced uranium exposure for 620,000 persons, protection from toxic kidney effects of uranium, and a reduced risk of cancer.
Estimated impacts of the Radionuclides Rule include . . .	Annual compliance costs of \$81 million. Only 795 systems will have to install treatment.

Regulated Contaminants

Regulated Radionuclide	MCL	MCLG
Beta/photon emitters*	4 mrem/yr	0
Gross alpha particle	15 pCi/L	0
Combined radium-226/228	5 pCi/L	0
Uranium	30 µg/L	0

*A total of 168 individual beta particle and photon emitters may be used to calculate compliance with the MCL.

Critical Deadlines & Requirements

For Drinking Water Systems

June 2000 - December 8, 2003	When allowed by the State, data collected between these dates may be eligible for use as grandfathered data (excluding beta particle and photon emitters).
December 8, 2003	Systems begin initial monitoring under State-specified monitoring plan unless the State permits use of grandfathered data.
December 31, 2007	All systems must complete initial monitoring.

For States

December 2000 - December 2003	States work with systems to establish monitoring schedules.
December 8, 2000	States should begin to update vulnerability assessments for beta photon and particle emitters and notify systems of monitoring requirements.
Spring 2001	EPA meets and works with States to explain new rules and requirements and to initiate adoption and implementation activities.
December 8, 2002	State submits primacy revision application to EPA. (EPA approves within 90 days.)



Radionuclides

Summary

Radionuclide contamination of drinking water is a significant, emerging issue. Until now, manmade radioactivity in drinking water has not been a major problem. Natural sources have been the primary cause of contamination. However, the potential for contamination exists throughout the country as releases from medical facilities or nuclear power plants may wind up in drinking water. Because of their potential health effects and widespread occurrence, natural radionuclides—including radon, radium, and uranium—cause much concern.

Where do radionuclides occur, and what are the public health risks?

Radionuclides occur naturally as trace elements in rocks and soils as a consequence of the “radioactive decay” of uranium-238 (U-238) and thorium-232 (Th-232). This decay happens because radioactive atoms have too much energy. When radioactive atoms release or transfer their extra energy, it is called decay. The energy they release is called ionizing radiation, which may be alpha particles, beta particles, or gamma rays. This energy is transmitted through space or another medium in waves (e.g., x-rays or gamma rays) or particles (e.g., electrons or neutrons) and is capable of either directly or indirectly removing electrons from atoms, thereby creating ions, which are electrically charged atoms.

Radon-222, radium-226, radium-228, uranium-238, and uranium-234 are ions of the U-238 and Th-232 decay series. They are the most common radionuclides found in groundwater. Other naturally occurring radionuclides tend to be environmentally immobile or have short half-lives, meaning they are far less likely to be found in significant amounts in groundwater.

When ionizing radiation strikes a living organism’s cells, it may injure the organism’s cells. If radiation affects a significant number of cells, the organism may eventually develop cancer. Or at extremely high doses, it may even die.

Radon: Radon is a naturally occurring radioactive gas that emits ionizing radiation. National and international scientific organizations have concluded that radon causes lung cancer in humans. Ingesting drinking water that contains radon also presents a risk of internal organ cancers, primarily stomach cancer. The U.S. Environmental Protection Agency (EPA) and the U.S. Surgeon General recommend

testing indoor air for radon in all homes and apartments located below the third floor. If you smoke and your home has high indoor radon levels, your risk of lung cancer is especially high.

Tap water only emits approximately 1 to 2 percent of the radon found in indoor air. However, breathing radon from this source increases the risk of lung cancer over the course of a lifetime.

Radium: Radium-226 and radium-228 are natural groundwater contaminants that usually occur at trace levels. At high exposure levels, radium-226 and radium-228 can cause bone cancer in humans and are believed to cause stomach, lung, and other cancers as well.

Uranium: Uranium is a naturally occurring radioactive contaminant that is found in both groundwater and surface water. At high exposure levels, uranium is believed to cause bone cancer and other cancers in humans. EPA also believes that uranium can be toxic to the kidneys.

Gross Alpha: Alpha emitters naturally occur as radioactive contaminants, but several come from manmade sources. They may occur in either groundwater or surface water. At high exposure levels, alpha emitters are believed to cause cancer in humans.

