

CHAPTER 5

CUMULATIVE IMPACTS

5.1 INTRODUCTION

Compliance with NEPA requires analysis of the cumulative effects of each alternative. Cumulative effects are the impacts on the environment that result from the incremental impacts of an alternative when added to other past, present and reasonably foreseeable future actions, regardless of who undertakes those actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

Humans have altered the Project Area's environment through various actions undertaken since people first began settling the general area. In combination with natural processes, these past and present actions have resulted in the affected environment described in Chapter 3. Because the effects of past and present actions have been incorporated into the description of the affected environment, they also were incorporated into the analysis of environmental effects discussed in Chapter 4, which evaluated the environmental effects of the alternatives on the affected environment. Consequently, the effects of these past and present actions have already been considered and the Chapter 5 discussion focuses on cumulative effects with future actions.

Several reasonably foreseeable future actions that may contribute to significant cumulative effects when combined with the alternatives' direct and indirect effects described in Chapter 4 were identified for use in the cumulative effects analysis. For the reasonably foreseeable future actions (RFFAs), it is important to note these are projections made only for the purpose of predicting future impacts. RFFAs items are assumptions for this analysis and are not part of the Proposed Action or alternatives. Inclusion in the RFFAs does not constitute a decision nor a commitment of resources.

The area considered for the cumulative effects analysis was derived from an analysis of geological characteristics of the area. The geologic report concerning the Reasonable Foreseeable Development (RFD) is on file at the Price and Moab BLM Field Offices, and the BLM State Office in Salt Lake City. However, the area considered for the cumulative effect analysis for some resources extended beyond the RFD area due to resource-specific characteristics. In the discussion of cumulative effects for each resource, the area considered for the analysis was the RFD area, unless specifically stated otherwise in the discussion.

5.2 REASONABLY FORESEEABLE FUTURE ACTIONS

The following sections describe the various reasonably foreseeable future actions considered in the cumulative effects analysis. Each description, including the identification of the action's key components and activities, reflects the amount information that was available for the analysis. Future development of previously-approved and proposed CBM projects are considered to be most likely to cause cumulative impacts, and therefore, are described and evaluated in detail. The other projects are less well defined by their proponents and, consequently, are described and evaluated in less detail. The projects evaluated for the air quality cumulative analysis were determined by the BLM in consultation with the EPA and UDAQ and are discussed in [Section 5.3.3](#).

5.2.1 Natural Gas Development

Natural gas development has occurred and is occurring in the Ferron Sandstone Member of the Mancos Shale (Ferron). Although this development primarily consists of CBM wells, some conventional natural gas also is being produced. The Price CBM Project is the primary CBM project currently being developed. The Ferron Natural Gas Project would be the second CBM project in the area. Potential also exists for additional CBM development in the Ferron in the reasonably foreseeable future (Reasonable Foreseeable Development Scenario). Consequently, natural gas development from the Ferron consists of these three components. The Price CBM Project and Reasonable Foreseeable Development Scenario are described below. The previous chapters of this EIS focus on the Ferron Natural Gas Project. **Table 5–1** shows the distribution of wells among the primary natural gas projects of the reasonably foreseeable future actions.

Table 5–1
Distribution of Natural Gas Wells Among Natural Gas Projects
Comprising the Reasonably Foreseeable Future Actions

Component	Number of Wells		Total
	Existing	Proposed	
Price CBM Project	125	396	521
Ferron Natural Gas Project			
Anadarko	15	65	80
Chandler	10	83	93
Texaco	43	137	180
Total	68	285	353
Other Wells in the Cumulative Analysis Area	12	0	12
Price CBM Project’s Reasonable Foreseeable Development Scenario	0	576	576
Ferron Natural Gas Project Reasonable Foreseeable Development Scenario	0	335	335
Total			1,797

5.2.1.1 Price CBM Project

In 1997, the Price CBM Project was approved through the BLM’s NEPA compliance process. Currently, it is in the early stages of development. The alternative selected by the BLM for the Price CBM Project includes the following level of development:

- 521 wells (**Table 5–1**);
- 313 miles of transportation corridors, which include roads, gas and water gathering pipelines/flowlines, and electrical utilities;
- 48 miles of pipelines and utility lines adjacent to existing roads;
- Five natural gas-fired compressors;
- Six disposal wells; and
- Six evaporation ponds.

The distribution of Price CBM Project's wells is shown on Plate 28 in the Price CBM Project's Final EIS and included in the reasonable foreseeable development (RFD) scenario for the Price area.

5.2.1.2 Reasonable Foreseeable Development Scenario

To define potential future development of oil and gas for this cumulative effects analysis, the BLM developed an RFD scenario for oil and gas. This RFD scenario, which is primarily based on known resources and geologic rationale, involves potential oil and gas resources within and adjacent to the Project Area. Specifically, it includes both CBM and conventional gas resources from the Ferron Sandstone Member of the Mancos Shale (Ferron). The complete RFD scenario report, which is only summarized here, is on file at BLM's Price Field Office in Price, Utah and State Office in Salt Lake City, Utah.

A potential for natural gas reserves exists throughout the entire Project Area. Because portions of the Project Area are unproven, exploratory drilling activity may be expected throughout portions of the Project Area that are undeveloped currently. All available well spacing windows within the confines of potential development, as defined in this EIS, could be occupied by potential well sites. Several of these sites would be difficult or impossible to drill due to topographic constraints and/or resource restrictions. [Plate 5-1](#) shows the distribution of potential wells that could be reasonably expected, given various restrictions and constraints. It is important to note these are projections made only for the purpose of predicting future impacts. RFD items are assumptions for the cumulative effects analysis and are not part of the Proposed Action or alternatives. Inclusion in the RFD scenario does not constitute a decision nor a commitment of resources.

An area with high potential for conventional gas resources is located in the South Area. The Ferron Fairway is an area with a high potential for CBM. Both these areas extend beyond the Project Area's boundary. Initial drilling activity is expected to concentrate in the Ferron Fairway for the first 2 to 3 years. As these areas are developed, activity could extend into areas with high potential for conventional gas reserves. Eventually, the remainder of the Project Area could be explored and possibly developed. Outside the high potential areas, a lower probability exists for conventional gas resources. These areas are untested, but have favorable stratigraphy for potential gas reserves.

A large measure of the cumulative effects analysis centers on the amount of total disturbance resulting from the future actions. [Table 5-2](#) shows the disturbance associated with the natural gas development considered in the cumulative analysis to quantify the effects analyzed for many of the resources. The long-term disturbance was gathered from the Ferron Natural Gas Project, the selected alternative of the Price CBM Project, and the RFD scenario. Disturbance associated with the RFD was based on the assumption that each well would result in a disturbance of five acres including the access roads and facilities.

5.2.2 Proposed and Potential Coal Mines

Eight coal mines were identified for inclusion in the cumulative effects analysis. They include new mines, reopened mines, and the expansion of an existing mine. The locations of these mines are shown on [Figure 5-1](#). Five mines are along the Book Cliffs north and east of the Project Area, two are located northwest of the Project Area, and one is located immediately adjacent to the western edge of the South Area. Available information about each mine is summarized below:

**Table 5–2
Cumulative Impacts Disturbance for Natural Gas Activities**

Component	Number of Wells	Long-Term Disturbance (acres)	Project Area Size (acres)	Portion of Project Area Disturbed (percent)
Ferron Natural Gas Project Alternative 1	353	763	111,520	0.68
Ferron Natural Gas Project Alternative 2	335	678	111,520	0.61
Ferron Natural Gas Project Alternative 3	222	367	111,520	0.33
Price CBM Project	521	1,519	188,242	0.81
RFD	923	4,615	299,762	1.53
Total with Ferron Alternative 1	1,797	6,897		2.30
Total with Ferron Alternative 2	1,779	6,812		2.27
Total with Ferron Alternative 3	1,666	6,501		2.17

5.2.2.1 Willow Creek Mine

The Willow Creek Mine would be a new underground mine constructed adjacent to the site of the closed Castlegate mine. Cyprus Plateau Mining Company is operating the mine currently. Construction of the mine would disturb about 20 acres of privately-owned lands. Existing roads provide access to the mine site from Highways 6 and 191. No new employment is expected because workers would transfer from the Companies' other mines.

