

Town of Rangely Source Water Protection Plan



Rio Blanco County, Colorado

January 2010

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Colorado Rural Water Association

For the community water provider:
Town of Rangely: ID # CO015

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EXECUTIVE SUMMARY

The Town of Rangely values a clean, high quality drinking water supply and decided to work collaboratively with area stakeholders to develop a Source Water Protection Plan to protect their water source, the White River watershed. During the months of June 2009 to January 2010, six stakeholder meetings were held in Rangely, Colorado to encourage local public participation. The planning process attracted interest and participation from 27 people including local citizens, water operators, government, industry, and agency representatives. This group comprised the Rangely Planning Team (the Planning Team or Team).

The Team initially reviewed the Source Water Assessment completed by the Colorado Department of Public Health and Environment. The Assessment included the delineation of the source water protection area, potential sources of contaminants, and the susceptibility of these contaminants to degrade the water source. Using this information as a starting point, the Team defined the source water protection area as a Primary and Secondary protection areas. The delineated source water protection area defines the region where the Team has chosen to implement its source water protection measures to reduce source water susceptibility to contamination.

To develop their management approach, the Planning Team focused on the following potential contaminant sources within the Source Water Protection Area: agricultural practices, septic systems, transportation on roads, private water wells, residential practices, mining, oil/gas and oil shale development, solid waste and transfer sites, noxious weeds treatment, land use, zebra and quagga mussels, wastewater discharge sites, hazardous waste generators, future reservoir dredging, private water wells, storage tanks, and forest lands.

The Planning Team reviewed and discussed several possible management approaches that could be implemented within the protection area to help reduce the risks of potential contamination to the community's source water. Voluntary implementation of source water management approaches at the local level (i.e. county and municipal) applies an additional level of protection to the drinking water supply by taking preventive measures to protect the source water. The Planning Team established a "common sense" approach in identifying and selecting the most feasible source water management activities to implement locally. These management practices included in this Plan are recommended by the Team to reduce the risks of potential contaminants to the Source Water Protection Area and protect the drinking water source for the Town of Rangely.

At the completion of this plan, a Steering Committee was formed to oversee its implementation. Representatives from the Town, community, and government agencies who participated on the Planning Team volunteered to serve on the Steering Committee and meet quarterly throughout the year. The first meeting of the Steering Committee is scheduled on June 29, 2010. At this meeting the Committee will decide which management approaches to implement during 2010.

The Colorado Rural Water Association's Source Water Protection Specialist, Colleen Williams, helped facilitate the source water protection planning process. The goal of the Association's Source Water Protection Program is to assist rural and small communities served by public water systems to reduce or eliminate the potential risks to drinking water supplies through the development of Source Water Protection Plans, and provide assistance for the implementation of prevention measures.

INTRODUCTION

The Town of Rangely operates a municipal supply water system that supplies drinking water to 2,200 residents of the town and surrounding adjacent area located in the western part of Rio Blanco, Colorado. Members of the community recognize the possibility of potential threats to the Town's water supply, the White River watershed. They realized that in order to protect their source of drinking water, they needed to develop a protection plan to prevent possible contamination of this valuable resource. Proactive planning and prevention are essential to both the long-term integrity of their water system and limiting their costs and liabilities.



SOURCE: WWW.PANOAMJO.COM

Coming into Rangely along Highway 64.

Purpose of the Source Water Protection Plan

The Source Water Protection Plan (SWPP) is a tool for the Town of Rangely to ensure clean and of high quality drinking water sources for current and future generations. This Source Water Protection Plan is designed to:

- Create an awareness of the community's drinking water sources and the potential risks to water quality within the watershed;
- Encourage education and voluntary solutions to alleviate pollution risks;
- Promote management practices to protect and enhance their drinking water supply;
- Provide for a comprehensive action plan in case of an emergency that threatens or disrupts the community water supply.

Developing and implementing source water protection measures at the local level (i.e. county and municipal) will complement existing regulatory protection measures implemented at the state and federal governmental levels by filling protection gaps that can only be addressed at the local level.

Public Participation in the Planning Process

Public participation is vitally important to the overall success of Colorado's Source Water Assessment and Protection (SWAP) program. Source water protection was founded on the concept that informed citizens, equipped with fundamental knowledge about their drinking water source and the threats to it, will be the most effective advocates for protecting this valuable resource. Local support and acceptance of the plan is more likely where local stakeholders have actively participated in the development of their protection plan.

During the months of June 2009 to January 2010, six stakeholders meetings were held at the Colorado Northwestern Community College in Rangely, Colorado to encourage local public participation in the planning process. Local stakeholders were sent letters of invitation to participate with follow-up email reminders of meeting dates. The source water protection planning process attracted interest and participation from 27 people including local citizens, water operators, government, industry, and agency representatives. Input from the following list of Planning Team participants was greatly appreciated.

Table 1. Rangely Source Water Protection Plan Participants

Participant	Affiliation
Ann Brady	Town of Rangely Mayor
Peter Brixius	Town of Rangely Administrator
Brent Shroyer	Town of Rangely Board of Trustees
Chris Brasfield	Town of Rangely Town Clerk
Alden Vanden Brink	Town of Rangely Utilities Supervisor
Ken Parsons	Rio Blanco Board of Commissioners
Kai Turner	Rio Blanco Board of Commissioners
James Roberts	Bureau of Land Management - White River Field Office
Bob Lange	Bureau of Land Management - White River Field Office
Forest Nelson	White River / Yampa Roundtable
David Brown	U. S. Geological Service - Colorado Water Science Center
Joe Sullivan	U. S. Geological Service - Colorado Water Science Center
Michelle Burke	Rio Blanco County Planning and Development
Jeff Madison	Rio Blanco County Planning and Development
Peggy Rector	Rio Blanco Water Conservancy District
Wade Cox	Rio Blanco Water Conservancy District
Dan Eddy	Rio Blanco Water Conservancy District
Kelly Osborn	Douglas Creek Conservation District
Marc Blake	Encana
Fred Slagle	Encana Production Manager
Ross Alire	Chevron USA
Bill Savagy	Chevron USA
Reed Kelly	Colorado Independent Cattle Growers Association
Marvin Noel	Local Landowner
Kimberly Mihelich	Colorado Rural Water Association
Colleen Williams	Colorado Rural Water Association

Protection Plan Development

The source water protection planning effort consisted of public Planning Team meetings and individual meetings with water operators, government, and agency representatives. Information discussed at the meetings helped the Team develop an understanding of the issues affecting source water protection for the Town of Rangely. The Team then made recommendations for management approaches to be incorporated into a protection plan. In addition to the Planning Team meetings, data and other information pertaining to source water protection areas was gathered via public documents, internet research, phone calls, emails, and field trips to the protection area. A summary of the meetings is presented below.



PHOTO: COLLEEN WILLIAMS

The Planning Team meetings attracted interest and participation from 27 people.

Table 2. Presentations, Tours, and Planning Team Meetings

Date	Purpose of Meeting
11/20/08	Presentation of the Source Water Protection Planning process to the Town Board of Rangely, Colorado.
6/24/09	First Planning Team meeting with presentation on the process of developing a Source Water Protection Plan for the Town of Rangely. Review of the State's Source Water Assessment and discussion of the delineation of the source water protection area.
7/28/09	Second Planning Team meeting with discussion on the State's inventory of potential sources of contamination and the need to update inventory to reflect current data available. Presentation by USGS scientists on water quality monitoring in the White River basin.
8/25/09	Third Planning Team meeting with review of the potential sources of contaminants inventory including: permitted wastewater dischargers, hazardous waste sites, solid waste sites, and storage tanks.
9/22/09	Fourth Planning Team meeting with discussion on narrowing the protection plan's focus to include the Primary Source Water Protection Area and Secondary Source Water Protection Area (SWPA). Presentation on the potential contaminant sources within the Primary SWPA.
10/27/09	Fifth Planning Team meeting with identification of the issues of concern and the management approaches to include in the Source Water Protection Plan.
1/26/10	Sixth Planning Team meeting to review and edit the Draft Plan; appoint a Steering Committee; set the date for the first Steering Committee meeting; and implement one of the action items on the Plan.

Steering Committee Members

At the completion of this plan, a Steering Committee was formed to implement the management approaches of this Source Water Protection Plan. Members of the Planning Team volunteered to serve on the Steering Committee and meet quarterly throughout the year. The first meeting of the Steering Committee is scheduled for June 29, 2010. At this first meeting the Committee will develop an Action Plan for management approaches to implement during 2010.

Table 3. Steering Committee Members

Name	Affiliation
Peter Brixius	Town of Rangely Administrator
Chris Brasfield	Town of Rangely Town Clerk
Alden Vanden Brink	Town of Rangely Utilities Supervisor
Brent Shroyer	Town of Rangely Board of Trustees
Ken Parsons	Rio Blanco Board of Commissioners
Kai Turner	Rio Blanco Board of Commissioners
Bob Lange	Bureau of Land Management - White River Field Office
Forrest Nelson	White River / Yampa Roundtable
Jeff Madison	Rio Blanco County Planning and Development
Peggy Rector	Rio Blanco Water Conservancy District
Ann Brady	Resident of Rangely (Former Mayor of Rangely)
Paula Davis	Town of Rangely Mayor
Wade Cox	Rio Blanco Water Conservancy District
Jeremy Simmons	Rio Blanco County Environmental Health
Dan Eddy	Rio Blanco Water Conservancy District
Colleen Williams	Colorado Rural Water Association

WATER SUPPLY SETTING

Location

The Town of Rangely is a small rural community located in western Rio Blanco County, in the valley of the White River, in northwest Colorado. The town of Rangely is located at Latitude 40°5'10"N, Longitude 108°47'53"W at an elevation of 5,297 feet. Rangely is situated on the far western side of the State of Colorado, 13 miles east of the Utah border and 90 miles north of Grand Junction, Colorado. Road access to Rangely is provided from the south (near Grand Junction) by Highway 139 and from the east and west by Highway 64. The Town of Rangely covers 2,392 acres, has a population of approximately 2,200 people, approximately 1,100 residential dwellings, and a small town atmosphere. As an incorporated town, its municipal affairs are governed by the Rangely Town Council. The county seat is located in the Town of Meeker, 60 miles east of Rangely (Rangely, 2009).

Location of Rio Blanco County, Colorado

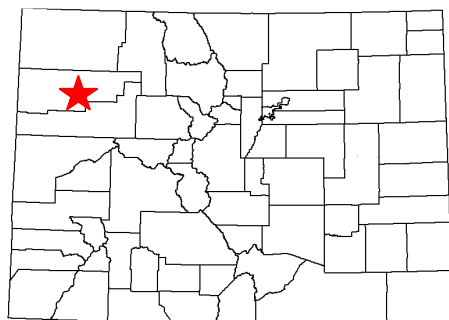


Figure 1. Regional Setting Map



SOURCE: MAPQUEST.COM

Geology

Western Rio Blanco County is in the north-eastern part of the Colorado Plateau physiographic province; eastern Rio Blanco County lies within the north-central part of the Southern Rocky Mountains physiographic province. The Grand Hogback, a monoclinic structure of steeply dipping sedimentary strata, traverses the county in a general north-south direction near State Highway 13 and separates the two major provinces. East of the Grand Hogback and the Meeker area, the White River uplift has raised the land to elevations ranging from about 6,000-12,000 feet. Subsequent stream and glacial erosion of this topographic high has exposed some of the oldest rocks in the county. West of the Grand Hogback, the Piceance Basin forms the principal geologic structure in the west central part of Rio Blanco County. The basin extends from the Grand Hogback westward to Cathedral Bluffs and contains sedimentary strata rich in oil shale, gas, and alkaline minerals. West of Cathedral Bluffs, in the most western parts of Rio Blanco County, the geologic landforms are controlled mostly by an anticlinal structure known as the Douglas Creek arch. The axis of the arch trends north - south and the arch contains significant resources of recoverable gas and oil.

Surface geology in Rio Blanco County is mostly sedimentary rocks ranging in age from the Paleozoic (230-600 million years ago) to the Cenozoic (present to 63 million years ago). Paleozoic and Mesozoic (63-230 million years ago) sedimentary rocks are most common in the eastern third of the county; Mesozoic and Cenozoic sedimentary rocks dominate in the northern, central, and western parts of the county. During the last half of the Cenozoic Era, extrusives of mostly basaltic composition intermittently covered exposed rocks along the crest of the White River uplift. These volcanics are still evident (Flat Tops area) as resistant rock layers that cap older strata in the eastern parts of the county. Cretaceous and Tertiary (1-63 million years ago) shales and siltstones are common in the central and western part of the county and are generally less resistant to erosion than the rocks of the White River uplift (RBC, 2003).

Soils

All soils within Rio Blanco County have been surveyed and mapped. Two soil surveys have been completed in the County. The Rio Blanco Soil Survey (USDA, 1982) covers private and BLM lands. The Flat Tops Survey covers the National Forest areas and some private land. At present, only the Rio Blanco Soil Survey has been published. Most soil units in Rio Blanco County have varying limitations for land uses. Common soil characteristics that may cause hazards and/or limitations for selected land uses include: shrink-swell, frost action, soil strength, piping, excessive settling, corrosivity, stoniness, soil depth, and permeability.

Vegetation

Natural vegetation cover in the county at elevations generally greater than 7,000 feet primarily consists of conifer and aspen forests; pinon pines, junipers, mixed grasslands, and sagebrush predominate at elevations generally less than 7,000 feet. The conifer and aspen forests are common in the eastern parts of the county and the high elevations along the rim of the Piceance Basin. Pinyon pines, junipers, mixed grassland, and sagebrush are common in the central parts of the county; sagebrush, sparse growths of grasses, pinyon pines, and juniper are typical in the western parts of the county. Irrigated and dry-land crops of grains, mixed grasses, and alfalfa hay are grown in the central parts of the county and along stream valleys throughout much of the county (RBC, 2003).

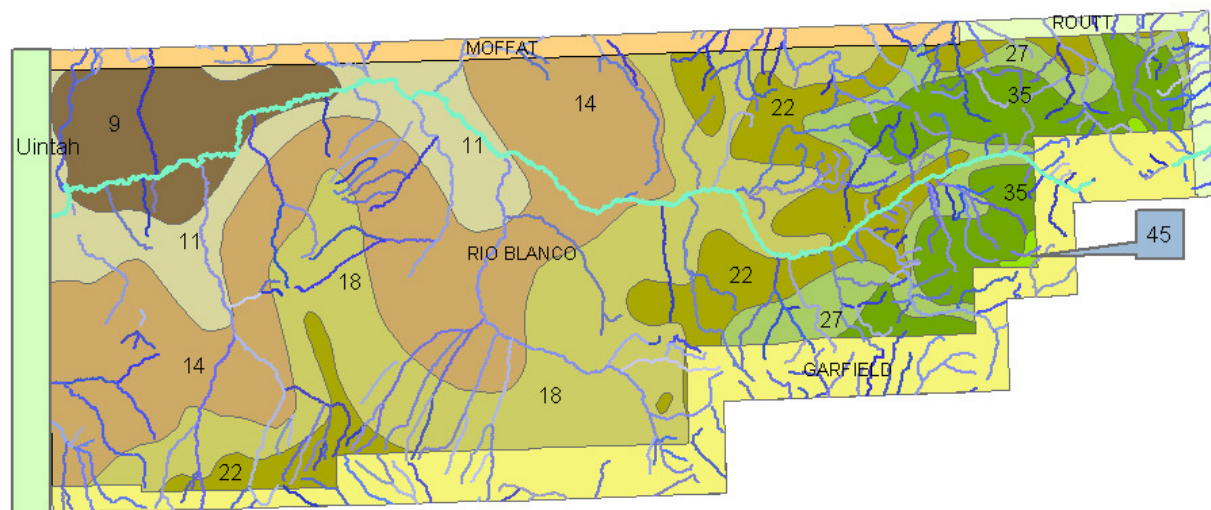
Climate

The climate of Rio Blanco County is continental, characterized by dry air, sunny days, clear nights, variable precipitation, moderate evaporation, and large diurnal temperature changes. Climate is mostly semiarid/high desert in the lower elevations in the western half of the county and along the Utah border. Climate becomes transitional near Meeker and is alpine in the higher elevations of Piceance Basin and eastern Rio Blanco County. Blizzards and extremely frigid conditions occur occasionally (usually due to continental arctic air masses), while severe weather conditions such as tornados and damaging hail are rare.

Changes in topography cause considerable variations in local temperatures, precipitation, and surface winds. Variations in annual precipitation in the county primarily are due to orographic (mountain related) control. Annual precipitation ranges from less than 10 inches near Rangely to greater than 50 inches near Marvine Peaks in eastern Rio Blanco County. Most of the county receives an average of 10-20 inches of precipitation per year. Snowfall amounts vary from about 30 inches of snow at the lower elevations to 180 inches of snow at the Marvine Ranch. Most mountainous areas typically receive 30-50 inches of annual snow pack.

Seasonal and daily temperatures vary with elevation and, to a lesser extent, local microclimates. Daily temperatures (in degrees Fahrenheit) in summer usually range from the upper 40's to the 80's (in mountain terrains) and mid 90's (western valleys). In winter, cold air commonly accumulates in the valleys. Maximum daytime temperatures in winter typically range from 10 to 40 degrees; nighttime temperatures commonly average 20-30 degrees colder than daytime temperatures. Extreme temperatures have ranged from -48 degrees (Little Hills in 1963) to 104 degrees (Rangely in 1954). At the higher elevations, freezing temperatures are possible throughout the year and snow may accumulate from October to May. At lower elevations, freezing temperatures and snow accumulation are likely from October to April. Prevailing winds in the upper levels of the atmosphere are mostly from the southwest, but local air movements are strongly influenced by topography (RBC, 2003).

Figure 8. Average precipitation in inches for areas of Rio Blanco County



SOURCE: RIO BLANCO COUNTY PRE-DISASTER NATURAL HAZARD MITIGATION PLAN, 2003

Land Ownership and Use

The Source Water Protection Area for the Town of Rangely lies within the eastern portion of the Town of Rangely, the unincorporated land of Rio Blanco County, and on public lands. Public lands owned by the federal government account for 75% of the County and are managed by the U.S. Department of Agriculture's Forest Service and Department of the Interior's Bureau of Land Management. National Forest lands within the White River watershed are managed by the Blanco Ranger District. Bureau of Land Management lands are managed by the White River Field Office in Meeker. The other 25% of the land in the County is privately owned and either managed by the Towns of Rangely or Meeker or by Rio Blanco County. Rio Blanco County comprises approximately 3,226 square miles with approximately 2,064,791 acres (Sorensen, 2007). The densest residential areas of the County are the communities of Rangely and Meeker.

Land use in the County primarily consists of agriculture, urban and rural residential development, recreation, tourism, oil and mineral extraction, and industry. Ranching is the predominant private land-use in the eastern half of the watershed. Irrigated acreage in the White River basin totals approximately 28,600 acres, of which approximately ninety percent is in pasture grass, and the remaining ten percent is in alfalfa. The greatest concentration of irrigated lands is in the river valley around Meeker.

Land use on public lands consist of dispersed recreation (motorized, hiking, fishing, mountain biking, hunting, camping, equestrian), grazing, timber harvest, wildlife habitat, aquatic habitat, and municipal water supply for the towns of Meeker and Rangely.

Land Use: Administration

Rio Blanco County has the authority to protect and promote the health, welfare and safety of the people of Rio Blanco County and the authority to regulate land use planning and protection of the environment. The County has adopted regulations to exercise such authority including the review, approval or denial of proposed activities and uses of land and natural resources, including oil and gas operations (Madison, 2008). The Rio Blanco County Master Plan, adopted in 1999, provides a framework for decision making and serves as a guide to development within the unincorporated Rio Blanco County. The County is currently upgrading its Master Plan.

Most of the land use decisions for the unincorporated areas of Rio Blanco County are made by the Rio Blanco County Board of Commissioners with recommendation from the Rio Blanco County Planning Commission and department staff. The Planning Commission may:

- (1) Make studies and recommend to the Board of County Commissioners approvals for subdivisions, agreements, permits, plans, goals, and objectives relating to the growth, development, and redevelopment of the county, cities and towns;
- (2) Develop and recommend to the Board of County Commissioners policies, resolutions, ordinances, administrative procedures, and other means for carrying out plans in a coordinated and efficient manner; and
- (3) Perform any other duties assigned by the Board of County Commissioners (Rio Blanco County, 2008).

The Department of Planning and Development administers, on behalf of the Board of County Commissioners, Rio Blanco County's land use regulatory system. The Department coordinated issues relating to physical land use and development activities in Rio Blanco County as well as long range planning.

Land Use: Zoning

There are two types of zoning districts within Rio Blanco County: basic use and overlay district. The location and boundaries of these districts are designated in the Rio Blanco County Land Use Resolution. Basic use districts include: agricultural, rural residential, compact residential, mixed commercial, moderate industrial, leisure recreation, and multiple use.