Beta and photon emitters: Beta and photon emitters are primarily manmade radioactive contaminants associated with operating nuclear power plants, facilities that use radioactive material for research or manufacturing, or facilities that dispose of radioactive material. Some beta emitters occur naturally. Beta and photon emitters primarily occur in surface water. At high exposure levels, beta and photon emitters are believed to cause cancer in humans.

Radionuclides

TABLE 1: What regulations govern radionuclides?

Radionuclide National Primary Drinking Water Regulations						
Contaminants	Drinking Water Health Effects	Proposed Maximum Contaminant Level Goal MCLG	EPA Standards		Sources	Best Available Technology(BAT) ²
			Proposed Maximum Contaminant Level (MCL)	Current MCL		
Radium-226	Cancer	Zero	20 pCi/L	5 pCi/L combined with radium-228	Naturally occurring	Ion Exchange (IE); Lime Softening (LS); Reverse Osmosis (RO)
Radium-228	Cancer	Zero	20 pCi/L	5 pCi/L combined with radium-226	Naturally occurring	IE; LS; RO
Radon-222	Cancer	Zero	300 pCi/L	-	Naturally occurring	Aeration
Uranium	Kidney toxicity, Cancer	Zero	20 ug/L ³	-	Naturally occurring	Coagulation/Filtration; Anion exchange; LS; RO ⁴
Adjusted gross alpha emitters	Cancer	Zero	15 pCi/L	15 pCi/L	Naturally occurring and manmade	RO
Gross beta and photon emitters	Cancer	Zero	4 mrem ede/yr	4 mrem ede/yr any organ or whole body	Naturally occurring	IE; RO

1 PicoCuries per liter (pCi/L) is an activity measurement of radioactive decay (1 pCi/L = 2.2 disintegrations per minute); micrograms per liter (µg/L) is a mass measurement; mrem is measurement of effective radiation dose to organs.
 2 Except as noted, BAT for the purpose of issuing variances is the same as BAT for compliance.
 3 20 µg/L is based on kidney toxicity. 20 µg/L is the equivalent of 30 pCi/L.
 4 Coagulation/Filtration and Lime Softening are not BAT for small systems (those with fewer than 500 connections) for the purpose of granting variances.

Note: EPA recognizes that most radionuclides emit more than one type of radiation as they decay. The lists of compounds labeled "alpha" or "beta" emitters identify the predominant decay mode.

Note: In this document the unit mrem ede/yr refers to the dose ingested over 50 years at the rate of 2 liters of drinking water per day.
 Source: U.S. Environmental Protection Agency, 1991

What are the treatment technologies for radionuclides?

Whether or not a particular treatment technology effectively removes radionuclides from drinking water depends on the contaminant's chemical and physical characteristics as well as the water system's characteristics (e.g., source water quality and water system size). Other considerations include cost, service life, and co-treatment compatibility.

Evaluation of Technologies

The following treatment technologies were evaluated for their ability to remove radionuclides from water:

- ion exchange (IE);
- point-of-use (POU) IE;
- point-of-entry (POE) IE;
- reverse osmosis (RO);
- POU RO; POE RO;
- lime softening (LS);
- greensand filtration;
- co-precipitation with barium sulfate;

- selective sorbents;
- electro dialysis / electro dialysis reversal (ED/EDR); and
- preformed hydrous manganese oxides (HMOs).

Ion Exchange: Small systems may readily use IE treatment, which removes approximately 90 percent of radionuclides. The effluent must be regularly monitored and the resin must be frequently regenerated to ensure that breakthrough does not occur. Ion exchange units may be controlled automatically, requiring less of the operator's time. However, it is necessary to employ a skilled operator to determine when regeneration is needed and to trouble-shoot. Also, disposal of concentrated radionuclides can be expensive.

Ion exchange treatment generates wastes that include rinse and backwash water, and the resin. The rinse and backwash liquid waste includes brine, radium, and any other contaminants that the process removes.

Cation Exchange: A cation is a positively charged ion. Cation exchange resins exchange like-charged ions equally with protons—sodium ions (Na+), or in sodium-restriction cases, potassium ions (K+)—to remove undesirable cations from water. Cation exchange is often used to remove calcium and magnesium cations, and to treat hard water.