5.2.2.2 Dugout Canyon Mine

The Dugout Canyon Mine would be a new mine constructed by the Soldier Creek Mining Company. This underground mine, which would require the construction of eight miles of new access road, would disturb approximately 140 acres for the road and ancillary facilities. About ten acres would be disturbed for the mine. The surface land ownership is private. Access roads would consist of existing state roads with new access roads across federal lands and private property. No new employment is expected because workers would transfer from the Company's other mine.

5.2.2.3 C Canyon Mine

The proponent is the Anadlex Resources, Inc.. This underground mine would require 3.5 miles of upgraded access road disturbing approximately 62 acres. An estimated ten acres would be disturbed for the mine. No new employment is expected because workers would transfer from the Company's other mine. The surface land ownership is a mixture of public land managed by BLM and fee lands.

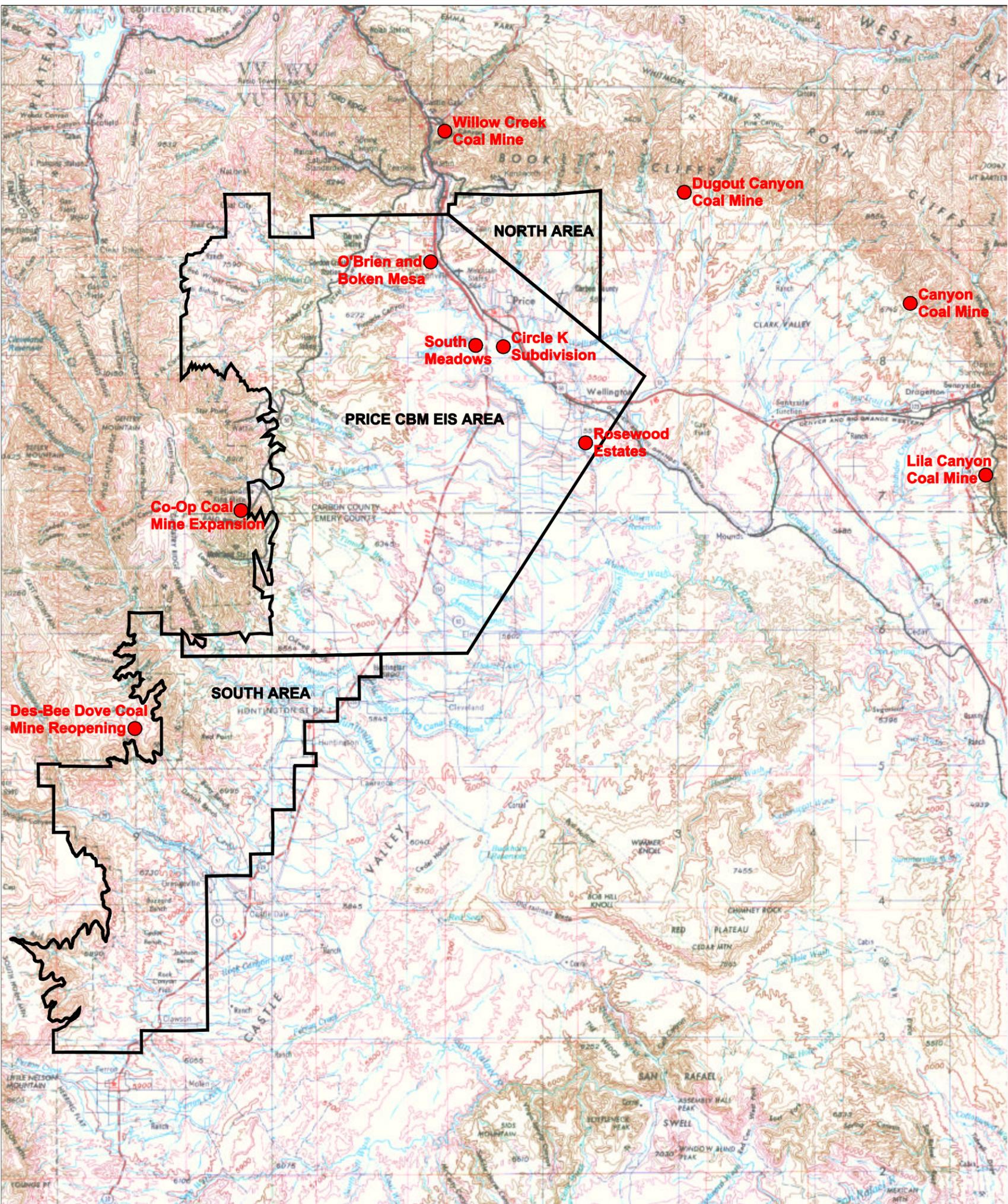


Figure5-1
Cumulative Analyses Locations

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5.2.2.4 Horizon Mine

The proponent is the Horizon Coal Corporation. This underground mine currently has an access road. Approximately 10 to 20 acres would be disturbed for the mine. Approximately 40 to 50 new employees would be hired. The surface land ownership is private.

5.2.2.5 Lila Canyon Mine

This new underground coal mine would be on the property of the Horse Canyon Mine, which closed around 1984. The case lease is still valid and ROW applications have been submitted. However, no mine plan has been submitted. If this mine were to become active again, it is assumed that approximately 20 to 30 acres of the former mine site would be redisturbed, approximately 70 to 80 employees would be hired, and the existing roads would be upgraded. The surface land ownership is federal.

5.2.2.6 Columbia Mine Reopening

This new mine would be on the property of the Sunnyside Mine. Although a mine plan has not been submitted, ROW applications have been submitted. Coke ovens may be built, however, not specific plans have been submitted. If this mine proceeds, approximately 70 to 80 employees would be hired.

5.2.2.7 Des-Bee Dove Mine Reopening

This mine would be located between the Cottonwood/Wilberg and the Deer Creek Mine, both located on the western edge of the South Area. However, there is no information currently submitted for this coal mine.

5.2.2.8 Co-op Mine Expansion

This mine would be located on the Moreland leases near Hiawatha and would be an expansion of the existing mine. However, no proposal has been submitted.

5.2.3 Other Proposed and Potential Mines

5.2.3.1 Chalk Hills Mine

Gypsum Resource Development has a 5-acre, inactive gypsum mine east of Castle Dale approximately 12 miles, in Emery County.

5.2.3.2 BJ Mine

Diamond K actively operates this 71-acre gypsum mine located approximately 12 miles east-southeast of Ferron, Utah, in Emery County. Three workers produce 20,000 to 30,000 tons per year.

5.2.3.3 Eagle Canyon Mine

Georgia Pacific Corporation is producing approximately 60,000 tons per year of gypsum with a workforce of six. The site has disturbed approximately 30 acres and is located south of Ferron, Utah approximately 12 miles.

5.2.3.4 Kimball Draw Mine

U.S. Gypsum has proposed a 107-acre disturbance associated with a gypsum mine approximately 18 miles south and 6 miles east of Ferron, Utah, in Emery County. An EIS is in progress.

5.2.3.5 San Rafael Desert Mine

Sutherland Brothers have an intermittently active one-acre property which produces less than 500 tons per year of gypsum using a workforce of two. The site is located approximately 24 miles southeast of Ferron, Utah, in Emery County.

5.2.3.6 Lone Tree Wedge (Hebe) Mine

Western Clay produces approximately 20,000 tons of gypsum per year from a 5-acre site operated by four workers. The site is located approximately 24 miles south of Ferron, Utah, in Emery County.