Agricultural District

Most of the private land in the unincorporated areas in the source water protection area lies within the land zoned Agricultural District. This district is for agricultural, farming, ranching, forest and recreational uses to provide protection from encroaching business, industrial, and non-farm residential uses. It is not intended for rural business such as but not limited to truck repair, excavation companies or industrial, and non-farm residential uses.

Agriculture is defined as farming and ranching including plowing, tilling, cropping, installation of best management practices, seeding, cultivating or harvesting for the production of food, horticultural, and fiber products. It does not include commercial logging and timber harvesting. The land zoned Agricultural District is in excess of 160 acres unless the property owner can demonstrate that the smaller parcel(s) is the primary, or part of a primary operation that provides the landowner their principle income, or it is obvious that the land is maintained as agricultural as opposed to some other use such as but not limited to rural residential.

Uses not meeting this definition are required to be zoned according to their appropriate use category as determined by the planning commission based on a report by the Director of Land Use Management after analysis of the actual use status of the land based on determining conformance to the definition above. Properties of less than 160 acres that are denied rezoning from agricultural to rural residential shall not be granted building permits for the construction of residential uses (RBC, 2002).

Multiple Use District

Public lands within the White River watershed lie within the County's Multiple Use District which is for the orderly and cooperative arrangement of lands that have multiple uses defined and approved in Federal Acts, Plans, and Programs. These public lands include lands administered by the Bureau of Land Management and U.S. Forest Service. It also includes lands that are held privately for oil and mineral extraction (RBC, 2002).

Population and Growth

For such a vast county in terms of square miles and acres of land, Rio Blanco County is sparsely populated. In 2005, the county's population was estimated to be 6,073 (approximately 1.88 persons/sq mile) with growth projected to be 7,575 by the year 2020. Of the 6,073 people living in the county, 2,273 live in Meeker, 2,068 live in Rangely, and the remaining 1,732 live in the unincorporated parts of the county (Sorensen, 2007).

Historic growth in Rio Blanco County has occurred at a slower rate than the national average and is expected to continue to grow at an annual rate of 1.94 percent until 2023. Growth rates for the county could greatly increase if projected oil and gas development continues. In 2007, cumulative drilled oil and gas wells in Rio Blanco County numbered approximately 2,500 wells. By 2022, the number of oil and gas wells is projected to be 17,500. It is estimated that the focus of oil and gas drilling in Northwestern Colorado will shift north to Rio Blanco County and the regional population may double by 2035. Additionally, if commercial oil shale develops, the population in Rio Blanco County is projected to exceed 39,000 residents (BBC, 2008). Oil shale development may increase the county population by 20,389 (Table 4).

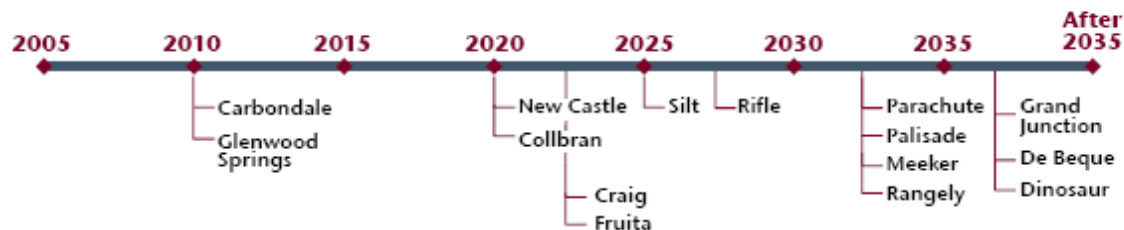
Table 4. Population estimates with oil, natural gas, and oil shale development

Rio Blanco County	2005 Population	2035 Population		Population Difference
		With oil and gas development	With oil shale development	
Meeker	2,273	4,932	4,938	6
Rangely	2,068	4,392	6,296	1,904
Unincorporated	1,732	9,300	27,780	18,480
Total County	6,073	18,624	39,013	20,389

SOURCE: NORTHWEST COLORADO SOCIOECONOMIC ANALYSIS & FORECAST

The County's future growth will most likely be determined by the development of oil shale, oil, coal, and gas production in nearby areas. The projected population levels for Rangely reflect the estimated capacity limits for the town. It is estimated that the town of Rangely will approach build out or 80% of its capacity between 2030 and 2035 with the oil, gas, and oil shale development (Figure 5).

Figure 5. Dates when communities begin to approach build out or 80% of capacity



SOURCE: NORTHWEST COLORADO SOCIOECONOMIC ANALYSIS & FORECAST

Economics

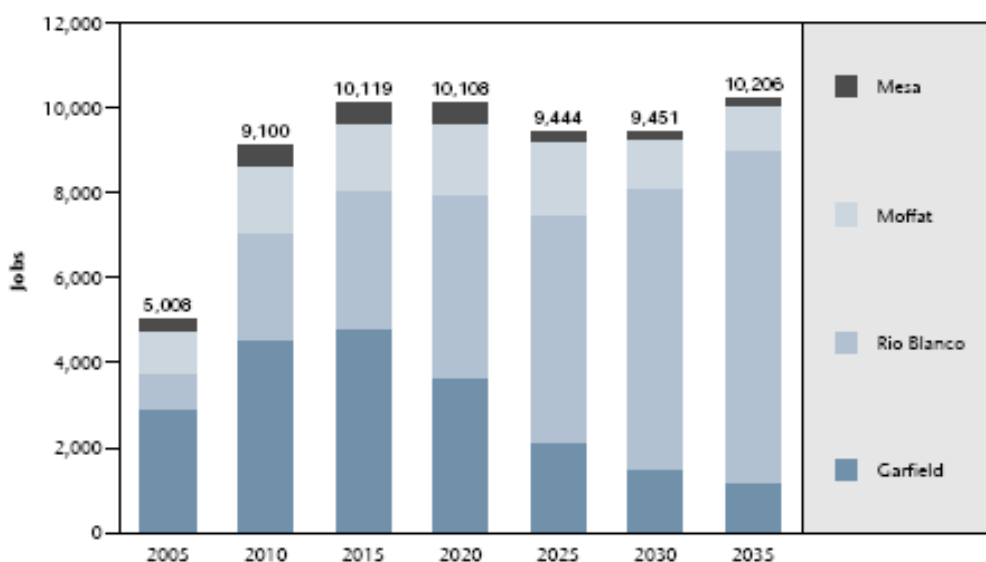
In recent years, energy development has become the major driver of the county's economy. In 2006, for property tax assessment purposes, the top 10 valued companies were directly related to energy development comprising 80% of the county's total assessed value. With the increase in future population and growth, the demand for services will continue to increase as well as the need for improvements in the county's infrastructure.

The recent energy exploration activities have had an impact on the local job market. In 2005, an estimated 4,164 jobs were available. The unemployment rate was estimated to be in the 4% range. The job growth rate from 2004 to 2005 was estimated to be in the 7% range and is projected to be carried through 2007. In 2007, the unemployment rate was approximately 1.5%.

The total number of direct jobs in the energy sector is forecasted to increase in Northwest Colorado to over 9,100 between 2005 and 2010, an increase of almost 4,100 jobs or 82 percent. The number of direct energy jobs is anticipated to peak at almost 10,120 in 2015 before decreasing to 9,450 by 2030 and increasing again to over 10,200 by 2035 (Figure 6).

The increase in permanent residents in Rio Blanco County has not increased proportionally with the available jobs and demand for workers within the county. This is due to the lack of affordable and attainable housing within the county and as a result, potential county residents are seeking housing in neighboring counties and commuting to their jobs in Rio Blanco County (Sorensen, 2007).

Figure 6. Direct Energy Jobs by County, 2005–2035



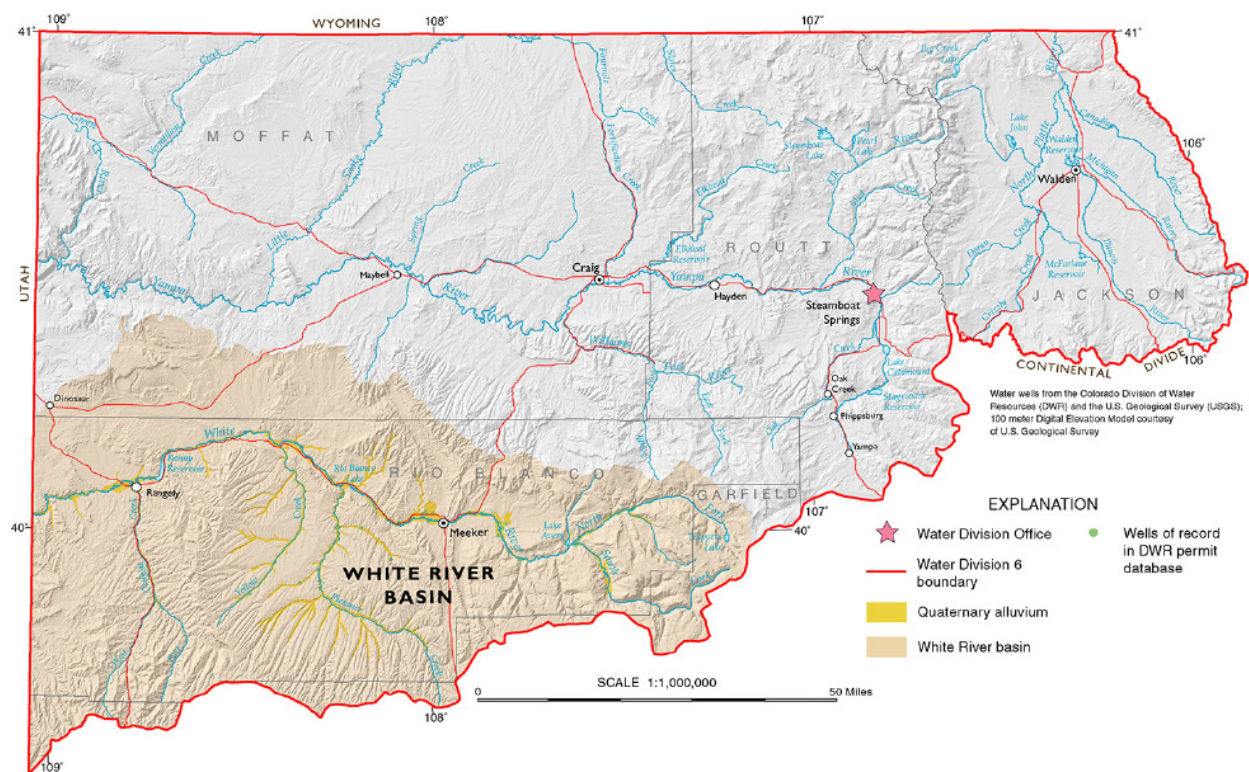
SOURCE: NORTHWEST COLORADO SOCIOECONOMIC FORECAST AND ANALYSIS

Water Quality Setting

Hydrology

The White River is the principal source of drinking water for the town of Rangely. The White River basin lies between the Colorado River and Yampa River basins in northwest Colorado. The headwaters for the White River originates in the Flat Tops Wilderness Area of the White River National Forest and flows westerly to its confluence with the Green River in Utah. Stream flows that originate in the North Fork and South Fork Basins join near Buford to form the main stem of the White River. The elevation of the drainage basin varies between 12,000 feet at the eastern headwaters to 4,600 feet at its mouth (Wright, 1973).

The White River basin within Colorado drains approximately 3,750 square miles, and encompasses nearly all of Rio Blanco County as well as the southwestern fringe of Moffat County to the north, and portions of Garfield County to the south and east. The basin is part of Colorado Water Division 6 with the office of the Division Engineer in Steamboat Springs (Topper, et al, 2003).



SOURCE: GROUND WATER ATLAS OF COLORADO

Figure 7. Map of the White River Basin

The White River is the major source of water for domestic, industrial, and agricultural uses in Rio Blanco County. The watershed encompasses a complex set of perennial and intermittent stream systems characterized by a highly erosive and unstable landscape. Tributary streams east of Meeker mostly flow throughout the year (perennial) or seasonally (intermittent). Except for Strawberry, Piceance, Yellow, and Douglas Creeks, tributary streams west of Meeker mostly flow in response to storm events or occasional snowmelt (ephemeral). The annual discharge normally ranges between 400,000-700,000 acre-feet.

The channel of the White River above Meeker may be characterized as relatively steep with a shallow depth. In the five miles upstream from Meeker the channel slope varies considerably. Within Meeker the channel slope decreases in the area of the 5th St. Bridge and again downstream from the 10th St. Bridge. This flattening out of the river is also characterized by an increase in the size and frequency of meanders. Gravel bar formation is common on the reach through Meeker.

As the river continues downstream of Meeker it continues to flatten out to slowly meander until it meets Kenney Reservoir. Here, at the mouth of the reservoir the considerable sediment loads normal in this reach of the river are dropped out. Below the reservoir, through the town of Rangely, the river is slow and characteristic of a channel moving through a thick alluvial plain of sediment deposition of highly erosive soils.

Peak flows in the White River occur during the months of May and June when runoff from melting snowpack is at a maximum. Occasional intense thunderstorms may temporarily increase flow in the White River during summer, but runoff contributions to the annual streamflow of the White River directly from rainfall generally are small. Snowmelt contains relatively small quantities of suspended sediment and dissolved solids. Thus, the large streamflow that originates from the North Fork and South Fork during spring and early summer transports large quantities of excellent quality water to the central and western parts of the basin.

Water storage in Rio Blanco County is both natural and man-made. Natural storage is mostly as groundwater within valley fill and bed rock aquifers. Surface water storage occurs in the high-elevation natural lakes in eastern Rio Blanco County and in the man-made reservoirs of Lake Avery, Kenney Reservoir, and several smaller impoundments. The Yellow Jacket and Rio Blanco Water Conservation Districts manage large quantities of streamflow in Rio Blanco County.

Historically, water use and diversion within the White River basin has been for agricultural and domestic needs. Constraints on water use generally were limited to periods of drought. However, during the national energy crisis in the 1970's and early 1980's, projected water needs to support proposed oil-shale projects in the semiarid Piceance Creek Basin caused an increase in filings for water diversions. The potential loss of water from the White River for nahcolite mining and oil shale development and the increases in demand in the Lower Colorado River basin, prompted concerns that the White River could become an over-allocated river and that water shortages would be common.

The degradation of the water quality of the White River or its alluvial aquifer would be expected to have serious consequences to residents of the county. Water treatment costs to the Towns of Meeker and Rangely could substantially increase. Water in private wells along the valley could become increasingly contaminated and require treatment. The diverse aquatic life in the river could diminish. If severe degradation occurs, public health problems caused by water-borne pathogens might develop. All of these impacts would tend to reduce the quality of life presently enjoyed in Rio Blanco County (RBC, 2003).

Water Quality Standards: Surface Water

Under the Clean Water Act, every State must adopt water quality standards to protect, maintain and improve the quality of the Nation's surface waters. The State of Colorado's Water Quality Control Commission has established water quality standards that define the goals and limits for all waters within their jurisdictions. Colorado streams are divided into individual stream segments for classification and standards identification purposes. Waters within these segments are classified for the present beneficial uses of the water, or the beneficial uses that may be reasonably expected in the future. Stream classifications can only be downgraded if it can be demonstrated that the existing use classification is not presently being attained and cannot be attained within a twenty year time period. A Use Attainability Analysis must be performed to justify the downgrade (WQCC, 2009). Standards are designed to protect the associated classified designated uses of the streams. Stream segments located within the source water protection area of the White River watershed are listed in Table 5.

Definitions of Designated Uses

- Aquatic Life Cold 1: Refers to waters that are capable of sustaining a wide variety of cold water biota, including sensitive species, or could sustain such biota in correctable water quality conditions.
- Aquatic Life Warm 1: Refers to waters that (1) currently are capable of sustaining a wide variety of warm water biota, including sensitive species, or (2) could sustain such biota but for correctable water quality conditions.
- Aquatic Life Cold and Warm 2: Refers to waters that are not capable of sustaining a wide variety of cold or warm water biota, including sensitive species due to physical habitat, water flows or levels, or uncorrectable water quality conditions that result in substantial impairment of the abundance and diversity of species.
- Recreation Primary Contact E: These surface waters are suitable or intended to become suitable for recreational activities in or on the water when the ingestion of small quantities of water is likely to occur.
- Recreation Primary Contact P: These surface waters have the potential to be used for primary contact recreation. This classification is assigned to water segment for which no use attainability analysis has been performed.
- Recreation Secondary Contact N: These surface waters are suitable or intended to become suitable for recreational activities on or about the water which are not included in the primary contact subcategory, including but not limited to fishing and other streamside or lakeside recreation.
- Recreation Class U: These are surface waters whose quality is to be protected at the same level as existing primary contact use waters, but for which there has not been a reasonable level of inquiry about existing recreational uses and no recreation use attainability analysis has been completed.
- Agriculture: These surface waters are suitable or intended to become suitable for irrigation of crops usually grown in Colorado and which are not hazardous as drinking water for livestock.
- Domestic Water Supply: These surface waters are suitable or intended to become suitable for potable water supplies. After receiving standard treatment (defined as coagulation, flocculation, sedimentation, filtration, and disinfection with chlorine or its equivalent) these waters will meet Colorado drinking water regulations and any revisions, amendments, or supplements (WQCC, 2009).

Table 5. Stream segments within the White River Watershed SWPA and their Classified Designated Uses

Stream Segment Description	Designated Use	
1. All tributaries to the White River, including all wetlands, which are within the boundaries of the Flat Tops Wilderness Area. Outstanding Waters Designation.	Aq Life Cold 1 Recreation E	Water Supply Agriculture
3. Mainstem of the North Fork of the White River and mainstem of the White River from the Flat Tops Wilderness Area boundary to a point immediately above the confluence with Miller Creek.	Aq Life Cold 1 Recreation E	Water Supply Agriculture
4. All tributaries to the North Fork of the White River, including all wetlands, from the Flat Tops Wilderness Area boundary to the confluence with the South Fork of the White River except for the specific listings in Segment 1.	Aq Life Cold 1 Recreation E	Water Supply Agriculture
6. Mainstem of the South Fork of the White River, including all tributaries and wetlands, from the boundary of the Flat Tops Wilderness Area to the confluence with the North Fork of the White River.	Aq Life Cold 1 Recreation E	Water Supply Agriculture
7. Mainstem of the White River from a point immediately above the confluence with Miller Creek to a point immediately above the confluence with Piceance Creek.	Aq Life Cold 1 Dec 1 to March 1 Mar 2 to Nov 30 Recreation E Agriculture	Water Supply Recreation P Agriculture
8. All tributaries to the White River, including all wetlands, from the confluence of the North and South Forks to a point immediately above the confluence with Piceance Creek, which are within the boundaries of White River National Forest.	Aq Life Cold 2 Recreation N	Water Supply Agriculture
9a. All tributaries to the White River, including all wetlands, from the confluence of the North and South Forks to a point immediately above the confluence with Flag Creek, which are not within the boundary of national forest lands, except for the specific listings in Segments 9c, 9d and 10b.	Aq Life Cold 2 Recreation N	Water Supply Agriculture
10a. All lakes and reservoirs tributary to the White River, from the confluence of the North and South Forks of the White River to a point immediately above the confluence of the White River and Piceance Creek, except for specific listing in Segments 11, 25 and 27.	Aq Life Cold 1 Recreation E	Water Supply Agriculture
10b. Mainstem of Big Beaver Creek, Miller Creek, and North Elk Creek, including their tributaries and wetlands, from their boundary with national forest lands to their confluences with the White River. Mainstem of Coal Creek, including all tributaries and wetlands, from the source to the confluence with the White River.	Aq Life Cold 1 Recreation P	Water Supply Agriculture
11. Rio Blanco Lake and Taylor Draw Reservoir (a.k.a. Kenney Reservoir).	Aq Life Warm 1 Recreation E	Water Supply Agriculture
12. Mainstem of the White River from a point immediately above the confluence with Piceance Creek to a point immediately above the confluence with Douglas Creek.	Aq Life Warm 1 Recreation E	Water Supply Agriculture
13a. All tributaries to the White River, including all wetlands, from a point immediately below the confluence with Piceance Creek to a point immediately above the confluence with Douglas Creek, except for the specific listings in Segments 13b through 20.	Aq Life Warm 2 Recreation N	Agriculture
13b. Mainstem of Yellow Creek including all wetlands from the source to the confluence with Barcus Creek. All tributaries to Yellow Creek from the source to the White River, including wetlands.	Aq Life Warm 2 Recreation N	Agriculture
13c. Mainstem of Yellow Creek, including all wetlands from immediately below the confluence with Barcus Creek to the confluence with the White River.	Aq Life Warm 2 Recreation N	Agriculture
13d. Violet Springs Ponds.	Aq Life Cold 2 Recreation P	Agriculture
14a. Mainstem of Piceance Creek from the source to a point just below the confluence with Hunter Creek.	Aq Life Cold 2 Recreation P	Agriculture
14b. Mainstem of Piceance Creek from a point just below the confluence with Hunter Creek to a point just below the confluence with Ryan Gulch.	Aq Life Cold 2 Recreation P	Agriculture
15. Mainstem of Piceance Creek from a point just below the confluence with Ryan Gulch to the confluence with the White River. The Dry Fork of Piceance Creek, including all tributaries and wetlands, from a point just below the confluence with Little Reigan Gulch to the confluence with Piceance Creek.	Aq Life Warm 2 Recreation P	Agriculture
16. All tributaries to Piceance Creek, including all wetlands, from the source to the confluence with the White River, except for the specific listings in Segments 15, 17, 18, 19 and 20.	Aq Life Warm 2 Recreation P	Agriculture
17. Stewart Gulch from the sources of the East Middle, and West Forks to the confluence with Piceance Creek.	Aq Life Cold 2 Recreation N	Agriculture
18. Mainstem of the Dry Fork of Piceance Creek, including all tributaries and wetlands, from the source to a point just below the confluence with Little Reigan Gulch. Willow and Hunter Creeks, including all tributaries and wetlands, from their sources to their confluences with Piceance Creek.	Aq Life Cold 2 Recreation N	Agriculture
19. Mainstem of Fawn Creek from the source to the confluence with Black Sulphur Creek.	Aq Life Cold 2 Recreation N	Agriculture
20. Mainstems of Black Sulphur Creek including all tributaries and wetlands from the source to the confluence with Piceance Creek.	Aq Life Cold 1 Recreation N	Agriculture
24. All lakes and reservoirs tributary to the White River, which are within the boundaries of the Flat Tops Wilderness Area, including Trappers Lake.	Aq Life Cold 1 Recreation E	Water Supply Agriculture
25. Lake Avery (a.k.a Big Beaver Reservoir).	Aq Life Cold 1 Recreation E	Water Supply Agriculture
26. All lakes and reservoirs tributary to the North and South Forks of the White River, from the Flat Tops Wilderness Area boundary to the confluence with the North and South Forks of the White River.	Aq Life Cold 1 Recreation U	Water Supply Agriculture

SOURCE: COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT WATER QUALITY CONTROL COMMISSION REGULATION 37

The stream segments within the White River watershed are currently attaining their designated use. All tributaries to the White River within the boundaries of the Flat Top wilderness are listed as an "Outstanding Water" designation. While there are no segments listed on the 303d list as impaired, the Water Quality Control Commission has identified water bodies where there is reason to suspect water quality problems, but there is also uncertainty regarding one or more factors, such as the representative nature of the data (WQCC, 2008). These stream segments that are placed on a Monitoring and Evaluation list for further studies within the White River watershed are listed in Table 6.