The amount of waste (rinse and backwash) that cation exchange typically generates ranges between 2 and 10 percent of the treated water.

Lime Softening: Lime softening can be used to remove radium from drinking water with 80 to 95 percent efficiency. Also, adding lime or lime-soda ash to water increases the pH of the water and induces calcium carbonate and magnesium hydroxide precipitation. Lime softening also is used to treat hard water.

Lime softening generates wastes that include lime sludge, filter backwash liquid and sludge, and sludge supernatant.

Reverse Osmosis (RO): Reverse osmosis effectively removes many inorganic contaminants, including heavy metals and radionuclides, such as radium and uranium. RO can remove 87 to 98 percent of radium from drinking water. Similar

elimination can be achieved for alpha particle activity and total beta and photon emitter activity.

When using an RO system to remove radionuclides, performance depends on a number of factors, including pH, turbidity, iron/manganese content of the raw water, and membrane type. The pre-treatment design depends on the quality and quantity of the source water. Existing treatment plants may already provide much of the required pretreatment—for example, coagulation/filtration of highly turbid surface water or iron removal for well waters. RO can be cost effective for small systems.

Technologies for Radionuclide Removal Not Proposed as BAT in 1991

Greensand Filtration for Radium Removal

Greensand filtration technology consists of a conventional filter box with manganese greensand replacing the traditional filtration medium. Studies indicate that greensand filtration removes up to 56 percent of radium.

This process generates wastes that include sludge and supernatant from the filter backwash, and eventually the greensand media must be disposed of.

TABLE 2: Technologies for Radionuclides

Unit technology	Limitations (see footnotes)	Operator skill level required ¹	Raw water quality range and considerations ¹
1. Ion Exchange (IO)	(a)	Intermediate	All groundwater
2. Point of Use (POU) IO	(b)	Basic	All groundwater
3. Reverse Osmosis (RO)	(c)	Advanced	Surface water usually requires prefiltration
4. POU RO	(b)	Basic	Surface water usually requires prefiltration
5. Lime Softening	(d)	Advanced	All water
6. Green Sand Filtration	(e)	Basic	All water
7. Co-precipitation with Barium Sulfate	(f)	Intermediate to Advanced	Groundwater with suitable water quality
8. Electrodialysis/Electrodialysis Reversal		Basic to Intermediate	All groundwater
9. Pre-formed Hydrous Manganese Oxide Filtration	(g)	Intermediate	All groundwater

¹ National Research Council (NRC). "Safe Water from Every Tap: Improving Water Service to Small Communities." National Academy Press. Washington, DC. 1997.

Limitations Footnotes

- a. The regeneration solution contains high concentrations of the contaminant ions. Disposal options should be carefully considered before choosing this technology.
- b. When POU devices are used for compliance, programs for long-term operation, maintenance, and monitoring must be provided by the water utility to ensure proper performance.
- c. Reject water disposal options should be carefully considered before choosing this technology.
- d. The combination of variable source water quality and the complexity of the chemistry involved in lime softening may make this technology too complex for small surface water systems.
- e. Removal efficiencies can vary depending on water quality.
- f. This technology may be very limited in application to small systems. Since the process requires static mixing, detention basins, and filtration; it is most applicable to systems with sufficiently high sulfate levels that already have a suitable filtration treatment train in place.
- g. This technology is most applicable to small systems that already have filtration in place.

Source: Environmental Protection Agency, 1998



Preformed Hydrous Manganese Oxide (HMO) Filtration

Costs for HMO treatment can be quite low, if filtration is already in place.

HMO filtration is similar to oxidation/filtration in its complexity and the operator skill it requires. Proper dosages must be determined, and if water quality varies, the dosage must be recalibrated. Once the proper dose is determined, dosing is relatively easy. HMO filtration requires simple equipment and is fairly inexpensive. Filters must be backwashed, which may require intermediate operator skill. Radium containing wastes include HMO sludge, filter backwash, and sludge supernatant.