5.2.3.7 Last Chance Mine

Western Clay has a clay mine located approximately 6 miles southwest of the Lone Tree Wedge Mine, and 30 miles south of Ferron, Utah, in Emery County. This operation produces approximately 20,000 tons of clay per year using a workforce of three, on four-to-five acres.

5.2.4 Community Expansion

Seven subdivisions in or near the EIS Project Area have been approved in Carbon County, but have not yet been developed. Available information provided by Carbon County Building and Planning Department about these areas is presented below.

- **Rosewood Estates.** South of Wellington. Approved in 1996. Nine lots, 65 acres.
- **Circle K Subdivision Phase IIIA.** South of Price. Approved in 1996. 17 lots, 28 acres.
- **South Meadows.** South of Price. Approved in 1996. Plat A: nine lots, 13 acres. Plat B: 27 lots, 30 acres.
- **Leavitt's.** Near Price. Approved in 1996. Eight lots, 40 acres.
- **Westwood Phase IIIA.** Near Price. Approved in 1982. Six lots, 25 acres.
- **Broken Mesa.** Near Price, Approved in 1995. Nine lots, six acres.
- **O'Brien.** Near Price. Approved in 1996. 12 lots, two acres.

5.2.5 Logging

Logging could take place in the future on state and private land near the EIS Project Area. Potential logging areas that could impact resources also affected by the Price CBM Project include: private, state, and federal lands on the Wasatch Plateau west of Hiawatha and Wattis (headwaters of Cedar and Miller Creeks); private and state lands northwest of the EIS Project Area (headwaters of the North Fork of Gordon Creek); and private and state lands north of the EIS Project Area within the watershed of the Price River.

5.2.6 Narrows Dam Project

The U.S. Bureau of Reclamation has prepared a Draft EIS on this proposed project. The purpose of the project is to develop an additional supply of municipal water to support population growth in north Sanpete County, Utah. The proposed Narrows Dam would be located in the Upper Price River drainage basin between the lower Gooseberry Reservoir and the Fairview Lakes. The reservoir capacity would be approximately 17,000 acre-feet, and the project would divert 5,400 acre-feet per year from the Price River basin to the San Pitch River basin. This would create an average annual depletion in the Price River drainage of approximately 5,709 acre-feet per year. The project sponsor, Sanpete Water Conservancy District, is applying for financing for the Narrows Project under the Small Reclamation Projects Act of 1956, as amended (personal communication with Bureau of Reclamation, July 1998).

5.3 RESULTS OF CUMULATIVE EFFECTS ANALYSIS

The following sections describe the results of the cumulative effects analysis conducted for the alternatives considered in this EIS. The discussions of individual resources follow the same order as chapters 3 and 4.

5.3.1 Geology and Minerals

Except for the removal of natural gas and conflicts with coal leases, no cumulative effects on geology and minerals were identified for any of the Ferron Natural Gas Project alternatives. Up to 4.3 trillion cubic feet (RCF) of natural gas could be recovered under the RFD. Certain RFD wells would overlay mineable coal resources. Any future drilling would require resolution of the conflict prior to approval of the drilling.

5.3.2 Water Resources

The cumulative effects analysis for water resources consisted of a review of changes in water quantity, water quality, and uses within the cumulative effects area of Carbon and Emery counties.

5.3.2.1 Water Supply and Use

Water resources in Carbon and Emery counties are used for irrigation, domestic, and industrial uses. Land uses in the cumulative effects area include cropland, range, residential, fossil fuel development, mining, and logging. Fossil fuel development includes coal bed methane, coal mining, and conventional oil & gas production. There are fourteen underground coal, six gypsum, one bentonite, one uranium, and multiple gravel mines in Carbon and Emery counties. Additional water consumption includes the recharge of wetland and alluvial aquifers.

The USGS analyzed water consumption in hydrologic basins throughout the country in 1990 (USGS 1998a and 1998b). Data from the San Rafael and Price River Basins (**Table 5-3**) confirm data from the Utah Division of Water Resources described earlier in Chapter 3. Most water use is derived from surface water and irrigation is the predominant use of water in Carbon and Emery counties, accounting for 130.74 mgd or 64 percent of the 202.3 mgd of water consumed. Approximately 1,670 acres are spray irrigated and 39,110 acres are flood irrigated in the two basins. Evaporation from reservoirs in the two basins accounts for 9.7 mgd, if averaged over the entire year. Consumption by the coal fired power plants accounts for 62 mgd or 31 percent of the water. Domestic supply is responsible for 6.84 mgd or 3.3 percent of the water.

Table 5–3
Water Use in the San Rafael and Price River Basins, Utah

Use	Surface Water (mgd)	Groundwater (mgd)	Total (mgd)
Irrigation	130.74		130.74
Reservoir Evaporation	9.7		9.7
Fossil Fuel Thermoelectric Power Use	62.02	0.78	62.8
Public Supply	2.82	3.66	6.48
Self-supplied Domestic Use	0.08	0.25	0.33
Mining	0	1.55	1.55
Stock Watering	0.25	0.01	0.26
Total	196.04	6.25	202.29

Source: USGS 1998a and 1998b

Natural gas development would consume water through construction needs. Consumption of water during construction would shift a minor quantity of water (less than 50 acre feet annually for five years) from irrigation to industrial purposes. The Price CBM Project estimated about 45 acre feet would be consumed annually over a ten-year construction period, or 0.039 mgd.

The Ferron Natural Gas Project would generate a maximum of 3.4 mgd produced water (1.9 mgd average), assuming a minimum 100 bwpd produced water per well through the lifetime of the project. The Price CBM Project would generate a maximum of 4.1 mgd. Using a similar relationship as observed in the Ferron Natural Gas Project, Price CBM Project wells would generate 2.3 mgd on average. This water is being pumped from the Ferron Sandstone aquifer and the majority is disposed into the deeper Navajo aquifer and some is evaporated.

There is a potential for cumulative impacts on the water resources of the Ferron Sandstone from dewatering associated with gas development. As identified in **Table 5–1**, there could be 1,797 production wells under the RFD scenario. It is difficult to calculate the volume of water that would be produced from individual wells under this scenario due the combined drawdown effect between two or more wells, and the unsteady water production rate during a well's lifetime. However, assuming similar water production rates as anticipated for the Proposed Action, the volume of water withdrawn from the Ferron coals would increase proportionally with the number of wells. The maximum peak water production has been estimated to be 424,500 BWPd. As discussed in **Section 4.2.1.1.1**, the poor water quality and depth of the Ferron Sandstone renders the water within it uneconomical for most uses. Therefore, the cumulative production of water from the Ferron Sandstone is not considered a significant impact to the quantity or quality of the water in the coal seams.

The risk of causing water quality degradation in the non-potable portions of the Navajo-Nugget Aquifer as a result of injecting produced waters is considered to be low if all the proposed and reasonable foreseeable projects were developed. Negative impacts to the water quality within the Navajo-Nugget aquifer are not expected to occur since the quality of the injected water is typically much better than that of the Navajo-Nugget Aquifer.

Disposal of the waters resulting from coal seam dewatering has the potential to impact the water resources of the Navajo-Nugget Aquifer. Assuming all of the 1,779 RFD wells would be drilled, upwards of 42 disposal wells may be necessary to handle the maximum peak water production. If each of these injection wells would carry an average of 10,000 BWPD, and they are all equally distributed in the immediate vicinity of the Project Area, then no adverse cumulative impacts to the water quality of potable portions of the Navajo-Nugget aquifer would be anticipated. This aquifer is not an important water source in the EIS Project Area because of its poor water quality and great depth.

Coal mines either dewater their mines or pump water into closed portions of the mine. The coal mines in the Wasatch Plateau and Book Cliffs coal fields mine coal in the Blackhawk formation, which, stratigraphically, is several thousand feet higher than the Ferron. Any water discharged from these mines add slightly to surface water resources.