Table 6. Water Bodies Identified for Monitoring and Evaluation

WBID	Segment Description	Portion	Parameter
COLCWH07	Mainstem of the White River from a point above the confluence with Miller Creek to a point immediately above the confluence with Piceance Creek	White River, below Meeker	Copper
COLCWH09a	Tributaries to the White River from North and South forks to Piceance Creek not within the boundary of National Forest lands except segments 9b and 10b.	Strawberry Creek	Copper, Zinc
COLCWH10b	Mainstem of Big Beaver Creek, Miller Creek, and North Elk Creek, including tributaries, from their boundaries with the National Forest Lands to their confluences with the White River. Mainstem of Coal Creek, including all tributaries from the source to the confluence with the White River	Coal Creek	Selenium
COLCWH11	Rio Blanco Reservoir	Rio Blanco Reservoir	pH
COLCWH16	All tributaries to Piceance Creek, including all wetlands, lakes and reservoirs, from the source to the confluence with the White River	Ryan Gulch	E.coli

SOURCE: COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT WATER QUALITY CONTROL COMMISSION REGULATION 94

Preventing degradation of the surface and ground water in the watershed is important to the Town of Rangely in order for them to provide a safe, high quality drinking water supply to their customers. A copy of the "Status of Water Quality in Colorado - 2006" is included in the Appendices of this report.

Water Quality Monitoring

Water quality monitoring within the upper White River watershed has been conducted by the following entities:

- Colorado Department of Public Health and Environment's Water Quality Control Division (CDPHE WQCD)
- Rivers of Colorado Water Watch (River Watch)
- United States Geological Survey (USGS)
- Bureau of Land Management (BLM)
- Town of Rangely Water Department
- Oil and Gas Industry

Water Quality Control Division

The Colorado Department of Public Health and Environment's Water Quality Control Division monitors the water quality of segments within the White River basin to determine if the stream segments are meeting their designated water quality classifications and standards. The Division initiated focused water quality sampling in anticipation of the June 2008 Rulemaking Hearing. The sampling plan identified segments for which adequate water quality information has not previously been available, segments which available data has indicated actual or possible non-attainment of current standards, and segments because of their lengthy period of record to show a long term trend analysis of water quality conditions. Divisions monitoring plan for 2006-2007 include the following sites:

Table 7. Water Quality Control Division's water quality monitoring sites

Water Body ID	Site #	Description
COLCWH01	11532	South Fork White River above Buford
COLCWH04	11535	Lost Creek at 8 Road near Meeker
COLCWH09a	11555	Strawberry Creek at Hwy 64
COLCWH09b	11521	Flag Creek at 13 Road south of Meeker
COLCWH09b	11560	Sulphur Creek at Hwy 13 in Meeker
COLCWH10b	11562	Coal Creek at 8 Road
COLCWH11		Rio Blanco Lake
COLCWH12		Kenney Reservoir (Taylor Draw)
COLCWH13a	11743	Spring Creek at Hwy 64 above Kenney Reservoir
COLCWH13b	11733	Yellow Creek at 20 Road
COLCWH14	11608	Piceance Creek at Hwy 13 near Rio Blanco
COLCWH16	11627	Ryan Gulch Above Piceance at 24 Road
COLCWH17	11623	Willow Creek above confluence with Piceance Creek
COLCWH19	11626	Fawn Creek at 29 Road
COLCWH20	11625	Black Sulphur Creek above confluence with Piceance Creek at 26 Road
COLCWH21	11702	White River at Hwy 64

SOURCE: COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT WATER QUALITY CONTROL DIVISION

River Watch

River Watch is a statewide volunteer water quality-monitoring program operated by the Colorado Watershed Assembly in cooperation with the Colorado Division of Wildlife (CDOW). They work with voluntary stewards to monitor water quality and other indicators of watershed health and utilize this high quality data to educate citizens and inform decision makers about the condition of Colorado's waters. There are approximately 120 different organizations actively participating in the program. Volunteers sample on a monthly basis the following parameters: hardness, alkalinity, dissolved oxygen, pH, temperature, total and dissolved metals. Metal samples are analyzed at the CDOW laboratory in Fort Collins. Twice a year volunteers collect nutrient samples (CRW, 2009). Volunteer groups within the White River watershed have conducted water quality monitoring at 6 stations listed in Table 8. Data for these sites can be accessed at www.wildlife.state.co.us/landwater/riverwatch.

Table 8: River Watch monitoring stations

Station ID	Station Name
529	White
530	County Road 65
531	5 th Street Bridge
464	E Pump Station
465	Cox
763	Highway 64

SOURCE: RIVER WATCH

United States Geological Survey

The United States Geological Survey (USGS) monitors stream flow at 10 gaging stations in the White River watershed (Table 9). The stream gage is a water-stage recorder with satellite telemetry and crest-stage gage. The stations are listed in an upstream to downstream order. The majority of the flow originates in the eastern portion of the watershed (North Fork and South Fork of the White River) where topographic elevations and precipitation amounts are highest. Tributary streams entering the White River in the western portion (i.e., Piceance, Yellow, and Douglas creeks) have lower flow rates (USGS, 2009). Stream flow data can be accessed via the internet at <http://waterdata.usgs.gov>.

Table 9. USGS Stream Flow monitoring sites

Station ID	Station Name	Sampling Dates
09304115	WHITE RIVER BELOW NORTH ELK CREEK NEAR BUFORD, CO	January 2003 – current year
09304200	WHITE RIVER ABOVE COAL CREEK, NEAR MEEKER, CO.	October 1961 – current year
09304500	WHITE RIVER NEAR MEEKER, CO.	June 1901 – December 1906 October 1 – current year
09304800	WHITE RIVER BELOW MEEKER, CO	October 1961 – current year
09306200	PICEANCE CREEK BL RYAN GULCH, NR RIO BLANCO, CO.	October 1994 – September 1998 August 1999 – current year
09306222	PICEANCE CREEK AT WHITE RIVER, CO	October 1964 – September 1966 October 1970 – current year
09306224	WHITE RIV AB CROOKED WASH NR WHITE RIVER CITY, CO	October 1983 – current year
09306242	CORRAL GULCH NEAR RANGELY, CO	March 1974 – current year
09306255	YELLOW CREEK NEAR WHITE RIVER, CO.	October 1972 – September 1982 May 1988 – current year
09306290	WHITE RIVER BELOW BOISE CREEK, NEAR RANGELY, CO.	August 1982 – current year

SOURCE: UNITED STATES GEOLOGICAL SURVEY

USGS: Northern Piceance Basin Water Quality Data Repository

As large-scale energy development continues in the northern Piceance Basin, there is potential for changes in surface-water and groundwater resources. Recognizing this possibility, the U.S. Geological Survey (USGS), in cooperation with energy industry and local and State agency partners, has created and maintains a public, web-accessible common data repository. The repository combines water-quality data from industry, local, State, Federal, and other sources. Using the repository, the USGS will evaluate all available water-quality data to develop a baseline assessment of the region's water resources. Results of the baseline assessment will facilitate the development of regional monitoring strategies to fill identified data gaps and minimize redundancies in current and future water-resource monitoring (USGS, 2009).

Table 10: USGS Northern Piceance Basin monitoring sites

Water-Quality Trend Site Network	Sampling Frequency and Constituents
North Fork White River at Buford	4/yr: E. coli bacteria, bio-chemical oxygen demand, nutrients
South Fork White River at Buford	4/yr: E. coli bacteria, bio-chemical oxygen demand, nutrients
White River above Dry Creek near Buford	4/yr: E. coli bacteria, bio-chemical oxygen demand, nutrients
White River above Coal Creek near Meeker	4/yr: E. coli bacteria, bio-chemical oxygen demand, nutrients, chloride; Continuous water-temperature monitoring
White River below Meeker	5/yr: E. coli bacteria, bio-chemical oxygen demand, nutrients, major ions, trace elements, dissolved organic carbon, BTEX (2/yr), suspended sediment; Continuous water-temperature and specific-conductance monitor
White River above Crooked Wash	5/yr: E. coli bacteria, bio-chemical oxygen demand, nutrients, major ions, trace elements, dissolved organic carbon, BTEX (2/yr), suspended sediment; Continuous water-temperature and specific-conductance monitor
White River below Boise Creek	5/yr: E. coli bacteria, bio-chemical oxygen demand, nutrients, major ions, trace elements, dissolved organic carbon, BTEX (2/yr), suspended sediment (14/yr); Continuous water-temperature and specific-conductance monitor
White River below Taylor Draw near Rangely	4/yr: E. coli bacteria, bio-chemical oxygen demand, nutrients
White River at Hwy 64 bridge below Rangely	4/yr: E. coli bacteria, bio-chemical oxygen demand, nutrients
Piceance Creek below Ryan Gulch	4/yr: E. coli bacteria, bio-chemical oxygen demand, nutrients, major ions, trace elements, dissolved organic carbon, BTEX (2/yr), suspended sediment; Continuous water-temperature and specific-conductance monitor
Piceance Creek at White River	4/yr: E. coli bacteria, bio-chemical oxygen demand, nutrients, major ions, trace elements, dissolved organic carbon, BTEX (2/yr), suspended sediment; Continuous water-temperature and specific-conductance monitor
Corral Gulch near Rangely	3/yr: E. coli bacteria, bio-chemical oxygen demand, nutrients, major ions, trace elements, dissolved organic carbon, BTEX (2/yr), suspended sediment
Yellow Creek near White River	4/yr: E. coli bacteria, bio-chemical oxygen demand, nutrients, major ions, trace elements, dissolved organic carbon, BTEX (2/yr), suspended sediment

Drinking Water Supply Operation

Town of Rangely

The Town of Rangely operates a municipal supply water system built in 1975 to serve the residents and commercial/industrial users of Rangely. The size of the service area is approximately 12 square miles with a current population of approximately 2,200 people. Rangely also provides drinking water to residents outside of the town limits that are in close proximity to the town. The Water Treatment Facility is located on the eastern edge of Rangely, Colorado at 2000 East Highway 64.



PHOTO: ALDEN VANDEN BRINK

The Town of Rangely operates a conventional surface water treatment facility.

The Town of Rangely's water system consists of one surface water intake structure located on the White River within the Town of Rangely. Raw water is diverted from this intake and pumped for approximately 1 mile into two pre-sedimentation ponds holding a total of 3 million gallons of water. After settling, the water from the ponds is piped via gravity to the water treatment plant. The Rangely Water Treatment Plant is a class "A", conventional surface water treatment facility consisting of settling, chemical addition, coagulation, flocculation, filtration, taste and odor control, chlorination and fluoridation. It has a four million gallon a day capacity.

After treatment, the water enters a 150,000 gallon clear well and then is pumped into 4 above-ground storage tanks with the following capacity: (2) 1,000,000 gallon tanks, (1) 250 gallon tank, and (1) 175,000 gallon tank. The total water storage capacity is 2.75 million gallons. The treated water is distributed to their customers via a network of 15 miles of underground pipes to approximately 1007 metered service connections or taps.

The average daily demand is 700,000 gallons. The maximum daily gallon per day is 2 million gallons. Peak use during the summer is in July with an average of 1,400,000 gallons per day. The lowest usage month is November with an average of 400,000 gallons per day. Peak annual water usage for the five highest volume commercial or industrial customers includes: Chevron (19,194,000 gallons), Colorado Northwestern community College (11,199,000 gallons), MI Drilling (8,454,000 gallons), Dalbo (6,526,000 gallons), and Target (3,480,000 gallons) (Rangely, 2009). The system has a capacity for adding an additional 250 taps in the future.

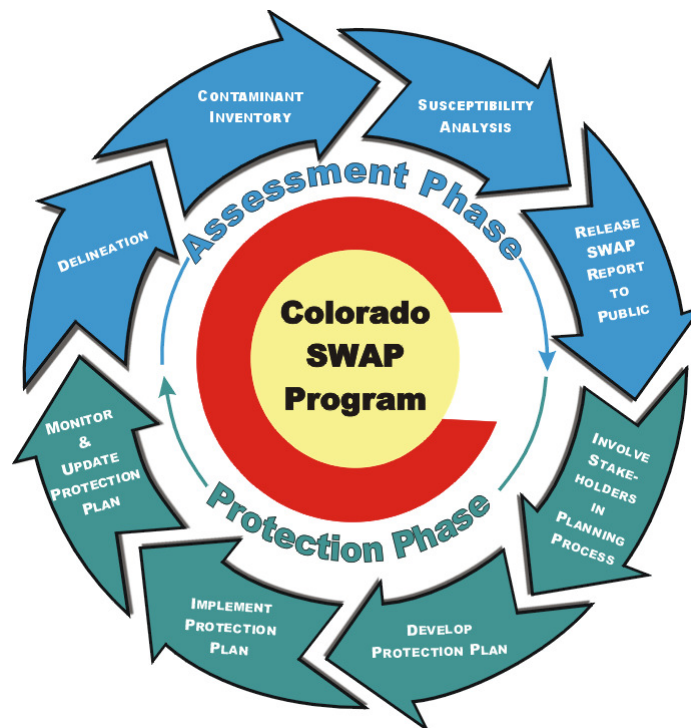
The Town of Rangely provides an Annual Drinking Water Quality Report to the public which provides information on the results of their water monitoring program. The 2008 report is available at the Rangely Town Office located at 209 East Main Street, Rangely, Colorado.

OVERVIEW OF COLORADO'S SWAP PROGRAM

Source water assessment and protection came into existence in 1996 as a result of Congressional reauthorization and amendment of the Safe Drinking Water Act. The 1996 amendments required each state to develop a source water assessment and protection (SWAP) program. The Water Quality Control Division, an agency of the Colorado Department of Public Health and Environment, assumed the responsibility of developing Colorado's SWAP program. The SWAP program protection plan will be integrated with the existing Colorado Wellhead Protection Program that was established in amendments made to the federal Safe Drinking Water Act (SDWA, Section 1428) in 1986. Wellhead protection is a preventative concept that aims to protect public groundwater wells from contamination. The Wellhead Protection Program and the SWAP program have similar goals and will combine protection efforts in one merged program plan.

Colorado's SWAP program is a two-phased process designed to assist public water systems in preventing potential contamination of their untreated drinking water supplies. The two phases include the Assessment Phase and the Protection Phase as depicted in the upper and lower portions of Figure 8, respectively.

Figure 8. Source Water Assessment and Protection Process.



Source Water Assessment Phase

As depicted in the upper portion of Figure 8, the Assessment Phase for all public water systems consists of four primary elements.

1. Delineating the source water assessment area for each drinking water source;
2. Conducting a contaminant source inventory to identify potential sources of contamination within each of the source water assessment areas;
3. Conducting a susceptibility analysis to determine the potential susceptibility of each public drinking water source to the different sources of contamination and;
4. Reporting the results of the source water assessment to the public water systems and the general public.

The Assessment Phase involves understanding where the Town of Rangely's source water comes from, what contaminant sources potentially threaten the water source(s), and how susceptible each water source is to potential contamination. The susceptibility of an individual water source is analyzed by examining the properties of its physical setting and potential contaminant source threats. The resulting analysis calculations are used to report an estimate of how susceptible each water source is to potential contamination.

Source Water Protection Phase

The Protection Phase is a voluntary, ongoing process in which the Town of Rangely has been encouraged to voluntarily employ preventive measures to protect their water supply from the potential sources of contamination to which it may be most susceptible. The Protection Phase can be used to take action to avoid unnecessary treatment or replacement costs associated with potential contamination of the untreated water supply. Source water protection begins when local decision-makers use the source water assessment results and other pertinent information as a starting point to develop a protection plan. As depicted in the lower portion of Figure 9, the source water protection phase for all public water systems consists of four primary elements.

1. Involving local stakeholders in the planning process;
2. Developing a comprehensive protection plan for all of the drinking water sources;
3. Implementing the protection plan on a continuous basis to reduce the risk of potential contamination of the drinking water sources; and
4. Monitoring the effectiveness of the protection plan and updating it accordingly as future assessment results indicate.

The water system and the community recognize that the Safe Drinking Water Act grants no statutory authority to the Colorado Department of Public Health and Environment or to any other state or federal agency to force the adoption or implementation of source water protection measures. This authority rests solely with local communities and local governments. The source water protection phase is an ongoing process as indicated in Figure 9. The evolution of the SWAP program is to incorporate any new assessment information provided by the public water supply systems and update the protection plan accordingly.

SOURCE WATER ASSESSMENT RESULTS

The Town of Rangely received their source water assessment report from the Colorado Department of Public Health and Environment in January 2005 and has reviewed the report along with Source Water Protection Planning Team. These assessment results were used as a starting point to guide the development of appropriate management approaches to protect their source water from potential contamination. A copy of the source water assessment summary report can be obtained by contacting the water system or by downloading a copy from the Colorado Department of Public Health and Environment's SWAP program web site located at: www.cdph.state.co.us/wq/sw/swaphom. The following sections provide a brief summary of the main findings from the three component phases of the assessment.

Source Water Assessment Area Delineation

A source water protection area is the surface and subsurface areas from which contaminants are most likely to reach a water source. Delineation is the process used to identify and map the drainage basin that supplies water to a surface water intake. The delineated source water assessment area provides the basis for understanding where potential contaminant threats originate and where source water protection measures can be implemented to decrease risk to their drinking water source.

Protection Areas

The Planning Team reviewed the State's delineation of the Town of Rangely's source water protection area which consists of a 2,805 square mile area draining the White River watershed (Figure 9). The Team approved the State's delineation and further defined the source water protection area as:

- **Primary Protection Area:** This area includes the drainage basins from the Town of Rangely's intake on the White River upstream and including Kenney Reservoir.
- **Secondary Protection Area:** This area includes the drainage basin beginning at the intake to Kenney Reservoir upstream to the Town of Meeker's Source Water Protection Area. The Town of Meeker's Source Water Protection Area includes both a Primary and Secondary Source Water Protection Area up to the headwaters of the White River.