Co-precipitation of Radium with Barium Sulfate

Adding a soluble barium salt—such as barium chloride—to radium and sulfate contaminated water causes co-precipitation of a highly insoluble radium-containing barium sulfate sludge. This process has primarily been used for wastewater treatment. Mine wastewater treatment data indicates that this process removes up to 95 percent of radium.

This process generates wastes that include the barium sulfate precipitate sludge, filter backwash, and sludge supernatant.

Other Technologies

Some other technologies also are available that may remove radionuclides from drinking water. However, these technologies have not been fully tested for drinking water treatment or have only been used in industrial or experimental situations. Examples of processes that remove radium include selective sorbents (e.g., acrylic fibers or resins impregnated with manganese dioxide) and non-sodium cation exchangers (e.g., hydrogen ions and calcium ions).

Where can I find more information?

- (1) American Water Works Association & American Society of Civil Engineers. 1998. *Water Treatment Plant Design; 3rd ed.* The McGraw-Hill Companies, Inc.
- (2) U. S. Environmental Protection Agency. September 1998. *Small System Compliance Technology List for the Non-Microbial Contaminants Regulated Before 1996.* EPA 815-R-98-002.
- (3) U. S. Environmental Protection Agency. August 1998. *Federal Register/Notices.* Vol. 63, No. 151.
- (4) U. S. Environmental Protection Agency. October 1999. Office of Groundwater and Drinking Water. *Proposed Radon in Drinking Water Rule: Technical Fact Sheet* EPA 815-F-99-006. www.epa.gov/safewater/radon/fact.html
- (5) U. S. Environmental Protection Agency. June 1991. Office of Ground Water and Drinking Water. *Radionuclides in Drinking Water - Fact Sheet* EPA 570/9-91-700.
- (6) U. S. Environmental Protection Agency. July 1991. "National Primary Drinking Water Regulations; Radionuclides; Proposed Rule" *Federal Register*, Vol. 56, No. 138.
- (7) U. S. Environmental Protection Agency. March 1997. *Federal Register*, Vol. 62, No. 43.

Have you read all our Tech Briefs?

"Tech Briefs," drinking water treatment fact sheets have been a regular feature in the National Drinking Water Clearinghouse (NDWC) newsletter *On Tap* for more than four years. NDWC Technical Assistance Specialist Mohamed Lahlou, Ph.D., researches, compiles information, and writes these very popular items.

To order, call the NDWC at (800) 624-8301 or (304) 293-4191. You may also order online at ndwc_orders@mail.estd.wvu.edu or download fact sheets from our Web site at www.ndwc.wvu.edu.

Additional copies of fact sheets are free; however, postal charges may be added.

For further information, comments about this fact sheet, or to suggest topics, call Lahlou at one of the above numbers or contact him via e-mail at mlahlou2@wvu.edu.

Provided by: **GREG CZERNISKI, Area Environmental Protection Specialist**

Common Ground Rising provided an article prior to the meeting concerning dumping of salt from brine wells drilled near the Rio Puerco at the Rio Rancho landfill that is owned and operated by Waste Management of New Mexico, Inc. in Rio Rancho (WMNM). According to this article, brine water was also dumped into the sewer system in 2019. Reportedly, 51 loads of this waste were received by the landfill in 2017. WMNM disputes the facts of that article*. However, this landfill is lined and the liner, which protects against groundwater contamination, is in good condition. The landfill is nearing the end of its permit (2028). Waste Management will be required to continue to monitor that site for 30 years after permit expiration.

* -Waste Management of New Mexico, Inc. does not agree with this statement.

Additional comment/response from Waste Management of New Mexico:

The Rio Rancho Landfill is designed and operated in compliance with Federal, State and local requirements. Waste disposal operations are conducted over a liner with leachate collection system. Leachate is monitored, characterized, and evaluated.

Additionally, the facility annually monitors the groundwater in upgradient and downgradient wells in the upper aquifer underneath the Rio Rancho Landfill. The groundwater monitoring is described in the Ground Water Monitoring Plan, approved by the New Mexico Environmental Department (NMED) Solid Waste Bureau. Groundwater is analyzed for organics, inorganics, metals, general chemistry, and physical indicator parameters. Groundwater results are also statistically evaluated to determine any changes and/or potential impacts from the landfill.