The limited amount of ground water used for domestic and public supplies is derived from alluvial aquifers. The Ferron Sandstone water is too saline to be used for domestic purposes and is too deep throughout most of Carbon and Emery counties for use to be economical. However, there are some wells completed in the Ferron near the outcrop that may be used for watering stock.

Applied Hydrology Associates (AHA 1998) modeled the decrease of the water level in the Ferron Sandstone from CBM dewatering of Ferron Natural Gas Project and Price CBM Project wells. Water wells completed in the Ferron Sandstone on or immediately west of the outcrop will exhibit lower water levels. The outcrop is located approximately five miles east of the eastern boundaries of the Project Area. The report is available at the Price BLM Field Offices and the BLM State Office in Salt Lake City. Projected drawdowns at observation wells along the outcrop would range from 6.6 to 77 feet after 20 years of operation in the Ferron Natural Gas Project and an additional five years in the Price CBM field (Year 26). Drawdown would increase with distance from the outcrop. A review of potential ground water right filings from the Utah Department of Water Resources Division of Water Rights identified five wells which could be producing water from the Ferron Sandstone and which could exhibit drawdowns from the Ferron Natural Gas Project and Price CBM projects. Additional site specific information on these wells is needed. Additional drilling of natural gas wells as identified in the RFD could generate additional drawdowns. Any drawdown would be a significant impact to individual users.

The modeling also showed that while the water table would be lowered, pumping reduced the steady state outflows from the Ferron Sandstone nine percent from the steady state condition at the Ferron Outcrop after 20 years of production. Thus, dewatering would not result in significant impacts to overall surface and ground water resources.

5.3.2.2 Water Quality

Disposal of Ferron Sandstone produced water into the Navajo-Nugget would yield a slightly less briny water quality in the Navajo. Negative impacts to the Navajo-Nugget water quality are not anticipated as the quality of the injected water would be much better than that of the Navajo-Nugget. The Navajo-Nugget aquifer is not an important water source in RFD scenario area due to its poor water quality and great depth.

Sediment and salinity would increase immediately downstream of any surface disturbance. Existing disturbances within the two counties consist of more than 3,000 acres dirt and gravel roads, 1,670 acres of cropland (assuming all spray irrigated lands are croplands [USGS 1998a and 1998b]), 5,767 acres of CBM disturbance (2,050 acres from the Ferron Natural Gas Project, 3,717 acres from the Price CBM Project),

1,735 acres associated with other oil and gas activity (RFD Scenario), 700 acres for underground coal mines (approximately 50 acres per mine for 14 mines), and an unknown acreage associated with housing.

Carbon and Emery counties are largely unvegetated and yield an erosional landscape due to low precipitation, steep slopes, and/or the presence of unproductive shale-based soils. Estimates of sediment loss have been developed, but they are backed up by numerous assumptions and yield widely varying values. Estimates were calculated for sediment loss (BLM 1997c) of 16.8 tons per acre per year for the Price CBM area. Sediment loss from the Ferron Natural Gas Project would be 10.7 tons per acre per year. It is assumed that sediment loss from the remaining 923 RFD scenario wells would be midway between the Ferron and Price Projects, or about 13.7 tons per acre per year. The average sediment loss of 13.7 tons per year per acre would slightly exceed the maximum naturally occurring rate of 12 tons per acre per year. Similar estimates are not available for croplands, rangelands, coal mines, and housing. However, all drainage from coal mine facility disturbances must pass through a siltation reservoir prior to discharging, thereby limiting the sediment contributions from coal mines.

The 1994 305B report (UDEQ 1995) indicates the Price and San Rafael Basins had use attainment limitations associated with total dissolved solids (TDS) and irrigation. Irrigation of saline soils results both in increased levels of TDS in the return flows as well as lower vegetative productivity for the irrigated fields. Estimates of salt production have also been made for oil and gas projects, but they share the weaknesses identified for the sediment loss analyses. Salt loss was estimated at between 0.31 tons per acre per year for Price CBM Project (BLM 1997c) and 0.30 tons per year for the Ferron Natural Gas Project. It can be assumed that the additional RFD wells would experience similar salt delivery rates. The average rate of 0.3 tons per acre per year is within the upper limit of the naturally occurring rate of 0.51 tons per acre per year. Therefore, it can be concluded that the cumulative effect should not have any net change on effects on the Colorado River Basin salinity levels.

5.3.2.3 Future Developments

The Price CBM EIS (BLM 1997c) identified two probable projects that could influence surface water supplies in the area. Community expansion of as many as 70 new lots could result in additional consumption of 0.024 mgd of potable water for domestic purposes or less than 0.4 percent of total domestic use in Carbon and Emery counties. The U.S. Bureau of Reclamation's Narrows Project Alternatives describe a transbasin diversion of 4,935 to 5,400 ac-ft of water per year from Gooseberry Creek and the northern portion of the Price river watershed to Cottonwood Creek and the central portion of the Price River watershed for the Narrows Dam.

The Price CBM EIS (BLM 1997c) also suggested that future logging on state and local lands in the headwaters of the Price River basin could yield elevated sediment and TDS levels immediately following logging. These impacts would be short to medium in term prior to revegetation, and would be minimized by BMPs to reduce sediment: the use of buffer zones next to streams and the use of culverts at road crossings. No information was available on the extent of logging.

Additional coal mines are likely. Discharges would also flow into the Price and San Rafael basins. These mines are anticipated to have similar minimal impacts to those described earlier.

5.3.3 Air Quality

5.3.3.1 Cumulative Impact NO_x Sources

The cumulative impact analysis of air quality within and near the Project Area includes the major sources of NO_x, the only significant pollutant associated with the Ferron Project. The sources include the Hunter, Huntington and Carbon County coal-fired power plants, the Hiawatha co-generation facility, the Carbon County co-generation facility, the Sunnyside co-generation facility, the Questar Dew Point plant, the approved Price CBM natural gas-fired compressors, the Questar Amine Carbon Dioxide Removal Plant, and the proposed Ferron natural gas-fired compressors. The cumulative sources are the same as those used in the Price CBM EIS cumulative analysis with the added effect of the Ferron Project and the Questar Amine Plant. The NO_x sources are described below and the location and emissions of these facilities are shown on **Table 5–4**. Sources other than the Price CBM and Ferron compressors contribute 97.4 percent of the NO_x emissions in the vicinity of the Project Area. The proposed Ferron compressors would contribute only 1.2 percent of the NO_x emissions in the area.

- The five natural gas-fired Price CBM compressors would emit 755 tpy of NO_x, an amount 113 percent greater than the total of the Ferron compressors.
- The Hiawatha co-generation project is currently comprised of the American Syngas project and the Carbon County co-generation project. These projects result in an NO_x emission rate of 191 tons per year (tpy) that is 29 percent of the Ferron compressors combined.
- The Questar Pipeline Dew Point Plant is an existing compressor station on Questar’s natural gas transmission line, and is a relatively small source of NO_x emitting 50 tpy.
- The Sunnyside Co-generation is an existing co-generation project that emits 765 tpy, or an 115 percent of the Ferron compressors combined.
- The PacifiCorp Hunter, Huntington, and Carbon Plants are coal-fired electric generating stations that contribute 96 percent of the NO_x emissions considered in the cumulative impact analysis.
- If the RFD of additional wells were to reach its full potential, additional compressor units would be required. The present uncertainty of the number of compressors, type, location, air pollutant emissions, etc. is too speculative to justify an air quality analysis at this time. The impact of additional compressors would have to be evaluated in the future if development increases above those levels that have been analyzed in the Proposed Action. Given the air quality impacts identified in the analysis of the Proposed Action and the recommended mitigation, it is highly likely that additional development under the RFD would cause additional air quality and visibility impacts.