Protection Zones

The State's delineation includes protection zones within the source water protection areas. The location of a potential contaminant source to the surface water drainage network was evaluated using Geographic Information technology to determine its proximity relative to three sensitivity zones defines as:

- 1) **Zone 1** includes 1,000 feet on either side of the surface water drainage network and is the main focus area for preventing contamination.
- 2) **Zone 2** extended outward a distance of one-quarter mile from the boundary of Zone 1.
- 3) **Zone 3** included the rest of the source water assessment area that was not covered by either Zone 1 or Zone 2.

[illegible]

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Contaminant Source Inventory

In 2001-2002 a contaminant source inventory was conducted by the Colorado Department of Public Health and Environment to identify selected potential sources of contamination that might be present within the source water assessment areas. The results were provided to the water systems as part of the source water assessment process. The Town of Rangely was asked to voluntarily review the inventory information, field-verify selected information about existing and new discrete contaminant sources, and provide feedback on the accuracy of the inventory.

The WQCD's assessment process used the terms "discrete" and "dispersed" potential sources of contamination. A discrete source is a facility that can be mapped as a point, while a dispersed source covers a broader area such as a type of land use (crop land, forest, residential, etc.). Discrete contaminant sources were inventoried using selected state and federal regulatory databases. Dispersed contaminant sources were inventoried using a recent land use/land cover and transportation maps of Colorado, along with selected state regulatory databases.

Discrete Potential Sources of Contamination

The State's contaminant source inventory results for the Town of Rangely indicate the following types of discrete contaminant sources identified within their source water protection area:

- Permitted Wastewater Discharge Sites (PCS)
- Above, Underground and Leaking Storage Tanks (TANKFAC)
- Solid Waste Sites (SWSITE)
- Existing/Abandoned Mine Sites (MASMIL)
- Standard Industrial Facilities (SIC)
- Oil/Gas Facilities (OGFAC)
- EPA Chemical Inventory Storage Sites (SARA)

Dispersed Potential Sources of Contamination

The contaminant source inventory indicates the following types of dispersed contaminant sources were identified within the source water assessment areas analyzed:

- Pasture/Hay, Row Crop, Small Grain
- Deciduous, Evergreen, and Mixed Forests
- Septic Systems
- Oil/Gas Wells
- Road Miles
- Commercial/Industrial/Transportation
- Low Intensity Residential
- Urban Recreational Grasses
- Quarries/Strip Mines/Gravel Pits

Notice

The information contained in this "Plan" is limited to that available from public records and the water supplier. Other "potential contaminant sites" or threats to the water supply may exist in the source water assessment area that are not identified in this "Plan." Identification of a site as a "potential contaminant site" should not be interpreted as one that will necessarily cause contamination of the water supply

Contaminants Health Concerns

The discrete and dispersed sources of contaminants can cause acute and chronic health concerns as indicated below. These categories of contaminants are most likely associated with the most prevalent sources identified in Table 11.

Acute Health Concerns

Acute health concern contaminants include individual contaminants and categories of constituents that pose the most serious immediate health concerns resulting from short-term exposure to the constituent. Many of these acute health concern contaminants are classified as potential cancer-causing (i.e., carcinogenic) constituents or have a Maximum Contaminant Level Goal (MCLG) set at zero (0).

Table 11. Acute Health Concerns

Acute Health Concern	Discrete Contaminants	Dispersed Contaminants
Microorganisms	x	x
Nitrate/Nitrite	x	x
Pesticides	x	x
Semi-volatile organic compounds (SVOCs)	x	
Volatile organic compounds (VOCs)	x	
Lead	x	
Ammonia or nitric acid	x	x

SOURCE: COLORADO WATER QUALITY CONTROL DIVISION

Chronic Health Concerns

Chronic health concern contaminants include categories of constituents that pose potentially serious health concerns due to long-term exposure to the constituent. Most of these chronic health concern contaminants include the remaining primary drinking water contaminants.

Table 12. Chronic Health Concerns

Chronic Health Concern	Discrete Contaminants	Dispersed Contaminants
Herbicides	x	x
Pesticides		x
Volatile organic compounds (VOCs)	x	
Non-metal inorganic compounds		
Metals – Primary Drinking Water (other than lead)	x	
Turbidity	x	x
Other inorganic compounds	x	x
Other organic compounds	x	

SOURCE: COLORADO WATER QUALITY CONTROL DIVISION

Susceptibility Analysis

The susceptibility analysis was conducted by the Colorado Department of Public Health and Environment to identify how susceptible an untreated water source could be to contamination from potential sources of contamination inventoried within its source water assessment area. The analysis looked at the susceptibility posed by individual potential contaminant sources and the collective or total susceptibility posed by all of the potential contaminant sources in the source water assessment area. The Colorado Department of Public Health and Environment developed a susceptibility analysis model for surface water sources and ground water sources under the influence of surface water, and another model for ground water sources. Both models provided an objective analysis based on the best available information at the time of the analysis. The Colorado Department of Public Health and Environment provided the Town of Rangely with a final source water assessment report and supporting analysis information.

Table 13 summarizes the total susceptibility and physical setting vulnerability results, and the individual susceptibility results for the discrete and dispersed contaminant sources associated with the water source identified in the assessment report. Water sources with a Moderately High or High individual susceptibility to a contaminant source generally are at greater risk for potential contamination from the contaminant source than water sources receiving lower individual susceptibility ratings to similar or different contaminant sources.

An explanation of the rating system used in Table 13 includes:

- 1) **Overall Susceptibility Rating** - This rating is based on two components: the physical setting vulnerability of the water source and the contaminant threat.
- 2) **Physical Setting Vulnerability Rating** - This rating is based on the ability of the ground water flow to provide a sufficient buffering capacity to mitigate potential contaminant concentrations in the water source.
- 3) **Land Uses (Dispersed Potential Sources of Contaminants) Susceptibility Ratings** - This summarizes those land uses that the WQCD's assessment considered to represent the highest threats to the water source.

Notice: The susceptibility analysis provides a screening-level evaluation of the likelihood that a potential contamination problem could occur rather than an indication that a potential contamination problem has or will occur. The analysis is NOT a reflection of the current quality of the untreated source water, nor is it a reflection of the quality of the treated drinking water that is supplied to the public.

Table 13. Table of Susceptibility Results and Contaminant Source Inventory from the State's Assessment completed in 2003.

Public Water System	Town of Rangely			
Public Water System Identification #	CO0152666			
Name of Drinking Water Source	White River			
Source Type: Source Water	SW			
SUSCEPTIBILITY RATINGS	Mod. Low	Moderate	Mod. High	High
Total Susceptibility Rating			x	
Physical Setting Vulnerability Rating	x			
DISCRETE CONTAMINANT SOURCES				
EPA Hazardous Waste Sites		1		
EPA Chemical Inventory/Storage Sites			9	
Permitted Wastewater Discharge Sites	1	5	1	
Aboveground, Underground and Leaking Storage Tank Sites	11	49	8	1
Solid Waste Sites	1	1	1	
Existing/Abandoned Mine Sites		21	69	14
Other Facilities of Concern	1	10	3	
TOTAL	14	87	91	15
DISPERSED CONTAMIANANT SOURCES				
Commercial/Industrial/Transportation	1			
Low Intensity Residential	1			
Urban Recreational Grasses	1			
Quarries/Strip Mines/Gravel Pits	1			
Row Crops	1			
Small Grains	1			
Pasture/Hay	1			
Deciduous Forest	1			
Evergreen Forest		1		
Mixed Forests	1			
Septic Systems	1			
Oil/Gas Wells		1		
Road Miles		1		
TOTAL	10	3		

Potential Contaminant Sources

The Planning Team reviewed the State's inventory of potential contaminant sources, field-checked sites on the inventory, and researched current State and Federal regulatory databases for discrete contaminant sources. The Team then discussed other potential sources of contaminants not included in the assessment on which to focus their management approaches.

Potential contaminant sources include:

- Roads: spills
- Land use
- Agricultural practices
- Noxious weeds treatment
- Mosquito abatement program
- Mining activity
- Zebra and Quagga Mussels
- Oil/gas and oil shale development
- Solid waste and transfer sites
- Wastewater discharge sites
- Hazardous waste generators
- Future reservoir dredging
- Private water wells
- Storage tanks
- Public lands
- Septic systems
- Residential practices

Surface and Ground Water Contaminants

Many types of land uses have the potential to contaminate source waters: spills from tanks, trucks, and railcars; leaks from buried containers; failed septic systems, buried or injection of wastes underground, use of fertilizers, pesticides, and herbicides, road salting, and polluted urban and agricultural runoff. While catastrophic contaminant spills or releases can wipe out a water resource, ground water degradation can result from a plethora of small releases of harmful substances. According to the USEPA, nonpoint-source pollution (when water runoff moves over or into the ground picking up pollutants and carrying them into surface and ground water) is the leading cause of water quality degradation (GWPC, 2008).

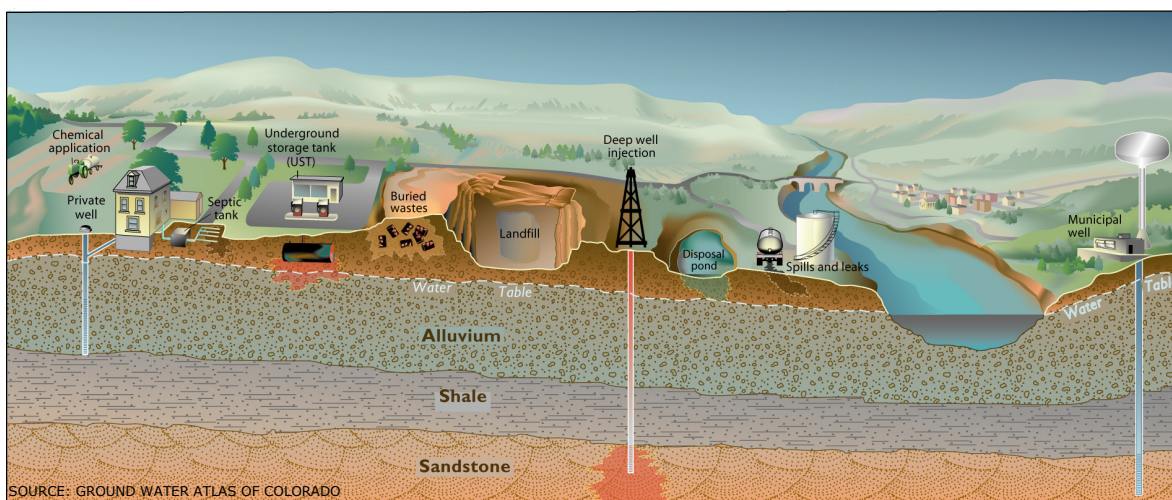


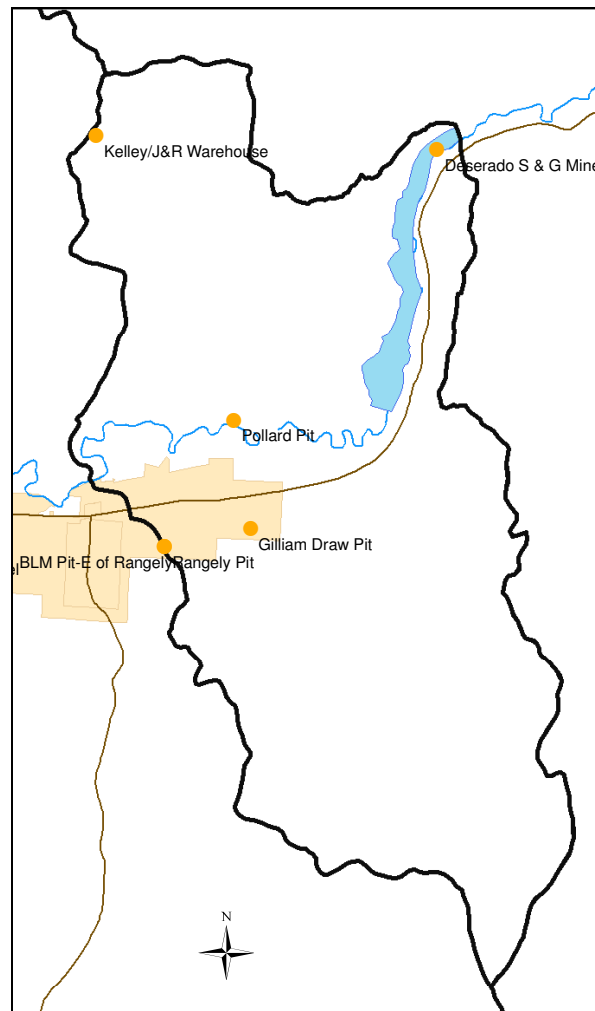
Figure 10. Schematic drawing of the potential sources of contaminants to surface and ground water.

Potential Contaminant Sources

Mining Activity

Active and inactive mining operations have a potential to contaminate drinking water supplies from either point source discharges (i.e. mine drainage tunnels or flowing adits) or nonpoint source discharges from run-off over tailing piles. Current mining permit data for the White River watershed was obtained from the Colorado Division of Mines, Reclamation, and Safety. Within the Primary Source Water Protection Area there are 5 inactive permits of which 3 were terminated and 2 withdrawn (Figure 11). All of the inactive permits were for sand and/or gravel mining. There are 32 active mining permits within the Secondary Source Water Protection Area (Table 14).

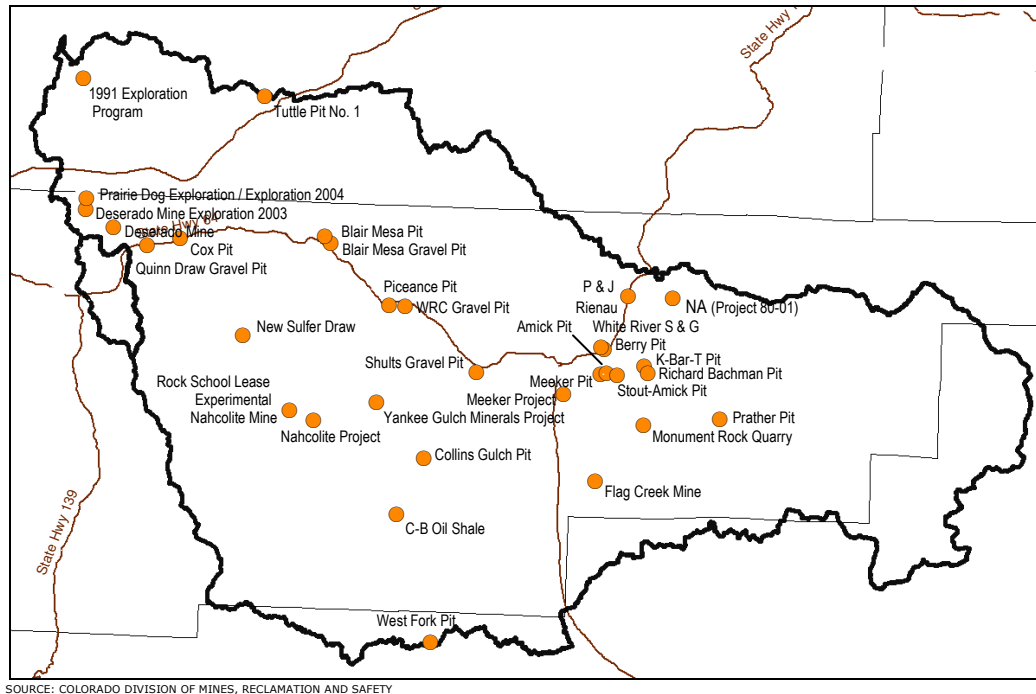
Figure 11. Location of inactive mines within the Primary Source Water Protection Area



SOURCE: COLORADO DIVISION OF MINES, RECLAMATION AND SAFETY

Potential Contaminant Sources

Figure 12. Active Permitted Mines within the Source Water Protection Areas



SOURCE: COLORADO DIVISION OF MINES, RECLAMATION AND SAFETY

Table 14. Active Permitted Mines in the Source Water Protection Areas

Site Name	Permittee	Commodity	Protection Zone
Tuttle Pit No 1	Moffat County	Borrow material for construction	2
Flag Creek Mine	Flat Top Flagstone, LLC	Dimension stone	2
Monument Rock Quarry	Monument Rock LLC	Stone	3
Rock School Lease Experimental Nahcolite Mine	Natural Soda, Inc.	Carbonates	2
Nahcolite Project	Natural Soda, Inc.	Carbonates	1
Yankee Gulch Minerals Project	American Soda, LLP	Carbonates	1
1991 Exploration Program	Twentymile coal Co.	Coal	1
Prairie Dog Tract Exploration	Blue Mountain Energy	Coal	1
Deserado Mine	Blue Mountain Energy	Coal	1
Meeker Project	Storm King Mines, Inc.	Coal	3
NZ (Project 80-01), P&J, Rienau Mine	Northern Minerals Inc.	Coal	3
Exploration License 2004	Blue Mountain Energy	Coal Exploration	1
Deserado Mine Exploration 2003	Blue Mountain Energy	Coal Exploration	1
Quinn Draw Gravel Pit	Rio Blanco County	Gravel	1
WRC Gravel Pit	Western Gravel, LLC	Gravel	2
Shultx Gravel Pit	XTO Energy Inc.	Gravel	2
Collins Gulch Pit	Newpark Mats & Integrated Services	Gravel	1
White River S & G Pit	White River Aggregates, Inc.	Gravel	1
West Fork Pit	EnCana Oil & Gas (USA), Inc.	Gravel	1
Cox Pit	Wade Cox	Sand & Gravel	1
Blair Mesa Pit	Lafarge West, Inc.	Sand & Gravel	1
Blair Mesa Gravel Pit	WRR Sand & Gravel, LLC	Sand & Gravel	1
Piceance Pit	Rio Blanco County	Sand & Gravel	2
New Sulfer Draw Pit	Ace West Trucking, Inc.	Sand & Gravel	1
Berry Pit	Oldcastle SW Group, Inc.	Sand & Gravel	1
Meeker Pit	Meeker Sand & Gravel, Inc.	Sand & Gravel	2
Amick Pit	Meeker Sand & Gravel, Inc.	Sand & Gravel	2
Stout-Amick Pit	Diana K. Watson	Sand & Gravel	1
K-Bar-T Pit	Lowell Lkingsmith & Lenny Lkingsmith	Sand & Gravel	1
Richard Bachman Pit	Rio Blanco County	Sand & Gravel	1
Prather Pit	Rio Blanco County	Sand & Gravel	1
C-B Oil Shale	Cathedral Bluffs Shale Oil Co.	Oil shale	2

SOURCE: COLORADO DIVISION OF MINES, RECLAMATION AND SAFETY

Potential Contaminant Sources

Gravel Mining

The Planning Team has identified current and future gravel mining operations within the source water protection area as a potential source of contamination, especially in the areas within the White River alluvial aquifer (Zone 1) upstream of the town of Rangely. Currently, there are 19 active sand and/or gravel operations in the protection area of which 13 are within Zone 1, 1000 foot on either side of the river and its tributaries upstream of the Town of Rangely (Table 8).



SOURCE: COLLEEN WILLIAMS

Photo of a gravel mine upstream of the Town of Rangely adjacent to the White River.

Sand and gravel operations have the potential to adversely impact ground and surface water quality, both as a result of the extraction process and in site reclamation. Sand and gravel mining within an alluvial aquifer, at a minimum, increase the vulnerability of an aquifer to be contaminated because it decreases the distance between the ground water table and land surface. In some cases, the excavation penetrates shallow aquifers, creating an excavation pit and direct access to ground water.

The excavation pit and the continual collection and infiltration of wash water raise the potential for other sources of contaminant to migrate to the aquifer. Any chemical contaminants that are allowed to enter the pit via wash water or spills in the area would have quicker access to the alluvial aquifer. Once in the ground water, a chemical substance would be free to move with the water in the aquifer to surface waters in the river (Kitsap, 1997). Possible sources of releases to ground or surface water could include rainwater running off piles of waste or aggregate, leaks and spills from heavy machinery and fuel tanks, the substances used for dust control, water washing discharges at processing plants, and leachate from fill placed in the pits (Greystone, 1999).

The Rangely Steering Committee will stay informed on gravel mining operations within the source water protection area and obtain information from Rio Blanco County Planning on the ongoing assessment of these mine sites.

Septic Systems

Currently, there are residences within the Source Water Protection Area with septic systems, also called individual sewage disposal systems (ISDS's). If managed improperly, these residential septic systems can contribute excessive nutrients, bacteria, pathogenic organisms, and chemicals to the groundwater. The Rio Blanco County Health Department administers septic system permits within the county and is committed to helping with this source water protection effort. They have been working together with CSU Extension office on providing educational seminars in Meeker and Rangely on septic systems and drinking water wells during January 2010 (Simmons, 2010).