5.3.3.2 Cumulative Impact Air Quality Modeled Results

The cumulative effects to air quality were modeled in the same manner as described in the Proposed Action. The modeled concentrations to the area NO₂ background of 17 μg/m³. As shown on **Plate 5–2**, the maximum annual NO₂ ambient concentration would be 60.7 μg/m³ the Huntington Power Plant in T17S R7E Section 1. By far, the largest impact areas would be on elevated terrain east and south of the Huntington Power Plant. If other compressors would be required under the RFD scenario, it is unlikely that they could be added without violation of the NO₂ NAAQS for the Project Area and surroundings. Further NEPA analysis would be required, and the operators would be required to individually obtain construction and operating permits

Table 5–4
NO_x Emissions in the Cumulative Impact Analysis Area

Facility	Location	Emission Rate (g/s)	Annual emissions (tons)
Price CBM Compressor D1	T14S R8E S2	2.42	83.8
Price CBM Compressor F1	T14S R8E S27	2.42	83.8
Price CBM Compressor E1	T14S R9E S32	7.25	251.7
Price CBM Compressor B1	T16S R9E S2	4.83	167.8
Price CBM Compressor C1	T16S R9E S16	4.83	167.8
Hiwatha Co-Generation Project	T16S R8E S34		
American Syngas			
Main Stack		2.69	93.4
Generator		0.04	1.4
Carbon County Co-Gen	T13S R9E S1		
Main Stack		2.77	96.2
PacifiCorp Carbon Plant			
Plant #1		64.64	2,245.0
Plant #2		90.72	3,150.8
PacifiCorp Hunter Plant	T19S R8E S16		
Plant #1		411.01	14,274.9
Plant #2		287.71	9,992.5
Plant #3		339.57	1,179.7
PacifiCorp Huntington Plant	T17S R7E S1		
Plant #1		412.78	14,336.4
Plant #2		257.1	8,929.4
Questar Dew Point Plant	T14S R13E S12		
Compressor Engine		1.45	50.4
Sunnyside Co-Generation	T15S R14E S6		
Boiler		22.05	765.8
Ferron Total			664.4
Area Total			56,535.2

from the UDEQ. Comparison to the PSD Class II NO₂ increment is not appropriate because of a mix of non-increment consuming sources, complex terrain, assumed conservative emission source parameters, and screening-level modeling procedures. All NEPA analysis comparisons to the PSD Class I and II increments are intended to evaluate a threshold of concern, and do not represent a regulatory PSD Increment Consumption Analysis. The determination of PSD increment consumption is a regulatory agency responsibility conducted as part of the New Source Review process, which also includes a PSD Class I Federal Land Management Agency's evaluation of potential impacts to Air Quality Related Values (AQRV) such as visibility, aquatic ecosystems, flora, fauna, etc. The review would be conducted by the Utah Department of Environmental Quality when the Companies apply for construction and operating permits.

The cumulative NO_x emission sources were also modeled and compared to Class I PSD increments at the closest boundary to the Canyonlands, Arches, and Capitol Reef National Parks. The Class I NO₂ increment is 2.5 µg/m³. The highest annual NO₂ concentrations would be 1.05 µg/m³ at the Canyonlands and Arches National Parks, and 1.57 µg/m³ at Capitol Reef National Park. By far, most of this impact results from the power plants near the Project Area and not the Ferron Project compressors. For comparison, the impacts resulting from only the Ferron Project at these Class I airsheds were 0.041 µg/m³ at Canyonlands and Arches and 0.062 µg/m³ at Capitol Reef.

5.3.3.3 Regional Haze Near-Field Cumulative Impacts

The cumulative effect on regional haze considered the effects of compressor emissions from of the Ferron Natural Gas and Price CBM Projects. The analysis procedure was the same as for the Proposed Action regional haze analysis. With the Price CBM compressors added to the Ferron compressors, the regional visual range is predicted to be reduced by at least 10 percent on 11 days. However, there is no visibility standard for this location.

5.3.3.4 Regional Haze Far-Field Class I Cumulative Impacts

The cumulative effect on regional haze at the three National Parks considered the effects of compressor emissions from of the Ferron Natural Gas and Price CBM Projects because these would be the two new developments since the visibility baseline data in 1995. The procedure was the same as the Proposed Action regional haze analysis for Class I airsheds. The cumulative effect, when all compressors would be fueled by natural gas from the operating wells and operating at maximum capacity, would be that standard visual range would be reduced more than 10 percent on 11 days at Capitol Reef and two days at Canyonlands. The visual reduction would be less than 10 percent on all other days considered in the air quality analysis. Therefore, it can be concluded that the cumulative effect of the Ferron Natural Gas Project with the Price CBM Project would result in a significant impact on the visibility at Capitol Reef National Park because of its closer proximity to the Project Area.

5.3.3.5 Mitigated Cumulative Impacts

Because of concerns raised by public comment concerning adverse visibility impacts at Class I areas under the Proposed Action and Alternative 2, this section analyzes the cumulative air quality and visibility impacts that would be associated with two options for Ferron Natural Gas Project and Price CBM Project compressors. The first option is compressors with lower emissions rates and more realistic exhaust parameters. The second option, similar to the second option of the Proposed Action, analyzes air quality impacts if all compressors would be electrically powered. Obviously, if all electric compressors would be constructed and operated for the Ferron Natural Gas Project, there would be no direct cumulative air quality or visibility impacts resulting from the Ferron Natural Gas Project. Therefore, the rest of this section discloses the reduced cumulative impacts that would occur with lower emission rates and more refined exhaust parameters.

5.3.3.5.1 Compressor Emissions

The compressor emissions and stack parameters used in the mitigation analysis are fully described in [Section 4.3.3.2](#). The actual engine configuration would be based on specific data once the actual engine configuration is selected and would conform to BACT based upon the UDEQ Approval Order. These emission levels are analyzed for this mitigation because they are attainable in the industry and would

significantly reduce potential impacts to visibility at Class I areas as well as significantly reduce ambient air concentrations of pollutants near proposed compressor locations. Based on these operating parameters, the NO_x emissions from the 12 proposed Ferron Natural Gas Project compressors would be 232 tons per year (or 35 percent of the Proposed Action emissions), and the total emissions from the Price CBM Project compressors would be 264 tons per year, as shown in **Table 5-5**.

Table 5-5
Cumulative NO_x Mitigated Emissions from Compressors

Company	Compressor Rating (HP)	Number of Compressors Locations	Total Compression (HP)	NO_x and CO Emissions	
				lbs/hour	tons/year
Anadarko	3,400	6	20,400	31.46	124.1
Texaco	4,000	3	12,000	18.50	72.9
Chandler	2,200	2	4,400	6.78	29.7
	850	1	850	1.31	5.7
Ferron Total		12	37,650	58.05	232.4
Price CBM D1	5,100	1	5,100	6.71	29.4
Price CBM F1	5,100	1	5,100	6.71	29.4
Price CBM E1	15,300	1	15,300	20.1	88.0
Price CBM B1	10,200	1	10,200	13.4	58.7
Price CBM C1	10,200	1	10,200	13.4	58.7
Price CBM Total		5	45,900	60.32	264.2
Cumulative Total		17	83,550	118.37	496.6

5.3.3.5.2 Cumulative Modeled Impacts

NO_x and CO emissions from each compressor station under the mitigation were modeled using both the 1986 and 1987 Clawson meteorological data and compared to the Class II PSD increments and the NAAQS. The modeled concentrations were multiplied by a factor of 0.75 to represent the conversion of total NO_x to NO_2 . The concentration contours are shown on **Plate 5-3**. The maximum concentrations for both pollutants were slightly higher using the 1986 data. Using the 1987 meteorological data, the highest NO_2 annual concentration with the $17 \mu\text{g}/\text{m}^3$ background would be $75.9 \mu\text{g}/\text{m}^3$, a value 75.9 percent of the annual NAAQS. This maximum concentration would occur on elevated terrain near the Huntington Power Plant located in T17S R7E Section 36. The second highest concentration would be $44.2 \mu\text{g}/\text{m}^3$ at the same location. Using the 1986 meteorological data, the highest NO_2 annual concentration with the $17 \mu\text{g}/\text{m}^3$ background would be $60.3 \mu\text{g}/\text{m}^3$, and the second highest concentration would be $56.4 \mu\text{g}/\text{m}^3$. This maximum concentration would occur on elevated terrain near the Huntington Power Plant located in T17S R7E Section 36.