Potential Contaminant Sources

Hazardous Waste

There are 13 Hazardous Waste sites identified by the EPA EnviroMapper within the Source Water Protection Area of which 8 are currently active sites. Hazardous waste transporters, many hazardous waste generators and other facilities that manage hazardous waste are required to obtain an EPA Identification Number that is issued by the State and EPA to identify a facility for hazardous waste management and tracking purposes. Information obtained from the Colorado Department of Public Health and Environment's Hazardous Materials and Waste Management Division about each of these sites is included in Table 15. This may not be a complete list of current sites, but is all that is available.

A hazardous waste is a solid, a liquid or a contained gaseous material that is no longer used or that no longer serves the purpose for which it was produced, and could pose dangers to human health and the environment after it is discarded. Hazardous waste can be one of two types:

1. Listed wastes – Wastes that are listed by the Colorado Hazardous Waste Regulations and are hazardous regardless of their concentration.
2. Characteristic wastes – Wastes that are not on one of the lists but are ignitable, corrosive, reactive, or toxic.

Hazardous Waste Activities include generators, storers, transporters, recyclers, treaters, transfer facilities, exempt boiler and/or industrial furnace, and underground injection control. Generators of non-acute Hazardous Waste include the following categories:

1. Large Quantity Generators (LQG) – Greater than 1,000 kg./month (2,200 lbs.)
2. Small Quantity Generators (SQG) – 100 to 1,000 kg./month (220-2,200 lbs.)
3. Conditionally Exempt Small Quantity Generators (CESQG) – Less than 100 kg/month

Information on the listing and identification of hazardous wastes can be found in the Colorado Hazardous Waste Regulations at the CDPHE Hazardous Materials and Waste Management Division.

Hazardous wastes require treatment prior to being land disposed to protect human health and the environment. Treatment standards have been established to diminish the toxicity of these wastes and to reduce the threat to human health and the environment prior to disposal. Wastes that have been treated are not prohibited from land disposal in a permitted hazardous waste landfill as long as all of the specific treatment standards for that waste have been met. *6 CCR 1007-3, Part 268.*

Treatment means any method, technique, or process (including neutralization, incineration, and physical activities such as evaporation, de-watering, diluting, grinding, compacting and blending) that changes the physical, chemical or biological character or composition of hazardous waste so as to neutralize the waste or to render the waste less hazardous, safer for transport, amenable for recovery or reuse (CDPHE, 2008).

Potential Contaminant Sources

Figure 13. Hazardous Waste Sites in the Source Water Protection Area

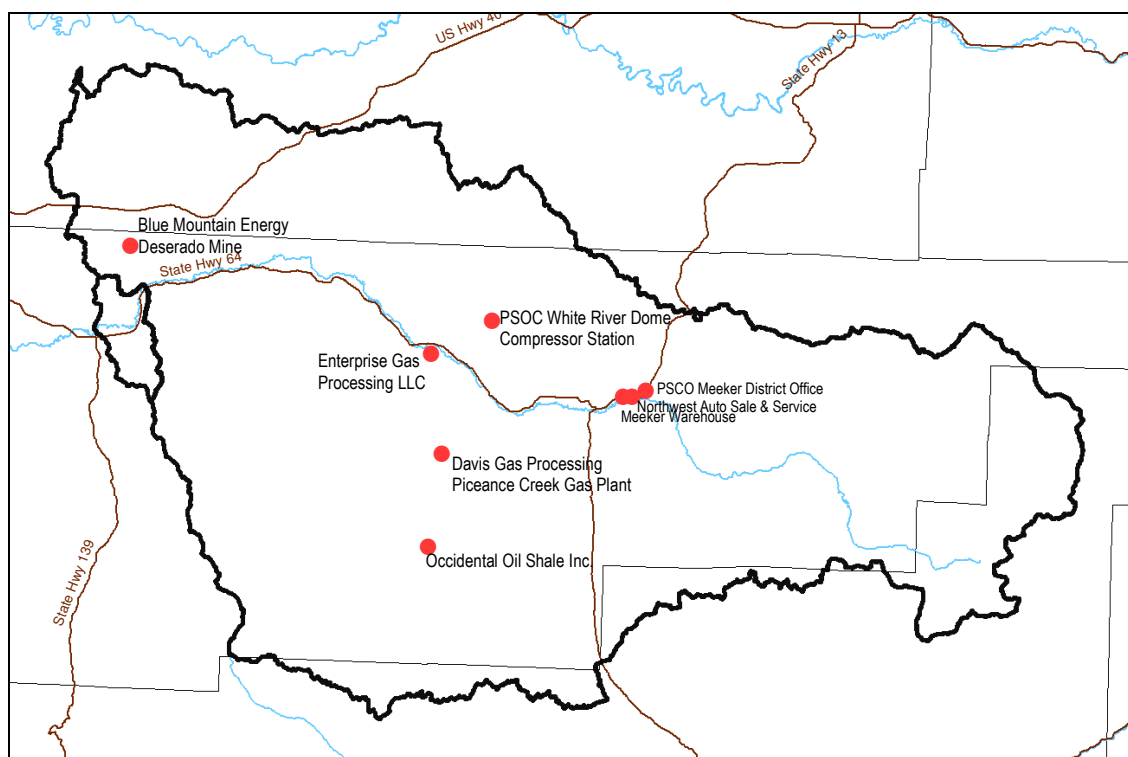


Table 15. Table of Active Hazardous Waste Sites Identified by EPA EnviroMapper

Facility Name	Facility ID	Address	Status and Type
Enterprise Gas Processing, Inc.	COR000216960	27991 County Road 5	Conditionally exempt small quantity generator
Occidental Oil Shale Incorporated (aka CB Oil Shale)	COD000716530	20011 County Road 5	Conditionally exempt small quantity generator; 1996 event of buried waste batteries cleaned up.
Davis Gas Processing-Piceance Creek Gas Plant	COR000220582	10142 RCB Road 76	Small quantity generator.
PSCO-White River Dome Compressor Station	COD983785247	7392 Rio Blanco Rd 142	Conditionally exempt small waste generator
PSOC-Meeker District Office (Xcel Energy)	COD981544422	44248 HWY 13-789	Conditionally exempt small waste generator.
Meeker Warehouse (aka Atmos Energy)	COR000000984	707 Hwy 13	Conditionally exempt small quantity generator.
Northwest Auto & Sales Service Inc. (old Reg Nichols Sales & Services site)	COD983802166	485 Market Street	Conditionally exempt small quantity generator
Blue Mountain Energy - Deserado Mine	COD042027912	3607 Road 65	Radioactive Materials License used for radioactive gauges inside the coal preparation plant; license expires Dec. 31, 2010. No violations.

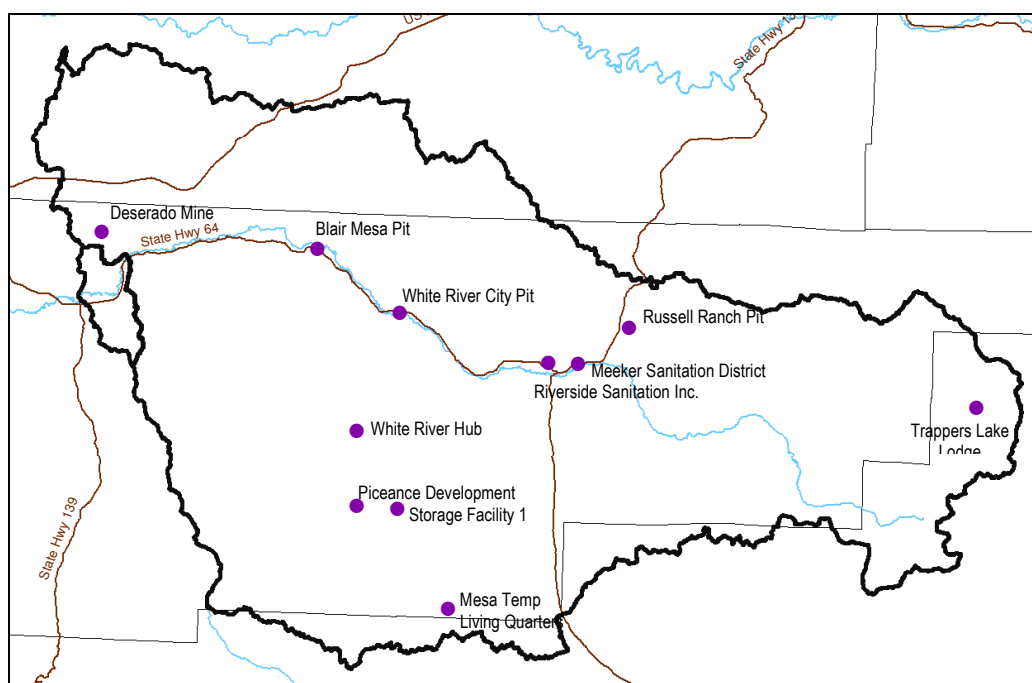
SOURCE: CDPHE Hazardous Materials and Waste Management Division

Potential Contaminant Sources

Permitted Wastewater Discharge Sites

There are 12 wastewater discharge sites within the source water protection area that discharge into the White River and its tributaries (Figure 14). These facilities are permitted under the CDPHE National Pollutant Discharge Elimination System (NPDES) regulation. The Water Quality Control Division issues and administers discharge permits and other control mechanisms as provided by the Colorado Water Quality Control Act. The Planning Team recommends contacting the facilities for information about their emergency response plan and to be notified in the event of a spill.

Figure 14. Permitted Wastewater Discharge Sites within the Source Water Protection Area



SOURCE: EPA ENVIROMAPPER

Table 16. Table of Wastewater Discharge Sites within the Source Water Protection Area

NPDES	Facility Name	Owner	Description
COG500225	Blair Mesa Pit	WRR Sand & Gravel, LLC	Sand and gravel mining
CO0038024	Deserado Mine	Blue Mountain Energy, Inc.	Coal and Lignite mining
CO0047139	Meeker Sanitation District	Town of Meeker	Sewerage system
CO0047716	Mesa Temp Living Quarters	Conoco Phillips Company	Sewerage system
COG072434	Piceance Development	Exxon Mobil Production CO.	Heavy Construction
COG500473	Russell Ranch Pit	Ben Rogers	Sand and gravel mining
COG072580	Storage Facility 1	Mantle Ranch	Heavy Construction
COG500484	White River City Pit	Robert Williams	Sand and gravel mining
COG604040	White River Hub (aka Questar Pipeline Co.)	White River Hub, LLC	Heavy Construction
COG588048	Riverside Sanitation, Inc.		Sewerage system
COX046973	Trappers Lake Resort		Sewerage system
COG072812	NW Pipeline, Piceance Lateral		Heavy Construction

Potential Contaminant Sources

Solid Waste and Transfer Site

Currently there are three active solid waste sites and two transfer sites identified in the Colorado Department of Public Health and Environment's database within the source water protection area (Table 17). EPA defines solid waste as any garbage or refuse, sludge from a water or wastewater treatment plant, or air pollution control facility and other discarded material, including solid, liquid, semi-solid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities.

Waste transfer stations are facilities where municipal solid waste is unloaded from collection vehicles and briefly held while it is reloaded onto larger long-distance transport vehicles for shipment to landfills or other treatment or disposal facilities (EPA, 2009).

Figure 15. Solid Waste and Transfer Sites in the Source Water Protection Area

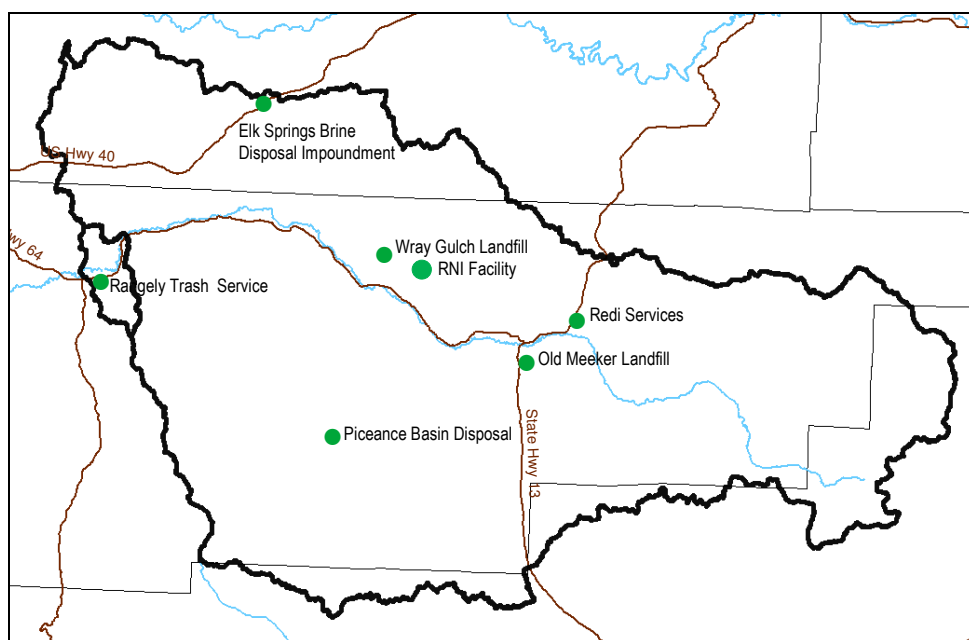


Table 17. Solid Waste and Transfer Sites

Facility Name	Facility ID	Location	Status & Type
Elk Springs Brine Disposal Impoundment	081-IMP-005	¼ mile SW of Elk Springs Moffat County	Active produced water facility
Wray Gulch Landfill	103-LFL-020	1496 County Road 72 Rio Blanco County	Active landfill
Piceance Basin Disposal	054-IMP-004	CR 5 & CR 26 Rio Blanco County	Active produced water facility
Meeker Landfill	103-LFL-010	SW of Meeker	Closed and reclaimed
Rangely Trash Service	054-TRS-001	2809 Shale Street Rangely, Colorado	Active transfer station
Redi Services (old GTM site)	054-TRS-002	235 County Road 15 Meeker, Colorado	Active transfer station
RNI Facility	07RB0987	Rio Blanco County	Active produced water facility

Potential Contaminant Sources

Storage Tanks: Above, Underground, and Leaking

Primary Protection Area

There are 9 storage tank sites (4 active and 5 inactive) within the primary source water protection area in the Town of Rangely (Figure 16). There have been 3 Confirmed Release spills which have been cleaned up (Table 14). Information of the current status of storage tanks within the source water protection area was obtained from the Colorado Department of Labor and Employment Division of Oil and Public Safety's database via their Colorado Storage Tank Information (COSTIS) website at <http://costis.cdle.state.co.us>.



PHOTO: COLLEEN WILLIAMS

All active storage tanks in the Primary Source Water Protection Area are Above Ground Storage Tanks (AST).

Figure 16. Active Storage Tanks in the Primary Source Water Protection Area

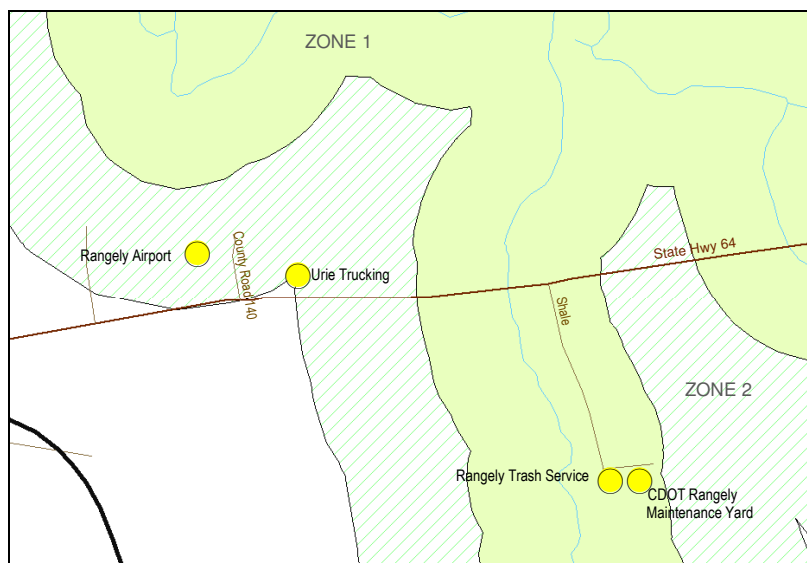


Table 18. Active Storage Tanks in the Primary Source Water Protection Area

Tank Sites and Identification Number	Information
CDOT Rangely Maintenance Yard - #1669	1 AST Diesel located in Zone 1 and has secondary containment
Rangely Airport - # 905	4 tanks: 2 AST closed, 1 UST closed, 1 AST active (in Zone 1 and has no secondary containment); 1998 Confirmed Release & 2000 closed
Rangely Trash Service - # 18776	1 AST located in Zone 1
Urie Trucking - # 18647	2 AST with no secondary containment located in Zone 2

* AST – Aboveground Storage Tank

Potential Contaminant Sources

Secondary Protection Area

There are 73 storage tanks within the secondary source water protection area listed on the COSTIS website of which 25 are active and 26 have a Confirmed Release or LUST (Leaking Underground Storage Tank) spill event.

Table 19. Active storage tanks within the secondary source water protection area

Tank Facility and Identification Number	Active	Event	Information
Amerigas - # 16330	x		2 LPG (Liquid Propane Gas) tanks
Buford Store - #5046	x		4 tanks: 2 UST (Underground Storage Tank) closed and removed; 1 LPG active; 1 UST out of use
CDOT Dinosaur Maintenance Yard - #1638	x		1 AST (Aboveground Storage Tank) Diesel
Dablo – Piceance Creek - # 563	x	x	4 tanks: 1 UST close, 1 AST temp out of use, 1 AST active, 1 AST not regulated (used oil), 2 Events: (1)1989 Confirmed Release & LUST cleanup completed 1997; (2) 2008 Confirmed Release & closure letter sent. <u>Needs follow-up.</u>
Flat Tops Fuel - #10564	x	x	9 AST: 7 active & 2 closed; 3 Events: 1)2005 Confirmed Release, 2007 Corrective Action Plan received, 2009 Monitoring Report Received. Needs follow-up; 2) 2008 Confirmed Release, 2009 Site characteristic report. Needs follow-up; 3) 2009 Confirmed Release. <u>Needs follow-up.</u>
Go-Fer Foods of Meeker	x		2 UST
Kum and Go 3925 - #3821	x	x	3 UST, 1997 Confirmed Release & no further action required
Meeker Airport - #8759	x	x	6 UST: 4 closed, 2 active; 1993 Confirmed Release, no further action, tank closed
Meeker Conoco Service - #8727	x		9 UST: 7 closed, 2 active
Meeker Full Service - # 8727	x		9 UST tanks: 2 active, 7 closed
Mini Mart (Loaf & Jug) #868 - #5793	x		3 UST
Our Co-op Association - #2102	x	x	5 tanks: 4 UST closed, 1 aboveground LPG active; 1991 Confirmed Release, 1993 LUST cleanup completed
Piceance Creek Compressor Station - #563	x	x	4 tanks: 1 UST closed, 3 AST with 2 active and 1 temporarily out of use; 1989 Confirmed Release & LUST cleanup completed in 1997; 2008 Confirmed Release and closure letter sent 11/08. <u>Needs follow-up.</u>
Pioneers Hospital - # 17870	x		1 AST
Rio Blanco County Shops - #9275	x	x	12 UST tanks: 8 closed, 4 active. Confirmed Release and LUST cleanup initiated in 1994, 2003 closure letter sent.
Samuelsons True Value - # 16331	x		1 LPG tank active
Seven Lakes Lodge - # 17913	x		2 LPG tanks active
Shell Oil - # 18119	x		4 active LPG tanks
Shell Oil Man Camp - # 17897	x		7 active tank permits and 3 pending permits
Valley Hardware - # 18624	x		1 LPG tank
White River Convenience - #4590	x		5 UST: 3 active, 2 closed.
White River Energy - # 16601	x		2 LPG tanks
WTG Fuels/Gas Card/Sem Crude - # 18193	x		1 AST

Potential Contaminant Sources

Storage Tank Spills

Over 35% of the above and underground storage tanks in the source water protection area have had Confirmed Releases. A release means any spilling, leaking, emitting, discharging, escaping, leaching, or disposing of a regulated substance from a storage tank into groundwater, surface water or soils. The owner/operators must report a suspected release within 24 hours and investigate suspected releases within 7 days. After confirming a release and conducting the initial response and abatement, the owner/operators must continue further source investigation, site assessment, characterization and corrective actions.

There are 19 Leaking Underground Storage Tanks (LUSTs) identified in the protection area of which 4 are active sites (Table 8). All of the LUST sites have been cleaned up or are currently in the clean up process. The majority of the underground storage tanks contain petroleum products (gasoline, diesel, heating oil, kerosene, jet fuel). The leaky tank releases gasoline or "liquid phase hydrocarbon." The gasoline descends through the unsaturated soil zone to float on the water table (gasoline is lighter than water). In the "smear zone", the gasoline releases compounds like benzene, toluene, ethylbenzene, and xylenes (BTEX) and methyl tert-butyl ether (MTBE) to the groundwater and they are carried in the direction of groundwater flow. The extent of contamination is defined by the concentration of benzene (from 10 to 10,000 parts per billion) in the ground water.

Spills from LUST sites can contaminate the groundwater and also presents other hazards. Because gasoline is lighter than water, gasoline floats on the water table and remains relatively close to the land surface. The most hazardous compounds in groundwater, the BTEX compounds, are quite volatile. These volatile compounds can enter nearby buildings. In poorly ventilated buildings, the compounds can accumulate and present a health risk through inhalation. In buildings, the volatile compounds can also present an explosion hazard (Ryan, 2006).

Residential Storage Tanks

Many residents within the rural areas of the White River corridor use petroleum products to heat their homes or for vehicular fuel. The private aboveground storage tanks are a concern because they may be old and subject to leakage. It only takes a small amount of petroleum to contaminate the ground or surface water. Fuel tanks should be inspected visually on an annual basis and properly seated on a type of secondary containment structure to prevent spills from reaching the ground. The Planning Team recommends public education to encourage proper maintenance of storage tanks and secondary containment round the storage tanks.



PHOTO: COLLEEN WILLIAMS

A private residential storage tank with secondary containment.

Potential Contaminant Sources

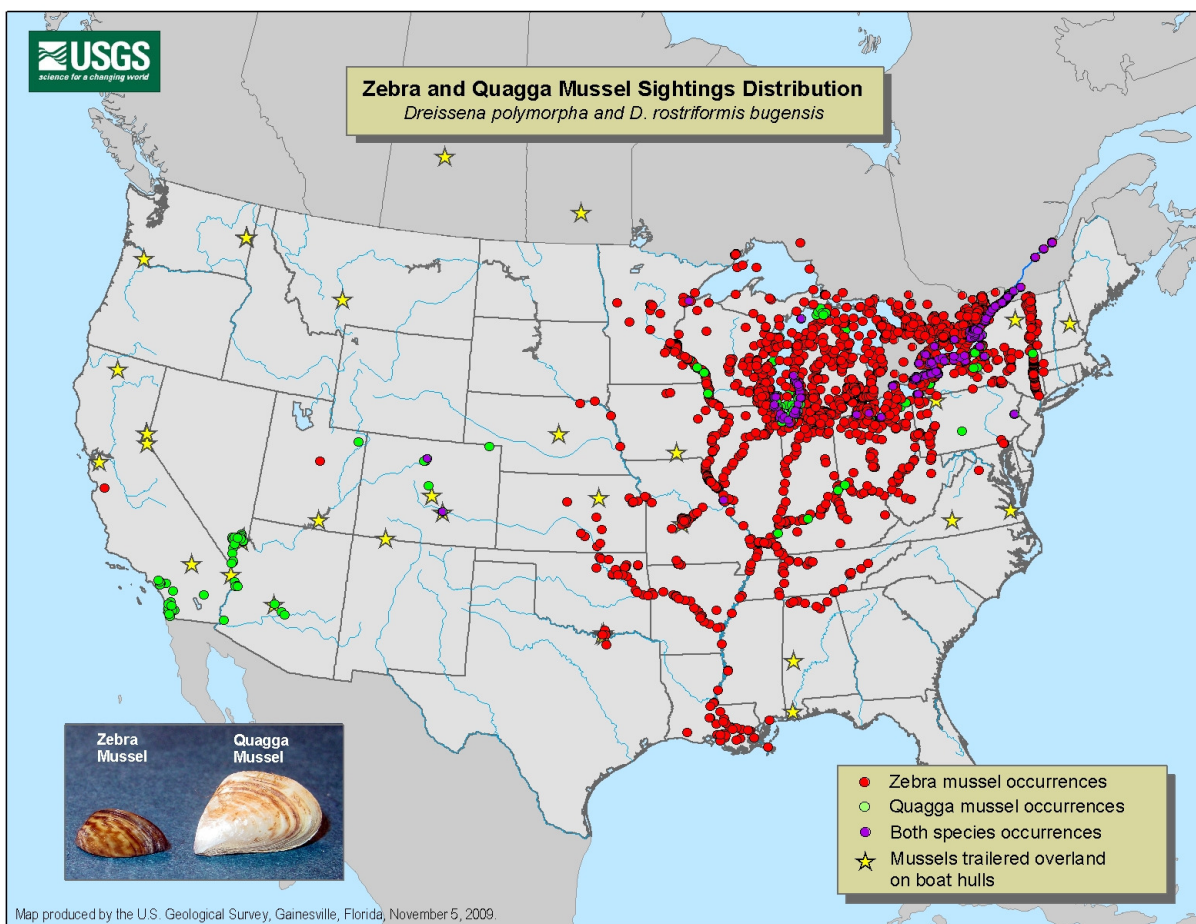
Zebra and Quagga Mussels

The introduction and spread of the invasive aquatic species zebra mussel (*Dreissena polymorpha*) and quagga mussel (*Dreissena rostriformis bugensis*) into the waters of Colorado is a concern for drinking water suppliers. The zebra and quagga mussels are invasive nonnative freshwater bivalve mollusks. They can be differentiated by morphological differences of their shell. The zebra mussel is more triangular in shape, usually have a striped pattern on their shells and average one inch in length. The quagga has a rounded carina, slightly larger than the zebra mussel and paler toward the hinge.

Location of Invasive Species

Both species of mussels were originally native to the lakes of southeast Russia and were accidentally introduced into other countries from ocean-going ships. The mussels were first discovered in the United States in the Great Lakes in 1988 and spread to a large number of waterways throughout the country (Figure 17).

Figure 17. Map of zebra and quagga mussel sightings distribution



Potential Contaminant Sources

During 2008, the zebra and quagga mussels were found in seven lakes and reservoirs of the three major river systems throughout Colorado (Table 20).

Table 20. Location of zebra and quagga mussels in Colorado

Water Body	River System	Zebra Mussel	Quagga Mussel
Grand Lake	Colorado River headwaters	x	x
Pueblo Reservoir	Arkansas River west of Pueblo	x	x
Lake Granby	Colorado River headwaters		x
Shadow Mountain Reservoir	Colorado River headwaters		x
Willow Creek Reservoir	Colorado River headwaters		x
Tarryall Reservoir	South Platte River headwaters		x
Julesburg Reservoir (Jumbo Lake)	South Platte River		x

SOURCE: U.S. DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION AND U.S. GEOLOGICAL SURVEY

Impacts to Water Bodies

Both species of mussels are prolific breeders, thus contributing to their spread and abundance. A fully mature female mussel is capable of producing up to one million eggs per season. Their larvae are microscopic. These invasive mussels smother other aquatic organisms and compete with native species for food and habitat. Their massive colonies can clog water intake structure, such as pipes and screens, therefore reducing pumping capabilities for power and water treatment plants, costing industries, companies, and communities. Recreation-based industries and activities have also been impacted; docks, breakwalls, buoys, boats, and beaches have all been heavily colonized. The mussels attach themselves to hard surfaces and are difficult to remove. They can withstand short periods (several days) out of the water if conditions are moist and humid.

Many of the potential impacts of these species are unclear due to the limited time scale of North American colonization. Nonetheless, it is clear that there is a high potential for rapid adaptation to extreme environmental conditions possibly leading to significant long-term impacts on North American waters (USGS, 2009).

The Planning Team is concerned with the potential introduction of these mussels into Kenney Reservoir, located 5 miles east of Rangely on the White River. The reservoir is a popular recreational spot for motor boating, sailing, swimming and fishing. Recreation at Kenney Reservoir is managed by the Rio Blanco Water Conservancy District located at 2252 East Main Street, Rangely, Colorado.

Many efforts are underway to contain or control the spread of these invasive species. Signage at the reservoir educates recreational users about the mussels and how to prevent transmission of them into the reservoir. The Planning Team recommends a public education effort to encourage recreational boaters and fishermen to clean their boats and equipment before transporting them to new waters. This also includes the disposal of any live bait.

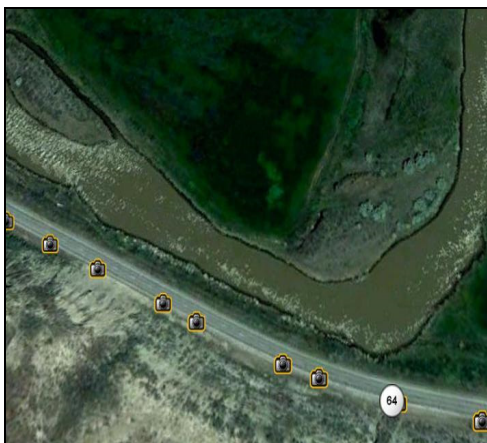
Potential Contaminant Sources

Transportation on Roads

The Town of Rangely's source water protection area is served by a network of native surface and paved rural roads on both private and public lands. Highway 64, the main east to west access route, is located in Zone 1 of the source water protection area along the White River corridor. This route along with Highway 13, the north to south route connecting Rifle to Craig, and County Road 5 in the Piceance River corridor are major traffic route for oil/gas industry vehicles.

The Colorado Department of Transportation (CDOT) maintains state highways, Rio Blanco County maintains their road system, and the U.S. Forest Service and BLM maintain the routes on the land they manage. Storm water runoff over these roads can deliver contaminants from the road surface into nearby surface waters. During the winter season CDOT applies a salt-sand mix to de-ice the highways. De-icing compounds can contaminate both surface water and ground water. Water runoff and erosion over natural surface roads may introduce sediment into the White River and its tributaries. The Planning Team recommends providing the County Road and Bridge Department and CDOT with a map of the source water protection area and encourages the use of Best Management Practices to prevent road materials from entering the source waters.

Within this rural area, chemicals, waste and petroleum products are transported via trucks to rural residences, local businesses, and oil and gas development. Many spills occur in Colorado each year on the highways and local roads. Chemicals from accidental spills are often diluted with water, potentially washing the chemicals into the soil and increasing the potential for contamination of the ground water. The Planning Team is concerned with vehicular spills contaminating the White River and its tributaries and recommends educating the public on how to respond to a hazardous spill as well as working with local emergency response teams to ensure that any spills within the protection area be effectively contained and cleaned up.



SOURCE: GOOGLE EARTH

Highway 64 east of Rangely runs close to the White River within the 1000 Foot Zone 1 protection area.



SOURCE: COLLEEN WILLIAMS

Large vehicles transport petroleum products along County Road 5 in the Piceance Creek corridor.

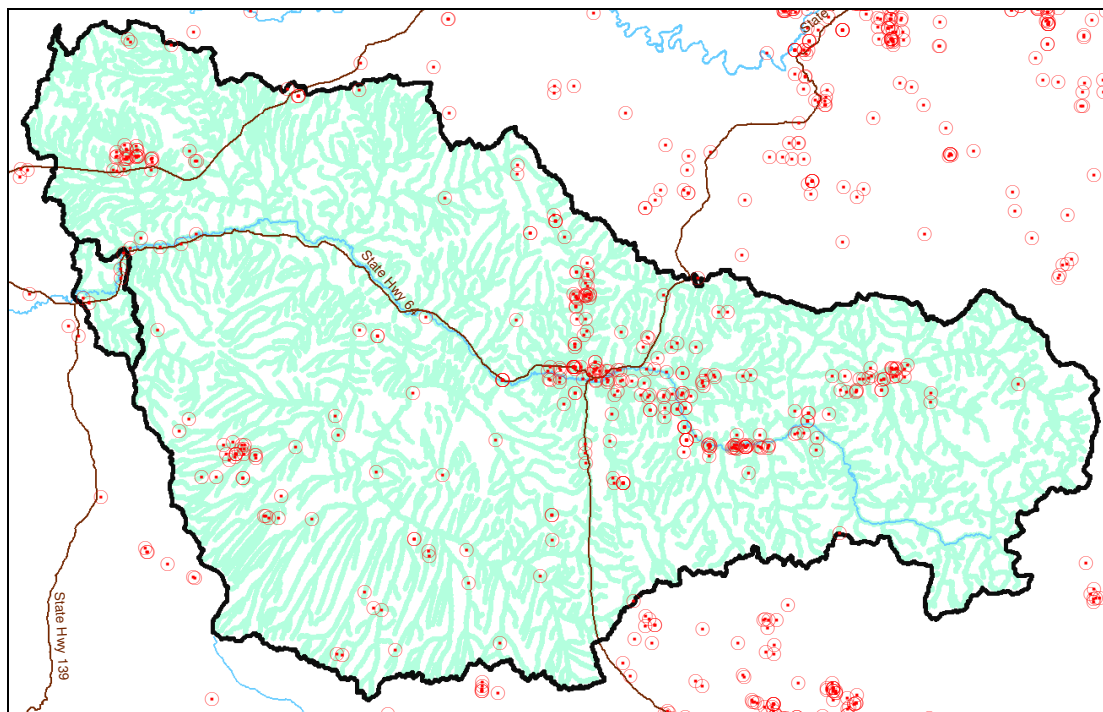
Potential Contaminant Sources

Private Water Wells

There are many private water wells within the Source Water Protection Area that are used for domestic purposes or to water livestock. Many of these private wells are located within the Zone 1 protection area and are drilled into the White River alluvial aquifer (Figure 8). The Colorado Division of Water Resources' well permit database identifies 75 alluvial wells of record with the majority concentrated east and west of Meeker. Withdrawal of ground-water from the alluvium of the White River basin is not extensive. Only 10% of the total water used in Rio Blanco County is from ground water; 90% is from surface water sources.

The Planning Team is concerned about the number and condition of these private wells and whether any of these wells are abandoned. The age of the wells is a factor when considering the potential for contamination of their water supply. Contaminants that infiltrate from the surface are more likely to pollute old, shallow, uncased wells than deep wells with properly installed casings. Abandoned wells are often an easy and direct route for contaminants to enter the ground water.

Figure 18. Map of private water wells within the source water protection area



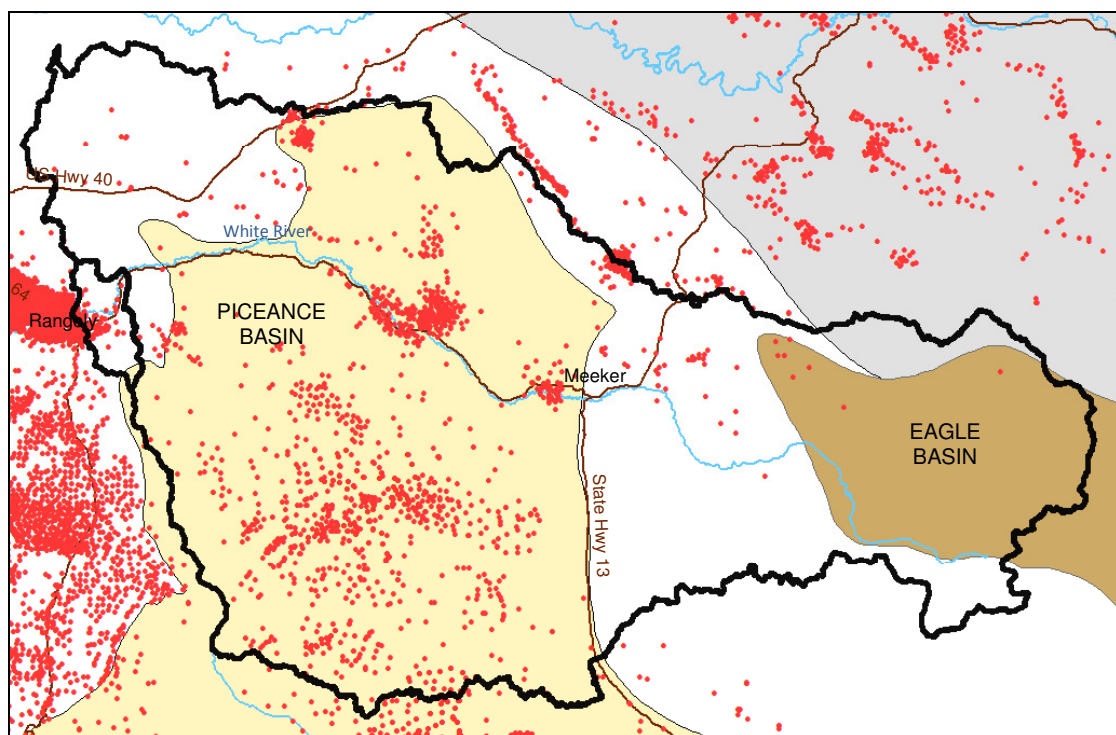
SOURCE: COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT

Potential Contaminant Sources

Oil and Gas Development

In 2002, large scale energy development began within northwest Colorado. New technology, rising demand and rising prices for natural gas have made this area attractive to national energy development companies such as Williams, Encana, Exxon-Mobil, Conoco-Phillips and Chevron-Texaco. Large reserves of oil and gas have been identified in the northern Piceance Basin, located within the White River watershed. The resulting economic boom that Rio Blanco County experienced from energy development during the decade has slowed down during 2008-2009 due to the downturn in the national economy. In 2009, total active oil and gas wells in Rio Blanco County numbered approximately 2,750 wells (RBC, 2009). The Colorado Oil and Gas Conservation Commission's (COGCC) website, www.cogcc.state.co.us, provides updated information on the location and status of oil and gas operations throughout Colorado.

Figure 19. Map of the oil/gas well permits in the source water protection area



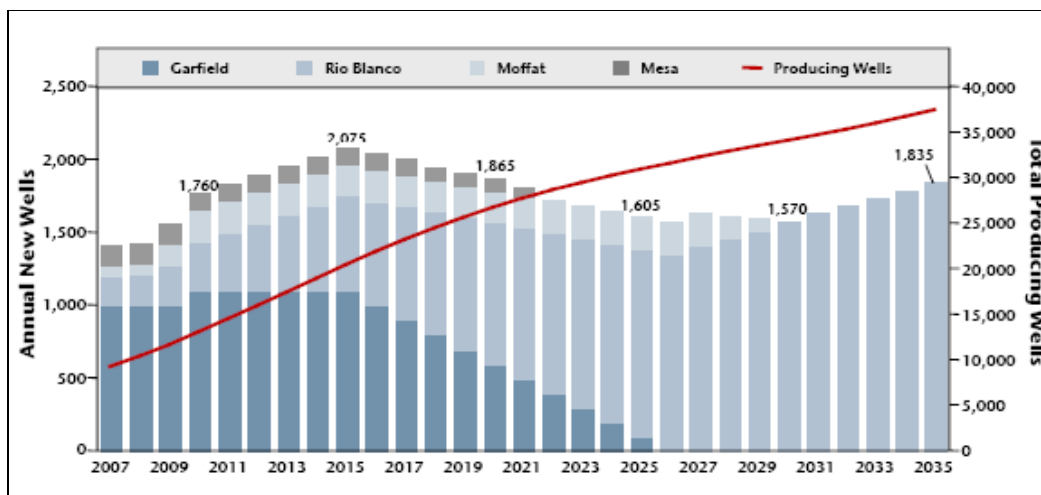
Potential Contaminant Sources

Future Projections

Although drilling activity in the region may have reached a temporary plateau, it is anticipated that gas development will continue for an extended period into the future. Information gathered from industry along with extensive research and analysis undertaken for the Bureau of Land Management's White River Resource Management Plan Amendment Environmental Impact Statement (RMPA) was used to project future natural gas development in the area. Industry sources suggested that over the next two decades the focus on drilling activity would gradually shift northward from Garfield County into Rio Blanco County (Figure 20).

In 2007, the BLM conducted extensive research with the natural gas industry to identify a Reasonably Foreseeable Development Scenario (RFDS) for natural gas activity in the White River Field Office (WRFO), primarily encompassing Rio Blanco County. BLM's RFDS, based on the agency's assessment and input from the industry, anticipates the completion of more than 17,000 wells in the WRFO area by 2027, with well production rising continuously over the next two decades (BBC, 2008).

Figure 20. Annual number of wells projected to be drilled in the area from 2007 through 2035. About 50,000 wells would be drilled over the 29-year period.