Comparison to the PSD Class II NO₂ increment is not appropriate because of a mix of non-increment consuming sources, complex terrain, assumed conservative emission source parameters, and screening-level modeling procedures. All NEPA analysis comparisons to the PSD Class I and II increments are intended to evaluate a threshold of concern, and do not represent a regulatory PSD Increment Consumption Analysis. The determination of PSD increment consumption is a regulatory agency responsibility conducted as part of the New Source Review process, which also includes a PSD Class I Federal Land Management Agency's evaluation of potential impacts to Air Quality Related Values (AQRV) such as visibility, aquatic ecosystems, flora, fauna, etc. The review would be conducted by the Utah Department of Environmental Quality when the Companies apply for construction and operating permits. Based on the results of cumulative air quality modeling with mitigation, it can be concluded that no adverse impacts on air quality would occur.

5.3.3.5.3 Cumulative Near-Field Visibility Modeled Impacts

The visibility analysis for the mitigation used the same methodology as for the Proposed Action. Using the modified method, the standard visual range (SVR) in and near the Project Area would not be reduced by more than ten percent on any day using both the 1986 and 1987 meteorological data. Therefore, it can be concluded that the cumulative sources with mitigated emission source parameters would have no effect on the regional haze in the vicinity of the Project.

5.3.3.5.4 Cumulative Far-Field Class I Visibility Modeled Impacts

The IWAQM screening method along with modifications by the Utah Department of Environmental Quality was used to evaluate effects on regional haze at Canyonlands, Arches and Capitol Reef National Parks. Based on this method when using the 1986 meteorological data, the modeled 24-hour NO_x concentrations at the Class I areas, the regional haze reduction would exceed 5 percent on two days at Capitol Reef National Park and one day at Canyonlands. The visibility would not be reduced more than ten percent at any time. When using the 1987 meteorological data, the regional haze reduction would be more than 5 percent on 14 days at Capitol Reef and 10 days at Canyonlands. The visibility is predicted to be reduced by ten percent or more on five days at Capitol Reef and one day at Canyonlands.

The slight exceedance using the conservative IWAQM screening analysis represents the potential effect at Capitol Reef and Canyonlands if the full development would occur. The analysis demonstrates that there may be a minor impact to visual resources at Capitol Reef and Canyonlands if all the natural-gas fired compressors from the Ferron Natural Gas and Price CBM Projects would be permitted and operated at mitigated levels. Further analysis of potential visibility impacts may be required by the Utah Division of Air Quality in the future when Approval Order applications are submitted. Because there is a slight potential of adverse visibility impacts at Class I areas, there may be an upper level of gas-fired development approved by the Utah Division of Air Quality. Therefore, considering that the Ferron Natural Gas Project is considering the installation of 12 compressor stations and the Price CBM Project is considering five compressors, but higher horsepower, any compressor proposed beyond an upper level may be disapproved or have to be electrically powered.

5.3.4 Soils

The cumulative impact analysis for soils resources includes the Price River Coal Bed Methane project, the proposed Ferron Natural Gas project and potential future developments in both project areas. The projects have or would disturb soils with similar characteristics as those in this EIS project area. Therefore impacts to soils would be similar to those described in [Section 4.4](#), but the magnitude would be greater. Long-term

impacts include removal of vegetation, exposure of soils, mixing of soil horizons, breakdown of soil structure, reduction of soil productivity, increased runoff, erosion, off-site sedimentation/salinity, and difficulty with reclamation.

A high percentage of soils in the area are classified as critical and are susceptible to erosion. The soils also tend to be saline. Many of these soils also exhibit an unsuitable reclamation potential and would require many growing seasons and multiple efforts to reseed and successfully generate a vegetative cover similar to existing conditions.

The rigorous implementation of erosion control measures and effective reclamation would reduce potential impacts to soils resources. The same environmental protection measures and mitigation to control erosion and soil loss as discussed in [Sections 4.2](#) (Water Resources), [4.4](#) (Soils), and [4.17](#) (Reclamation) would have to be applied at a much larger scale. These protection measures should bring erosion and salt delivery to within the range of natural rates for the area.

If all of the proposed and reasonably foreseeable development would occur within and near the Price CBM and Ferron Natural Gas Projects, the total long-term disturbance would be 6,897 acres. Development of all potential wells would not be likely to result in cumulative effects to regional soils. Much of the area is Federal lands and would be subject to requirements for erosion control and reclamation. In addition, development would affect a relatively small portion of the land within the RFD area and impacts would be dispersed throughout. Ongoing and potential projects would affect only about 3 percent of the area.

5.3.5 Vegetation

Implementation of all three alternatives would minimally contribute to cumulative effects to vegetation in the analysis area. Only projects that would occur within the North Area or South Area would generate effects that would overlap in time or space with the effects generated by the three alternatives considered in this EIS. Because few projects have been identified that would disturb vegetation within the North Area or South Area, little potential exists for the effects of these projects to contribute to each other cumulatively. The projects that may contribute effects cumulatively with the Ferron Natural Gas Project include the RFD Scenario, Des-Bee Dove Mine Reopening.

Cumulatively, the Ferron Natural Gas Project, RFD Scenario, and Des-Bee Dove Mine Reopening would combine to disturb an additional 3,785 acres of vegetation types within the Project Area, which is about 3.4 percent of the 111,781 acres of the combined Project Area and pipeline corridor. The Ferron Natural Gas Project would contribute almost half of 3,785-acre total disturbance.

Although the projects would ultimately disturb about 3,785 acres of vegetation types in the Project Area, the total acreage would not all be disturbed simultaneously, because the projects would not be constructed simultaneously. Thus, some of the disturbed acreage would be reclaimed or would be in the process of being reclaimed when new disturbances are initiated. As a result of interim reclamation that would occur upon completion of drilling, the total areal extent of simultaneous, long-term disturbance would probably be about 763 acres under alternatives 1 and 2. Implementation of Alternative 3 would result in total long-term disturbances of almost 370 acres.

Three minor, but unquantifiable, impacts would occur to the vegetation resources from the cumulative natural gas scenario. Dust generated from construction activities would slow the photosynthesis process by the deposit of dust on plants. This effect would be somewhat mitigated by the State of Utah requirement to apply

dust reduction techniques, described in Chapter 4, to reduce dust during construction activities. The dust would also make the forage less palatable to livestock, and they may utilize the dust covered vegetation less. A third factor would be the potential import and spread of noxious weeds around project activities. The proposed plans of the natural gas developers to control noxious weeds around their facilities would help to alleviate the spread of noxious weeds. If these plans and procedures would be applied to all natural gas development in the future, the impact of noxious weeds would be minimized.

5.3.6 Riparian Areas

Implementation of the three alternatives considered in this EIS would contribute minimally to cumulative effects in the Project Area. As with vegetation, only projects that would occur within the North Area or South Area and would affect riparian vegetation would generate effects that would overlap in time or space with the effects generated by the three alternatives considered in this EIS. A review of the RFFAs suggests only the RFD Scenario has components that may affect riparian areas. Thus, the RFD Scenario may contribute effects cumulatively with the Ferron Natural Gas.

Although at least some disturbance to riparian areas from roads appears likely under the RFD Scenario, locations of potential roads are unknown. Thus, no specific quantitative estimation of disturbances can be made. However, development of the RFD Scenario likely would parallel the Ferron Natural Gas Project. Consequently, it is estimated that 15 to 20 acres of riparian areas would be disturbed.