SOURCE: NORTHWEST COLORADO SOCIOECONOMIC FORECAST AND ANALYSIS

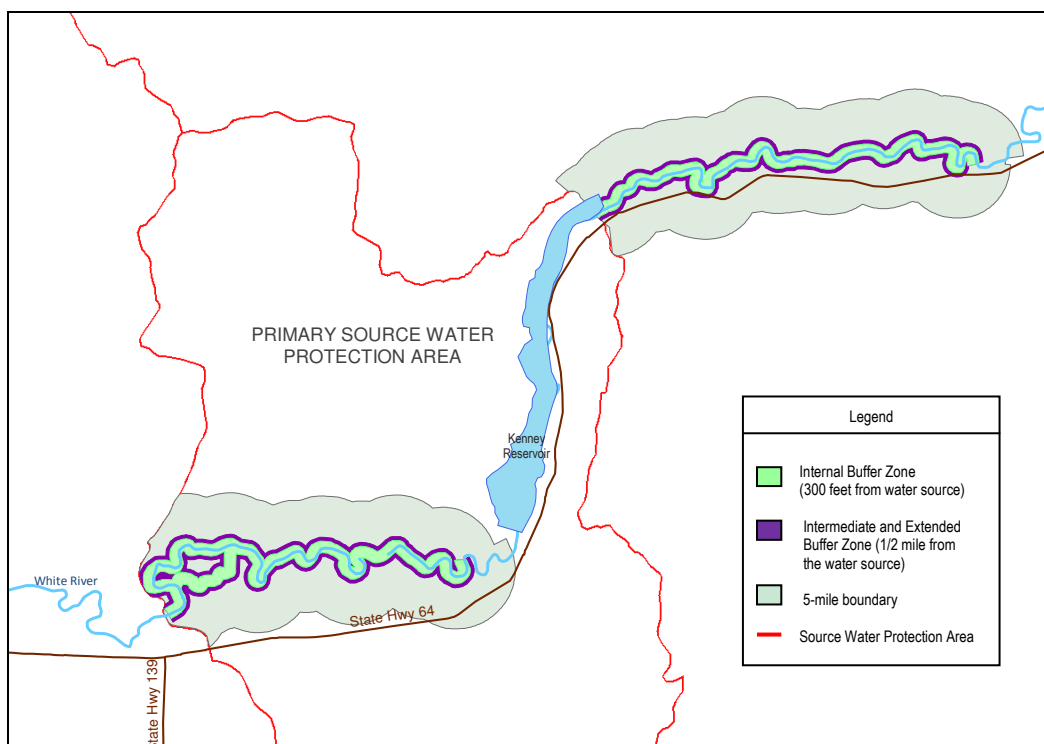
Potential Contaminant Sources

Colorado Oil and Gas Conservation Commission: Rule 317

The oil and gas industry in Colorado is regulated by the Colorado Oil and Gas Conservation Commission (COGCC). The mission of the COGCC is "To promote responsible development of Colorado's oil and gas natural resources". The Colorado legislature passed House Bill 1341 in spring 2007 to increase environmental and public health protections in the face of unprecedented oil and gas development. House Bill 1341 directed the Colorado Oil and Gas Conservation Commission to make and enforce rules consistent with the protection of the environment, wildlife resources, and public health, safety, and welfare. In 2008, the COGCC developed and passed new rules that became effective on May 1, 2009 on federal land and April 1, 2009 on all other land.

One of the new rules, Rule 317, protects public water systems by protecting the source of their drinking water. It creates protection zones, or buffer zones, combined with performance requirements applicable within 5 miles upstream of the surface water intake. The most protected Internal Buffer Zone is located within 300 feet of a water segment and is a drilling excluding zone. The purpose for protecting this zone is that a significant release in these areas would likely contaminate surface water used as a drinking water source. The Commission also decided that enhanced drilling and production requirements should apply in areas 1/2 mile from the water supply segment, in an Intermediate and Extended Buffer Zone (COGCC, 2008). The Rule 317 buffer zones are identified on the map in Figure 21.

Figure 21. COGCC Rule 317 Buffer Zones protecting Rangely's drinking water sources



SOURCE: COLORADO OIL AND GAS CONSERVATION COMMISSION

Potential Contaminant Sources

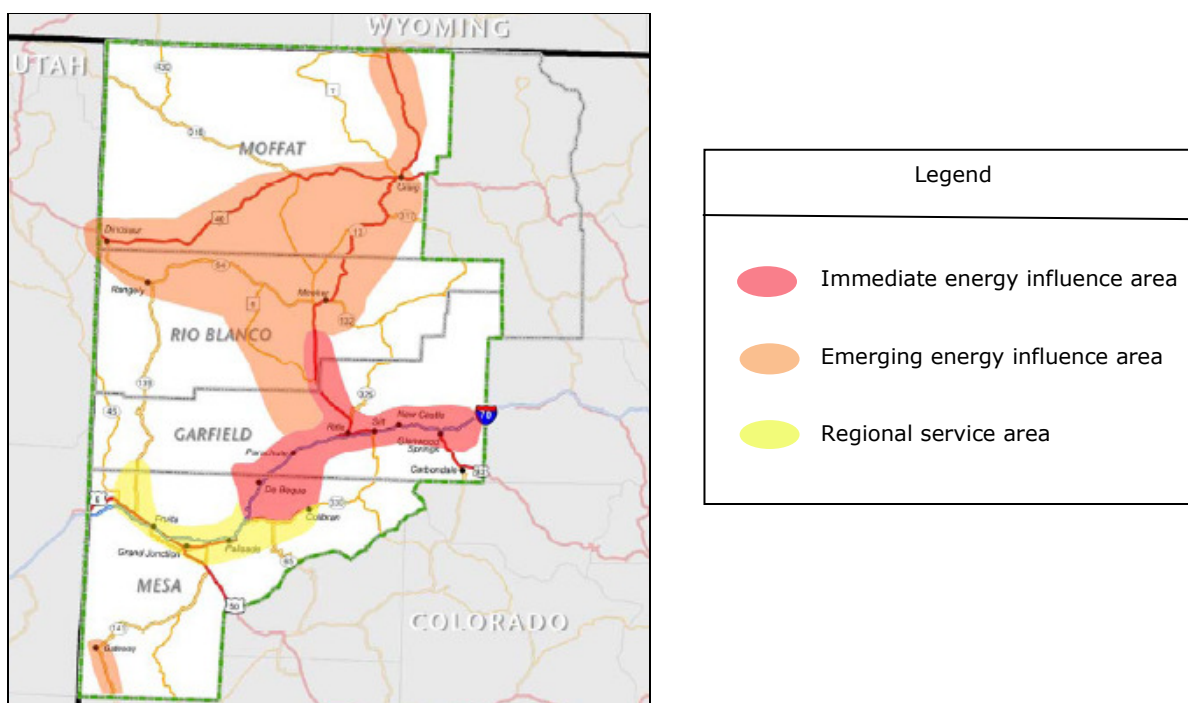
Potential Oil Shale Development

Northwest Colorado is also home to the largest unconventional oil resources in the United States. An estimated 1 to 2 trillion barrels of oil are locked in oil shale deposits in the Piceance Basin, primarily in Rio Blanco County. The federal government is encouraging oil shale development. The Energy Policy Act of 2005 directed the Department of Interior to aggressively lease federal lands for oil shale development. This support, coupled with sustained high oil prices and the prospect that world conventional oil production may now be in decline, may provide the conditions necessary to overcome the numerous challenges associated with developing this resource. Five research, development and demonstration (RD&D) projects are currently underway on lands administered by the Bureau of Land Management (BLM) in Rio Blanco County.

Whether or not a commercial scale oil shale industry will develop in northwest Colorado during the coming decades is both difficult to predict and potentially critical from the standpoint of regional planning. Previous efforts to develop oil shale (and the expectations that went along with those efforts) led to rapid growth followed by a lengthy regional recession during the 1980s. In December 2007, the BLM issued its Draft Programmatic EIS for resource management plan amendments to allow for leasing lands for commercial oil shale and tar sands development in Colorado, Utah and Wyoming.

Despite the many uncertainties surrounding the prospects for oil shale, it is prudent to begin considering the implications of a commercial-scale oil shale industry in northwest Colorado. It is projected that the emerging energy areas of Rio Blanco and Moffat counties will be the focus of future energy-related growth in Northwest Colorado (Figure 22) (BBC, 2008).

Figure 22. Emerging energy influence areas



SOURCE: NORTHWEST COLORADO SOCIOECONOMIC FORECAST AND ANALYSIS

Potential Contaminant Sources

Rio Blanco County's Role

The Rio Blanco County Planning Staff is the County's "Local Designee" to the Colorado Oil and Gas Conservation Commission and the oil and gas industry. The County reviews oil and gas drilling requests and coordinates County interests with the oil and gas companies. All drilling activities related to exploration and production of oil or natural gas in Rio Blanco County whether on Federally owned, Indian owned, State of Colorado owned or privately owned surface land require a Temporary Use Permit. Information about this permitting process can be accessed via the internet at: www.co.rioblanco.co.us/development. The Planning Staff also reviews Conditional Use Permit requests for pipelines, compressor stations and processing facilities needed to refine and transport natural gas.

The Northwest Colorado Oil and Gas Forum

Another opportunity for gathering information on the oil and gas development in the local community is through participation in the Northwest Colorado Oil and Gas Forum. The Forum is an informal meeting of local, state, and federal government officials, oil and gas industry representatives, and citizens that have been holding regularly scheduled meetings since 1989. The purpose of the Forum is to share information about oil and gas development in the northwest Colorado area and to make government officials and oil and gas industry representatives easily accessible to the public. Currently the meetings are conducted once per quarter. The minutes of the meetings and copies of the presentations are posted on the COGCC website's Library page at www.cogcc.state.co.us.

The Colorado Oil and Gas Association

The Colorado Oil and Gas Association's (COGA) purpose is to foster and promote the beneficial, efficient, responsible and environmentally sound development, production and use of Colorado oil and natural gas. COGA is a nationally recognized trade association that aggressively promotes the expansion of Rocky Mountain natural gas markets, supply and transportation infrastructure through its growing and diverse membership. COGA leads major legal and regulatory efforts in Colorado affecting industry before the Colorado courts, Colorado Oil and Gas Conservation Commission, Colorado Department of Public Health and Environment, as well as federal agencies (COGA, 2008).

The local COGA chapter, the Western Slope Oil and Gas Association, provide an expanded statewide grassroots presence for the industry and the Association in their local communities.

Table 21. Contact Information

TOPIC	AGENCY	PHONE #
Oil and Gas Regulations in Colorado	Colorado Oil and Gas Conservation Commission	(303) 861-0362
Dig Safely Program	Utility Notification Center of Colorado	1-800-922-1987
Gas Pipelines	Public Utilities Commission	(303) 894-2000
Geological Maps & Publications	Colorado Geological Survey	(303) 866-2611
Oil & Gas Severance Tax	Department of Revenue	(303) 238-7378
Produced Water Discharge Permits	CDPHE/Water Quality Control Division	(303) 692-3524
Service Stations (Inspections, complaints, etc.)	CDLE/Division of Oil & Public Safety	(303) 318-8507
State Oil & Gas Leases/Auctions	State Land Board	(303) 866-3454
Storage Tanks	CDLE/Division of Oil & Public Safety	(303) 318-8507
Local Oil and Gas Association	Western Slope Oil and Gas Association	(970) 630-3242

SOURCE: COLORADO OIL AND GAS CONSERVATION COMMISSION

Potential Contaminant Sources

Water Quality Concerns

The surface and subsurface impacts from oil/gas production can cause adverse impacts to the surface and ground water quality in the White River watershed. Land disturbed from construction of roads, well pads, pipelines, and compressor stations can lead to soil erosion and sediment transport to surface water bodies during storm water runoff. Well production may result in spills or releases of drilling fluids, fracturing fluids, produced water, hydrocarbons, or other chemicals transported within the source water protection area. During drilling there could be a release of fluids into the underlying aquifers, potentially contaminating the ground water resources.

Pumping oil and gas out of the ground may produce large volumes of water, known as produced water or brine due to its high salinity. Produced water quality can vary greatly depending on the water quality in the producing formation. Dewatering target formations can lead to a connected dewatering of surface seeps, springs, and streams, which may, in turn, impact riparian, wetland, wildlife, and aquatic habitat, as well as human water supplies. Dewatering techniques include re-injecting the produced water into an underground aquifer, evaporation, or surface discharge.

In order to prevent adverse affects from oil/gas production, the industry is required to obtain a Stormwater Management Permit from the Water Quality Control Division. Compliance with the permit requires the preparation and implementation of a Stormwater Management Plan for systematic monitoring of the site, establishment of positive, directed run-off management and implementation of site specific adaptive Best Management Practices (BMPs), such as ditches or berms, silt fences, straw wattles, or other erosion control methods.

Protection Strategies

The Planning Team will work with oil and gas development to ensure source water protection by:

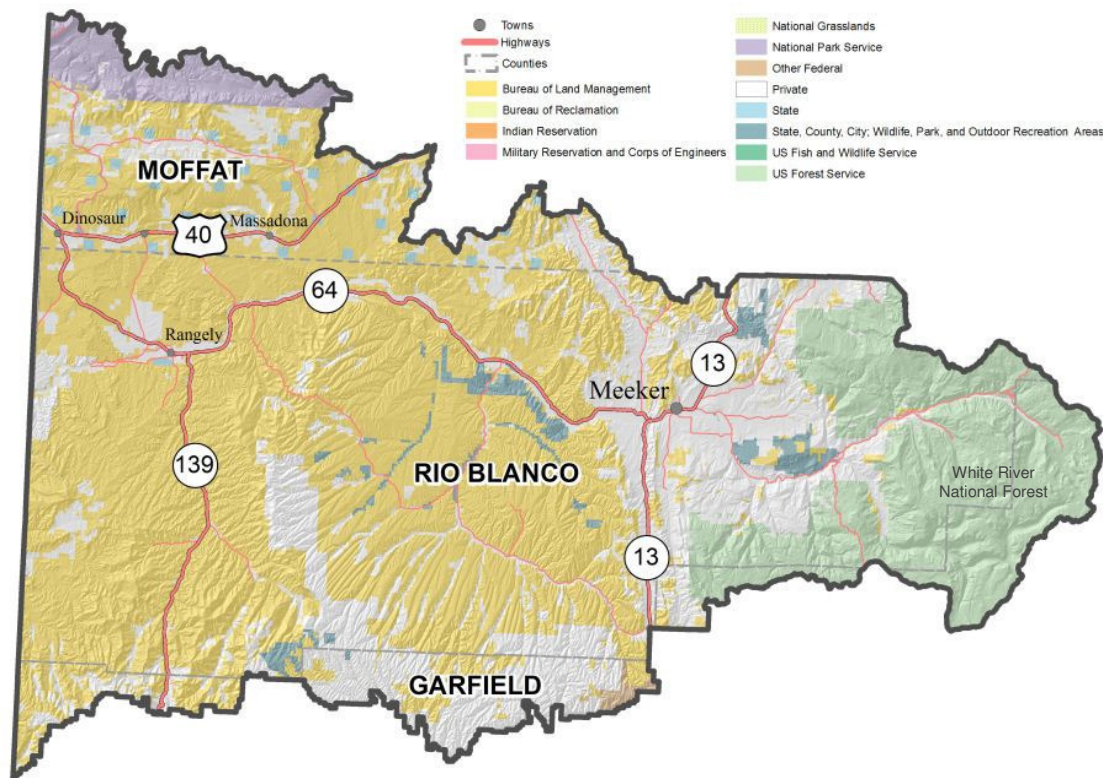
- Staying informed of any potential oil and gas developments within the protection area through the use of COGCC's website mapping, attending Northwest Colorado Oil and Gas quarterly forums, and participating in the Western Slope Chapter of the Oil and Gas Association.
- Become actively involved in the public process of reviewing public land management documents relating to oil and gas development in the source water protection area to encourage BMPs to protect water quality.
- Provide industry representatives an opportunity to participate in source water protection activities that foster a partnership between the industry and community.
- Encourage industry to comply with all regulations that prevents impacts to the water source.

Potential Contaminant Sources

Public Lands: U.S. Forest Service

Public lands owned by the federal government account for 75% of the County and are managed by the U.S. Department of Agriculture's Forest Service and Department of the Interior's Bureau of Land Management (BLM). The source waters for the Town of Rangely originate within the upper White River National Forest on lands managed by the Blanco Ranger District. There are 352,917 acres of National Forest land within the Blanco District boundaries. Land use and forest management activities within these public lands can affect the quality of the water in the watershed.

Figure 23. Map of Public Lands managed by the U.S. Forest Service Blanco Ranger District and the Bureau of Land Management White River Field Office



SOURCE: BUREAU OF LAND MANAGEMENT WHITE RIVER FIELD OFFICE

Contact Information: Blanco Ranger District
220 East Market Street
Meeker, Colorado 81641
Phone: (979) 878-4030
Website:
www.fs.fed.us/r2/whiteriver

Potential Contaminant Sources

Public Lands: Bureau of Land Management

The BLM manages 8.4 million acres of public lands in Colorado along with 29 million acres of subsurface mineral estate. The White River Resource Area is located in northwest Colorado and incorporates parts of Rio Blanco, Moffat, and Garfield Counties (Figure 20). The Resource Area includes approximately 2,675,360 acres of BLM, national forest, national park, state, and privately owned and administered lands. Of this, the BLM administers approximately 1,455,900 surface acres, and 365,000 acres of mineral estate underlying state and privately owned surface estate (BLM, 2006).

The BLM in Colorado adheres to the principal of multiple-use management outlined by the Federal Land Policy and Management Act. This means that the BLM balances outdoor recreation and preservation of wildlife habitat, air and water, and other scenic and historical values with environmentally responsible commercial development of the land and its resources. The mix of allowed uses depends on an area's resources, the type of permit and local demands (BLM, 2007).

The BLM in Colorado administers oil and gas leases on Federal lands. The BLM reviews and approves permits and licenses from companies to explore, develop, and produce oil and gas and geothermal resources. BLM is also responsible for inspection and enforcement of oil, gas, and geothermal wells and other development operations to ensure that lessees and operators comply with the lease requirements and BLM's regulations.

The Bureau of Land Management's (BLM) White River Field Office in Meeker, Colorado, is preparing a Resource Management Plan Amendment (RMPA) and Environmental Impact Statement (EIS) that will address potential oil and gas exploration and development activities within the 1.5 million acres it manages. The decisions in a RMP are designed to guide and control future land or resource management actions over a twenty year period. Opportunities for public involvement are available during development and implementation of the RMP. The RMP Amendment is necessary to address predicted development that is beyond what was considered in the 1997 RMP. It is estimated that 95% of this future natural gas development will be in this Mesaverde Natural Gas Play Area which is mostly within Piceance Creek and Yellow Creek watersheds, which are tributary to the White River above Rangely. In addition to this new development in the Mesaverde Natural Gas Play Area, continued oil and natural gas development in historical fields around Rangely is expected, although only 5% of the new drilling is expected in these areas. Much of this potential development is below Rangely's intake, in the Douglas Creek drainage and tributaries to the White River between Rangely and the Utah border (BLM, 2010).

The Planning Team is aware of potential impacts to water quality on public lands from forest fires, transportation, recreation, livestock grazing, and oil/gas development. The White River Field Office has participated on the Planning Team and has helped identify management approaches for these public lands to protect water quality. The Planning Team recommends keeping informed on land management issues, participating in the development of the Resource Management Plan, and developing partnerships with public land managers.

Contact Information: White River Field Office
220 East Market Street
Meeker, Colorado 81641
Phone: 970-878-3800, (970) 244-3000
Website: www.blm.gov/co/st/en/fo/wrfo

Potential Contaminant Sources

Land Use: Growth and Development

Most of the Town of Rangely's source water protection area is outside of its jurisdictional boundaries and therefore they must rely on the County to make land use decisions that will affect their source waters. Even though most of the land is zoned Agricultural, a list of Conditional Uses may be approved upon site plan review. A Special Use Permit could also be applied for other land uses not included in the Use-By-right and Conditional Use category. The largest land use trend affecting Rio Blanco County is growth within the unincorporated areas or small rural communities on land that is zoned for agricultural use. The County is seeing an increase in secondary homes built along the White River upstream from the town of Meeker. The Elk Creek subdivision has a potential for 65 homes all of which have septic systems.

Currently, the State of Colorado law allows the division of property into lots with a minimum of 35 acres without County review. There are large land tracts within the protection area that could be divided into these 35 acre parcels. Growth of both incorporated and unincorporated populations will accelerate the conversion of agricultural lands to other purposes. This conversion will further change the character of parts of northwest Colorado.

Future land use and growth within the protection area and the potential for water quality impacts from these changes is a concern to the Planning Team. The Planning Team recommends that all land use decision-makers within Rio Blanco County be encouraged to consider source water protection of the White River and its tributaries when making land use decisions and that these decisions minimize the impacts to the water quality of the White River watershed. The Team suggests working closely with the County Planning and Development staff and providing them with a map of the protection area, GIS map data layers, and a copy of the final plan. It is suggested that the Town of Rangely is notified when a special use permit is applied for and permitted to review the application.

Noxious Weed Control

Chemicals are applied on the lands within the watershed to manage noxious weeds by Rio Blanco County, public land managers, and private land owners. Rio Blanco County has adopted a Noxious Weed Management Plan that is implemented by their County Weed Department. During the summer months the Weed Department manages noxious weeds along roadsides and county properties, special management areas and on private, state and federal lands. Herbicides are applied to the noxious weeds. The Rio Blanco Weed Department also sells herbicide for weed control to private residents. Information about the Rio Blanco County Weed Department can be found online at www.co.rio-blanco.co.us.