5.3.7 Wildlife

5.3.7.1 Aquatic Species

Direct, indirect, and cumulative effects on aquatic species primarily originate from changes in stream flow and sedimentation. As discussed under the water resources and aquatic species sections of Chapter 4, direct and indirect effects to water quality and aquatic species would be minor and limited to segments of streams immediately downstream of the proposed crossings. Additionally, the cumulative effects analysis for water resources suggests the combination of direct and indirect effects to surface waters (changes in flows or sedimentation) from the RFFAs would not be perceptible cumulatively (over the long term in particular). Because the primary direct, indirect, and cumulative effects to the quality and quantity of surface waters would be minor and localized, the combination of effects from the projects comprising the RFFAs is not expected to generate perceptible cumulative effects to the aquatic species resource.

5.3.7.2 Terrestrial Wildlife

The primary cumulative effects of concern are the loss and fragmentation of winter ranges for mule deer and elk. The RFFAs occur within the two mule deer herd units and one elk herd unit the Ferron Natural Gas Project would affect. Thus, the effects of these projects on mule deer and elk winter ranges would compound cumulatively. Additionally, illegal harvests of deer and elk are expected to increase cumulatively with implementation of the RFD scenario.

The primary projects of concern for mule deer and elk winter ranges are the Price CBM Project, Ferron Natural Gas Project, and the natural gas development comprising the RFD Scenario. The other projects comprising the RFFAs would have minor or no cumulative effects on these winter ranges because they would involve limited amounts of winter range, if any.

As shown on **Table 5–6**, at least most 65,300 acres of winter range (crucial and high value) for mule deer would be disturbed cumulatively. Most of this disturbance (almost 55,224 acres) would occur in the Manti-Nebo mule deer herd unit. UDWR has identified about 1,063,573 acres of winter range within the Manti-Nebo mule deer herd unit. Thus, the RFFAs would cumulatively affect about 5 percent of the winter range delineated in the Manti-Nebo mule deer herd unit.

Table 5–6
Summary of Cumulative Effects to Mule Deer Winter Range

Project	Crucial Winter Range		High Value Winter Range		Total Winter Range (acres)
	Direct (acres)	Indirect (acres)	Direct (acres)	Indirect (acres)	
Price CBM	1,272	10,005	886	9,525	20,416
Ferron					
North Area	164	2,819	65	1,416	4,300
South Area	500	7,533	390	5,972	13,895
Total	664	10,352	455	7,388	17,740
RFD Scenario					
North Area	201	3,983	107	2,124	6,214
South Area	563	11,151	469	9,293	20,913
Total	764	15,134	576	11,417	27,126
Total	2,700	35,491	1,917	28,330	65,282

The other 10,058 acres (Ferron North Area) would occur in the Anthro/Range Creek mule deer herd unit. UDWR has delineated about 695,568 acres of winter range within the Anthro/Range Creek mule deer herd unit. The RFFAs would cumulatively affect about 2 percent of the winter range delineated in the Anthro/Range Creek mule deer herd unit. The extent of these disturbances would be similar for Alternatives 1 and 2. The extent under Alternative 3 would be somewhat smaller.

As shown on **Table 5–7**, at least 56,900 acres of winter range (crucial and high value) for elk would be disturbed cumulatively. All of this disturbance would occur in the Manti-Nebo mule elk herd unit. UDWR has identified about 786,463 acres of elk winter range within the Manti-Nebo elk herd unit. Thus, the RFFAs would cumulatively affect about 7 percent of the winter range delineated in the Manti-Nebo mule elk herd unit. As with mule deer, the extent of these disturbances would be similar for Alternatives 1 and 2. The extent under Alternative 3 would be somewhat smaller.

5.3.8 Special-Status Species

Overall, implementation of any of the alternatives considered in this EIS is not expected to induce substantive cumulative effects to the 53 special-status species of plants, terrestrial wildlife, or aquatic life shown on **Table 4–10**.

There could be a loss of some individual plants of the winkler cactus, the Creutzfeldt-flower, and the Canyon Sweetvetch. This loss would result from surface disturbance during development and use of off-highway vehicles in the plant's habitat. These losses would not be significant enough to endanger the continued

**Table 5–7
Summary of Cumulative Effects to Elk Winter Range**

Project	Crucial Winter Range		High Value Winter Range		Total Winter Range (acres)
	Direct (acres)	Indirect (acres)	Direct (acres)	Indirect (acres)	
Price CBM	496	7,435	1,588	35,953	44,976
Ferron					
North Area	0	0	0	0	0
South Area	173	8,989	34	2,980	12,003
Total	173	8,989	34	2,980	11,969
RFD Scenario ¹	295	0	295	0	0
Total	964	16,424	1,917	38,933	56,945

Note:

1. The indirect effects of the RFD Scenario's wells would involve the same acreage already affected indirectly by the Ferron Natural Gas Project in the South Area. Therefore, no additional acreage was included for the indirect effects of the RFD Scenario.

existence of the Creutzfeldt-flower and the Canyon sweetvetch or to cause them to be listed. For the winkler cactus, these losses would be in addition to the plants lost in the development of a bentonite mine and an exploration well developed outside of the RFD area. The winkler cactus has recently been listed as threatened by the USFWS, and these impacts were addressed in the listing package published in the Federal Register (USFWS 1998a). Individual applications could be denied if endangered species provisions could not be met.

There would be limited impacts to terrestrial wildlife. The peregrine falcon and bald eagle may experience a small loss of prey, but no sufficient enough to be significant. Their aeries would be protected with stipulations on when and what can be built within one mile of the aeries.

There would be limited impacts to aquatic wildlife. Not enough water would be removed from the watershed to impact the endangered fish in the Colorado River drainage.

None of the species listed in **Table 4–10** should be affected to any extent by the RFD scenario. All actions would require clearance surveys before construction. These surveys would be closely coordinated with the USFWS and UDWR to determine if any species may be impacted and what mitigation would be required. This would ensure that none of the special-status species would experience cumulative effects from the implementation of the Project.

5.3.9 Cultural Resources

The area for consideration of cumulative effects to cultural resources is the same as the RFD area, the combined Ferron Natural Gas and Price River Coal Bed Methane project areas (**Plate 5–1**). There have been approximately 200 wells drilled in cumulative analysis area. There is the potential for approximately 1,600 additional wells with associated facilities that could be drilled at full development under Alternatives 1 and 2. About 1,400 additional wells could be drilled with Alternative 3. Currently, there are about 680 wells proposed for the RFD area under Alternatives 1 and 2, and 480 wells proposed under Alternative 3.

A cultural resources Programmatic Agreement (PA) between the BLM, the State Historic Preservation Officer and the Advisory Council on Historic preservation has been completed for the Price Coal Bed Methane project area. For Alternatives 1 and 2 of this EIS, completion of a PA for the Ferron Natural Gas Project would combine with the Price Coal Bed Methane Project to provide a plan for management and treatment of cultural properties for nearly 40 percent of the projected development in the RFD area. Under alternative 3, if a PA were completed, 30 percent of the projected wells would be covered.

On Federal lands, all surface disturbing activities would be required to identify, evaluate, and, if necessary, treat cultural and historic properties, consult with Native American groups regarding traditional cultural properties, evaluate and treat historic properties encountered during construction or operation, and deal with any human remains encountered. Monitoring of identified sites could also be necessary.

Direct disturbance or destruction of archaeological sites would take place in areas subject surface disturbance from development. Indirect impacts could result from vandalism, inadvertent damage, or removal of cultural sites and properties. With the increased level of activity identified in the development scenario, the probability of effects to cultural resources would increase. However, as there has been no area wide cultural survey or statistical sampling completed for the area, the impacts cannot be accurately quantified.