The BLM White River Field Office works together with the County on integrating their weed management program. An effective weed management program includes: prevention and detection; education and awareness, inventory, planning, integrated weed management, coordination, and monitoring, evaluation, research and technology transfer.

Herbicides can be an effective tool in reducing noxious weed populations to a point at which they can be manually controlled. The application of herbicides needs to be done in a way to reduce the potential effects from the use of herbicides, protect riparian systems, water quality, human health, and other environmental factors.

Potential Contaminant Sources

Agricultural Practices

Irrigated Fields

Agricultural lands lie within the 1000 foot Zone 1 protection area along the White River upstream from the Town of Rangely. Much of this land is irrigated with either ground water wells drilled into the alluvial aquifer or from diversions from the White River. Excessive fertilizer use and poor application methods can cause fertilizer movement into ground and surface waters. The two main components of fertilizer that are of greatest concern to source water quality are nitrogen and phosphorus. The Planning Team recommends public education to encourage agricultural BMPs to protect water sources including the proper application and storage of fertilizers and irrigation techniques that prevent runoff of irrigated lands into water sources.

Livestock Grazing

Livestock grazing occurs within the private and public lands in the watershed. Livestock grazing can impact riparian health, stream channel conditions, upland infiltration and erosion, and water quality. The most common livestock-caused impacts include fecal/bacterial contamination, sedimentation, and increased temperatures. Pathogens that can be carried in animal waste include E.coli, salmonella, cryptosporidium, and giardia. Livestock grazing activities with the highest potential for direct and indirect impacts to water resources include long-term concentrated grazing in riparian areas, and trampling or trailing near water sources. Direct bank damage may add large amounts of sediment directly into streams, especially wet meadow streams or erosive topography that is prone to gully formation.

On public lands, operators are authorized grazing use on areas called allotments through an approved grazing permit/lease, e.g., kind and number of livestock, season of use, and amount of use permitted each grazing year. Active allotment plans that recently have been updated by the Blanco Ranger District stress grazing practices that protect watershed resources. Watershed conservation practices and grazing standards and guidelines designed to protect range and riparian areas will be included in grazing permits and allotment operating plans as they are revised and updated. Range specialists monitor allotments to ensure that these practices are implement and effective (WRNF, 2002).

Other agricultural practices that may impact water quality in the White River watershed include the disposal of dead animal carcasses in the river that float downstream to Kenney Reservoir and manure on private ranches in close proximity to the water source.



Animal waste discharges from a manure storage area can introduce excessive nutrients, organic matter, or pathogens to source waters.

Potential Contaminant Sources

Kenney Reservoir

Kenney Reservoir is located on the White River and serves as the municipal water storage and supply for the town of Rangely, Colorado. The reservoir was constructed in 1983, and since that time the storage capacity of the reservoir has been reduced by 36 percent from sediment loads entering the reservoir. At the current sedimentation rate of 315 acre-feet per year, the water storage capacity of the reservoir will be completely lost in less than 27 years.



SOURCE: TOWN OF RANGELY

The Rio Blanco Water Conservancy District operates the reservoir and associated power generation plant, and they have completed several engineering studies on the most effective and economical methods to extend the life of the reservoir. The most effective method in relation with costs is to retain sediment loads in the watersheds tributary of the White River. The Water District, through a grant from the Colorado Water Conservancy Board, identified and mapped the watersheds producing the greatest sediment loads entering the White River. A partnership between the Bureau of Land Management (BLM), Rio Blanco Water Conservancy District, and various BLM grazing permittees has been created to provide a working mechanism to assist in the reduction of sediment/salt loads and erosion rates of highly erosive drainages within the White River Watershed (BLM, 2006). These efforts include constructing erosion control structures, cleaning sediment out of existing earthen dams, and removal of the sediment in Kenney Reservoir by dredging.

Dredging is the process of excavating sediment from the bottom of the reservoir and disposing of the sediment at a different location. There are several different types of dredges that are typically mounted on a boat or barge for operation in the reservoir. The collected sediment is usually pumped into a sediment basin where it precipitates out of suspension allowing much of the water in the dredge slurry to return to the system. Benefits of dredging include significant removal of sediment to maintain an existing reservoir site.

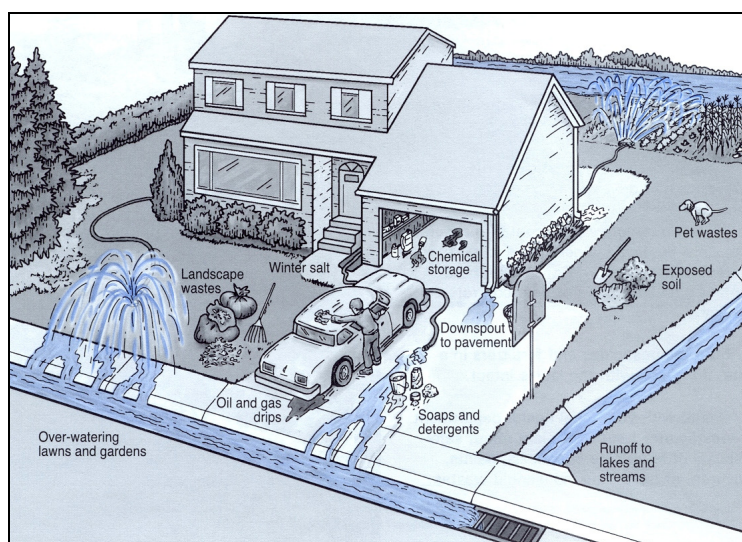
Effective sediment management and dredged material planning require open and early communication among federal and state dredged material regulators, watershed planners, and other interested parties. Coordination among these groups ensures: (1) sources of sediment (and sources of contamination carried by the sediment) are addressed; (2) the broadest range of beneficial use and disposal alternatives for dredged material are evaluated; and (3) adequate funding for dredged material use or placement is secured.

Sediment management efforts to control upstream erosion and pollution in the White River watershed will help to improve downstream water quality and reduce the need for dredging Kenney Reservoir.

Potential Contaminant Sources

Residential Practices

The Rangely Source Water Protection Area includes rural residential dwellings. Common household practices may cause pollutants to runoff residential property and enter the surface or ground water as indicated in the picture below. Prevention of ground water contamination requires education, public involvement, and people motivated to help in the effort. Educating the community and decision makers is one of the challenges and cornerstone of this protection plan. Public education will help people understand the potential threats to their drinking water source and motivate them to participate as responsible citizens to protect their valued resources.



SOURCE: COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT

Figure 32. Common household practices may cause pollutants to runoff residential property and enter the surface or ground water.

Residents within the source water protection area can help protect their drinking water source by:

- **Using Water Wisely** – Use it sparingly. Check for plumbing leaks, use water-saving showerheads and faucets and water lawns mornings or evenings.
- **Properly Dispose of Chemicals** - Properly dispose of household chemicals like cleaning supplies, paints, solvents and lawn and garden chemicals. Call your local Health Department for disposal options. Don't pour waste chemicals onto the ground or into sinks or toilets.
- **Use Fertilizers, Herbicides and Pesticides Properly** - Apply chemicals according to label instructions and avoid runoff. Do not exceed recommended application rates.
- **"Put Used Oil in Its Place"** - If you change your own motor oil place the used oil in a clean, leak proof, reusable container with a tight-fitting cap. Don't mix oil with water, gasoline, antifreeze, solvents, or other substances. Information on local collection centers can be found online at www.colorado-recycles.org.
- **Don't Use the Drain** - Do not dispose of automotive chemicals (gasoline, antifreeze, waste oil, brake fluid, cleaning solvents, etc.), paints or other pollutants into floor drains, storm drains or onto the ground. Many floor drains and storm drains discharge directly above groundwater. Wastes discharged onto the ground often seep into groundwater.

SOURCE WATER PROTECTION MEASURES

Management Approaches

The Planning Team reviewed and discussed several possible management approaches that could be implemented within the Source Water Protection Area to help reduce the potential risks of contamination to the community's source water. The Planning Team established a "common sense" approach in identifying and selecting the most feasible source water management activities to implement locally. The focus was on selecting those protection measures that are most likely to work for this project.

The Planning Team recommends the management practices listed in Table 22, "Source Water Protection Best Management Practices" be considered for implementation by:

- Town of Rangely
- Rio Blanco County
- Bureau of Land Management White River Field Office
- U.S. Forest Service Blanco Ranger District
- Rio Blanco Water Conservancy District
- Oil and Gas Industry
- Colorado Rural Water Association
- Citizens of the White River watershed

Evaluating Effectiveness of Management Approaches

The Town of Rangely is committed to developing a tracking and reporting system to gauge the effectiveness of the various source water management approaches that have been implemented. The purpose of tracking and reporting the effectiveness of the source water management approaches is to update water system managers, consumers, and other interested entities on whether or not the intended outcomes of the various source water management approaches are being achieved, and if not, what adjustments to the protection plan will be taken in order to achieve the intended outcomes.

The Town of Rangely is voluntarily committed to applying source water assessment and protection principles to finding and protecting new water sources in the future. This is part of the larger ongoing commitment to providing the highest quality drinking water to their consumers.

The Town of Rangely is voluntarily committed to assisting the Colorado Department of Public Health and Environment in making future refinements to their source water assessment and to revise the Source Water Protection Plan accordingly based on any major refinements.

Table 22. Source Water Protection Best Management Practices

Priority Issue	Management Approach	Implementer
Septic Systems		
Public Education	1. Develop a public education program for property owners within the SWPA to provide basic information on the proper use and maintenance of their septic systems and how the source of their drinking water can be affected by an inadequately functioning septic system.	Rio Blanco County Health Department
Septic System Inspection Program	1. The County Health Department will continue to implement their optional Septic System Inspection Program upon request of the property owner and use this opportunity to educate the property owner on the link between good septic practices and protecting source water.	Rio Blanco County Health Department
Coordinating New Construction and Permits	1. The County Health Department will be encouraged to work closely with the land use department on subdivision review for septic system uses and with the building department to ensure that whenever a building permit is applied for, the Health Department makes sure that adequate wastewater treatment is planned for.	Rio Blanco County Health Department
Roads: Spills & Sediment		
Road Maintenance	1. Keep informed on the road maintenance practices and schedules within the SWPA including: grading, de-icing, dust abatement and BMPs used. 2. Provide a copy of the Source Water Protection Plan and map of the protection area to the Rio Blanco County Road and Bridge Department, CDOT, and public land managers. Encourage them to use road Best Management Practices to prevent road materials from entering the source waters.	Steering Committee Steering Committee
Vehicular spills	1. Meet with the local fire departments to discuss their emergency response plans for responding to hazardous and non-hazardous vehicular spills within the SWPA. Provide information to the local fire departments: • Copy of the Source Water Protection Plan • Location of the intakes and Source Water Protection Area • Personnel to be notified in the event of an emergency 2. Educate the public about reporting spills on local roads through the use of area newspapers and/or signage on roadways.	Steering Committee Water Utility Steering Committee

Table 22. Source Water Protection Best Management Practices

Issue of Concern	Management Approach	Implementer
Land Use		
Land Use Planning and Controls	1. Provide Rio Blanco County with GIS mapping information of the SWP area and encourage them to overlay this area on their land use maps 2. Encouraged local and county government officials to consider source water protection of the White Rivers watershed when making land use decisions or zoning laws. Land use controls may include: subdivision growth controls, zoning, and land use restrictions. 3. Keep informed and participate in land use hearings or meetings regarding lands within the SWP area.	Colorado Rural Water Association Rio Blanco County Commissioners Town of Rangely Steering Committee Town of Rangely
Land Conservation	1. Work with local land trust groups in the watershed to educate landowners about conservation easements on their land (i.e. Yampa Valley Land Trust, Cattleman's Conservation Trust, and Watershed Land Trust).	Steering Committee Local Land Trusts
Water Utility		
Water Supply Intakes	1. Perform regular inspection of the surface water intakes. 2. Protect areas around intakes with fencing and signage.	Rangely Water Department
Water Operations	1. Ensure that the water treatment plant is properly managed, operated and maintained to prevent contamination of the drinking water. 2. Store chemicals properly at the treatment plant. 3. Ensure that all employees are familiar with the Source Water Protection Plan, emergency and contingency plan, and hazardous spill response.	Rangely Water Department
Public Education	1. Provide Information concerning the SWPP in the annual Consumer Confidence Report (CCR).	Rangely Water Department

Table 22. Source Water Protection Best Management Practices

Priority Issue	Management Approach	Implementer
Agricultural Uses		
Public Outreach and Communication	1. Develop a public education campaign for area residents within the Primary SWPA and Zone 1 of the Secondary SWPA on agricultural Best Management Practices for grazing management, manure management, chemical application, animal rendering, chemical use and storage. 2. Provide land owners with information on the water quality impacts of grazing within the creeks and on stream banks. Educational material will encourage the use of BMPs on: alternative stock watering, creating a buffer zone between the cattle and the creek, and bioengineering stream bank stabilization practices. 3. Provide educational materials to ranchers within Zone 1 of the SWPA on the proper disposal of dead animals including: burial, composting, and disposal at the local landfill. 4. Education techniques may include: workshops, mailings and community meetings/workshops, demonstration projects, and site visits by NRCS Field Office. Materials may include the "Well-A-Syst" program on Livestock Management.	Steering Committee NRCS/FSA Steering Committee NRCS/FSA Steering Committee NRCS/FSA CSU Extensions Steering Committee NRCS/FSA
Funding Opportunities	1. Provide agricultural residents with information on funding opportunities for cost sharing to implement BMPs on their land (i.e. EQIP) and to conserve their land under the Conservation Reserve Program.	Steering Committee NRCS
Zebra & Quagga Mussels		
Public Education and Outreach	1. Develop a public education campaign that provides information to reservoir users about the zebra and quagga mussels and how to prevent transmission of them into Kenney Reservoir. 2. Opportunities for public education include: newspaper articles, signage at the reservoir, brochures, and stations at the reservoir. 3. Work together with agencies (i.e. U.S. Fish and Wildlife, Colorado State Parks, Colorado Division of Wildlife) to explore opportunities for a boat washing station at the reservoir.	Steering Committee Rio Blanco Water Conservancy Steering Committee Steering Committee

Table 22. Source Water Protection Best Management Practices

Priority Issue	Management Approach	Implementer
Residential/Industrial		
Public Education and Outreach	1. Conduct public education and outreach programs for SWPA residents to encourage practices that will protect their drinking water source. Topics may include: source water protection, household hazardous waste storage and disposal, fertilizer usage, pet waste cleanup, water conservation, car washing, and secondary containment for above ground fuel storage tanks. 2. Opportunities for public education include: newspaper articles, poster displays at local utility offices and public buildings, water bill inserts, flyers, creek festivals, public forums, workshops and community events.	Steering Committee Water Utility Local Government
Hazardous Materials	1. Educate the community about proper disposal of any hazardous materials including: local waste oil, solvents, lubricants, and degreasers, ect. and encourage collection and recycling of used oil, batteries, tires, and agricultural chemical containers. 2. Organize local hazardous waste collection program for residents within the SWPA. 3. Develop an inventory of facilities that generate or store Hazardous Waste within the Source Water Protection Area.	Rio Blanco County Steering Committee Rio Blanco County Steering Committee
Wastewater Dischargers		
Spill Prevention	1. Maintain a current inventory of wastewater dischargers in the SWPA. 2. Gather information about their emergency response plan for spills and request to be notified in the event of a spill.	Rio Blanco County Town of Rangely
Mining		
	1. Gather information from Colorado Department of Reclamation, Mining, and Safety on the status of permitted mines within the SWPA. 2. Get involved in the review process for mining operation's permits at the State and County level.	Steering Committee Steering Committee

Table 22. Source Water Protection Best Management Practices

Priority Issue	Management Approach	Implementer
Public Lands		
Wildland Fires	1. Implement the National Fire Plan to reduce fuels within the National Forest lands within watershed. 2. Continue to implement the fire prevention plan which includes public education programs: Fire Wise Program and Project Learning Tree.	USFS USFS
Management Plans	1. The Bureau of Land Management will be completing the amendment process of their Resource Management Plan for the area. They will involve the public in the opportunities for public input as required. The Steering Committee will become actively involved in reviewing the plan and providing comment when needed on source water protection concerns.	BLM Steering Committee
Roads and sediment	1. Use road maintenance BMPS to prevent sediment delivery to streams including: grading, culverts, sediment basins, water bars, and revegetating areas along stream banks and reservoirs.	USFS BLM
Recreational Activities	1. Minimize the effects of recreational activities within the watershed from both motorized and non-motorized activities. Continue to provide multiple uses while restricting motorized vehicles to system roads that are signed. Prevent OHV damage to stream banks and upland areas surrounding the upper White River and its tributaries. Restore or close areas degraded by OHV usage.	USFS
Livestock Grazing	1. Minimize the effects of livestock grazing on the upper White River watershed. Conduct an intensive analysis to review and/or revise their allotment management plan to identify impacts and mitigate problems in order to comply with the Clean Water Act.	USFS
Resource Development	1. The Forest Service and BLM will inform the Steering Committee of upcoming activities as they arise.	USFS BLM

Table 22. Source Water Protection Best Management Practices

Priority Issue	Management Approach	Implementer
Oil and Gas Development		
Information Sharing	1. The Steering Committee will encourage industry representatives to share information about their operations within the source water protection areas by: public meetings and participation on the Ranglely Source Water Protection Steering Committee. 2. The Steering Committee will become educated on the Industry's operations by using information available from the State's COGCC website, attending the Northwest Oil and Gas Forum quarterly, and meeting with industry representatives. 3. The Steering Committee will encourage industry to educate all employees and subcontractors on the location of the source water protection areas, Emergency Response Plans, Storm Water Management Plans, and Spill Response Plans.	Steering Committee Industry Representatives Steering Committee Steering Committee Industry Representatives
Spill Prevention	1. The Steering Committee will encourage the industry to: a. Administer a Spill Prevention, Control, and Countermeasures Plan to prevent surface water and ground water contamination, b. Immediately notify the water providers of any spills, and c. Use proper equipment & vehicle maintenance BMPs to prevent chemicals from contaminating ground water.	Steering Committee Industry Representatives
Reservoir Dredging		
	1. Stay informed on dredging activities that occur in Kenney Reservoir. 2. Work cooperatively with area partners on the dredging activities to prevent contamination of waters downstream from the reservoir. 3. Monitor water quality downstream of the reservoir during dredging activities to prevent excessive amounts of sediment from entering Rangely's water intake.	Town of Rangely Rio Blanco Water Conservancy District Bureau of Land Management Town of Rangely

Table 22. Source Water Protection Best Management Practices

Priority Issue	Management Approach	Implementer
Petroleum Storage		
Underground Storage Tanks (UST)	1. Maintain a current inventory and information on the status of USTs within the SWPA using the Colorado Storage Tank Information (COSTIS) website at http://costis.cdle.state.co.us . Storage tank information from this site includes: facility, tank, owner, and events.	Steering Committee
	2. Identify Leaking Underground Storage Tank (LUST) events that have occurred within the SWPA using the State's database COSTIS. Contact the Colorado Department of Labor and Employment Division of Oil and Public Safety (303-318-8000) for information regarding LUST events within the SWPA. Contact the Public Records Center for a file review at (303) 318-8521 or (303) 318-8522. Monitor progress on any remedial action conducted for the known contamination sites.	Steering Committee
	3. Provide information to tank owners on how they can help with source water protection efforts.	Steering Committee
Above Ground Storage Tanks (AST)	1. Inventory private AST within the Source Water Protection Areas via surveys to area residents.	Steering Committee
	2. Field-check AST when possible to assess the condition of the tanks, location to the source water, and secondary containment surrounding the tanks.	Steering Committee
	3. Educate the tanks owners on the need to assess their storage system and develop a system that guards against leaks and spills that may potentially contaminate the water supply. Use the "Well-A-Syst" voluntary program for information on petroleum storage management.	Steering Committee
Solid Waste / Transfer Sites		
	1. Gather information on the location of all solid waste/transfer sites within the SWPA.	Steering Committee
	2. Provide information on the source water protection plan to all sites and emphasize the importance of complying with all regulations that prevent materials from entering ground and surface water.	Steering Committee

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APPENDICES

Town of Rangely Water and Wastewater Emergency Response Plan*

Source Water Assessment Report and Appendices

Meeting Attendance Roster, Minutes, and Contact List

Funding Sources for Source Water Protection

Miscellaneous Maps and Reports

Citizen's Guides and Handbooks

Glossary

*Notice: This public document will only include information that is not deemed sensitive to the safety and operation of the individual community's water plan operation. Appendices marked with a * are only included in the Public Utility's report or kept on file at their office. All other documents are included in the CD located in the back pocket of this report or included in the printed document. All documents can be reprinted.*