Because cultural resource surveys would be completed prior to surface disturbances in areas not previously inventoried, the potential for increased impacts to cultural sites would be minimized. By avoiding known cultural and historical sites during the layout of drill sites, access roads and pipeline corridors, the potential for incremental increases in cumulative impacts would be avoided. Where this is infeasible, the development of data recovery and site mitigation plans would be necessary and would provide information on the cultural and historical properties of the area. On Federal lands, adherence to requirements for protection of cultural resources should provide measures to mitigate adverse effects. However, despite the best efforts to avoid and protect cultural resources, some direct and indirect impacts would be possible under the projected activities of the RFD. While mitigation or data recovery of cultural sites provides valuable historic information, the actions would affect the sites. Loss, destruction or damage to cultural resource sites would be an irreversible effect.

5.3.10 Land Use

Existing, planned or foreseeable activities in Carbon and Emery counties include continued natural gas development on state and private lands in the Project Area and adjacent areas. As of the end of 1997, natural gas developments in addition to the Proposed Action included the Price CBM Project and the wells included in the RFD Scenario. The proposed long-term disturbance to public and private lands by the Price CBM Project is 1,519 acres. The proposed disturbance resulting from an additional 923 wells under the RFD Scenario would be 4,615 acres, based upon an average disturbance per well of five acres, including the well pad, roads, and facilities. The total number of long-term disturbances on all lands from existing and proposed natural gas developments would be 6,897 acres or 0.5 percent of the 1,234,715 acres in Carbon and Emery counties.

The long-term disturbances from most existing and foreseeable natural gas developments occur primarily in the historical and existing land uses of grazing, agriculture, and wildlife habitats. These resources are discussed in other sections. An increase in activities near residential areas could be anticipated.

Increased traffic levels associated with the construction periods of all natural gas projects should not significantly overlap in time and space. Price CBM development has been ongoing for two years. The

construction should be complete by 2001. Ferron construction would begin in 1999 and be completed by 2004. Therefore, increased traffic levels from the Ferron and Price CBM projects should occur from 1999 to 2001 and then decrease to Ferron numbers. With increased construction related traffic near the Price area from 1999 to 2001, the probability of traffic accidents should increase slightly. Increased traffic near residences would result in increased noise and traffic dust. Generally speaking, the construction period for the RFD wells and facilities would probably not begin until the Ferron project is complete. Therefore, the rest of the impacts described above would continue for the duration of activities.

5.3.11 Livestock Management

The minor direct and indirect effects on livestock management associated with each alternative for the Ferron Natural Gas Project would contribute to the effects of the RFFAs within the analysis area. However, the Ferron Natural Gas Project's cumulative contribution also would be minor and limited. Overall, the Ferron Natural Gas Project's effects would contribute to a slight drop in AUMs available on the BLM's allotments within the resource areas. However, the effects on the individual allotments would be imperceptible overall.

The new roads that would need to be constructed would create more access into the grazing allotments. Increased harassment of livestock and vandalism to both livestock and facilities could occur. Dust from construction activities could decrease the palatability of forage for livestock, reduce the photosynthesis rate for growth, and decrease the rate of new growth and subsequent reclamation efforts when the gas development projects end.

5.3.12 Recreation

Additional population growth in Carbon and Emery counties is possible as a result of various in-migration factors, and could result in additional demand for recreational opportunities under all alternatives. Population growth and demand for recreation opportunities could reflect current growth in other areas of Utah, and that at some point during the life of the project, overall demand for recreational use could exceed supply in both counties.

There are currently no developed recreation areas in Carbon and Emery Counties that are affected by existing natural gas projects. The Price CBM Project and the existing development in both the North and South Areas have begun to affect dispersed recreational opportunities such as hunting, OHV use and trail-related activities near the Price area.

Other public lands in the counties may see an increase in visitors who seek solitude. However, opportunities for solitude in a natural setting would continue to decrease near the Price area. Natural gas development in the North Area, in conjunction with the adjacent development of the Price CBM Project, would continue to decrease the opportunity for local residents to experience the solitude and natural setting that is both nearby and convenient. The trail systems that have informally developed over the years would be altered, and in some cases destroyed, by natural gas development. On the other hand, the additional development would open more access roads although these roads would not be inherently designed for recreational use. If the local people near Price would be driven from the nearby North Area and Price CBM project areas because of a loss of solitude and natural setting, more opportunities for solitude, but not natural setting, may be available in parts of the South Area even if the distance would be longer to newer locations.

5.3.13 Visual Resources

Cumulative impacts to visual resources would result from other planned or foreseeable natural gas development activities that could occur on lands adjacent or located near to the proposed project in addition to existing developments. This analysis incorporates the visual impacts of the Price CBM Project, the Ferron Natural Gas Project, and the wells that would be drilled and operated under the RFD Scenario. These projects would involve the following wells and roads: Price CBM Project — 521 wells and 350 miles of roads; Ferron — 347 wells, 98 miles of new roads, and upgrading approximately 100 miles of existing roads; RFD — 923 wells and 1,170 miles of roads. The road mileage for the RFD Scenario is based on the assumption that each well would result in 5 acres disturbance, 1.3 acres would be the well pad disturbance, 3.3 acres would be the road disturbance. The average road would be 24 feet wide and 1.27 miles long.

All of these project lands are managed under BLM VRM Classes II, III, and IV. Class II areas are managed to retain the existing character of the landscape. The level of change should be low and not attract the attention of the casual observer. Class III objectives are to provide for management activities that may contrast with the basic landscape elements, but remain subordinate to the existing landscape character. Activities may be visually evident, but should not be dominant. Class IV objectives provide for major modification of the landscape, and allow management activities to dominate the landscape. **Table 5–8** summarizes the total number of each component of wells that would be constructed in the three BLM VRM classes.

Cumulatively, 34 wells could be drilled and operated in VRM Class II areas. All of these wells would be located on State and private lands. Even if the recommended mitigation of this EIS would be applied, the Class II VRM objectives would not be met. Cumulatively, 223 wells in the Ferron and Price CBM Project Areas would be constructed in VRM Class III areas. Visual mitigation described in Chapter 4 would alleviate the impact of these wells in VRM Class III areas. If the same mitigation would be applied to the 518 wells in VRM Class III areas considered in the RFD, the visual impact would be lessened. Regardless of the mitigation applied, the cumulative impact would be to change the predominantly rural character of the landscape in the Castle Valley area between Helper in Carbon County and Ferron in Emery County to a rural/industrial landscape character.

Electrical power maybe installed for Ferron Natural Gas Project facilities. To determine the cumulative impacts to visual resources from the aboveground power poles and lines, it is assumed that all the Price CBM project and the RFD scenario would also be electrically powered. Additionally, it is assumed that all the lines with poles at 300-foot intervals, would be installed along existing and proposed roads. Under the Ferron Proposed Action, 187 miles of power lines and 3,300 poles, would be installed. Approximately 350

Table 5–8
Cumulative Well Placement by BLM VRM Class

Project	Number Wells	VRM Class II	VRM Class III	VRM Class IV
Ferron Natural Gas Project	353	20	158	175
Price CBM Project	521	0	65	456
RFD Scenario	923	14	518	391
Total	1,797	34	741	1,022

miles of power lines and 6,160 poles, would be installed in the Price CBM Project Area. Approximately 1,170 miles and 20,600 poles, would be installed to power RFD facilities. Therefore, a total of 1,700 miles of overhead lines and 30,060 poles could be installed. Approximately 2 percent of these facilities would be installed in VRM Class II areas and the Class II management objectives would not be met. Another 41 percent would be in Class III areas. If the recommended mitigation in this EIS would be implemented on State and private lands, the impacts would be lessened but overall, management objectives would not be met. The remaining 57 percent of facilities would be installed in Class IV areas, and management objectives would be met.

Other industrial, commercial and residential developments may also result in changes in land uses and the visual character of some areas, as these uses are generally developed on lands previously used for agriculture or as open space. It is probable that various in-migration factors will result in economic and population growth of Carbon and Emery counties in the future. The landscape character of some areas in the counties, particularly adjacent to communities along SR 10, would change as a result as a result of increasing development on private lands. Commercial, residential and industrial uses are being developed on lands previously used for wildlife habitat and agriculture. This type of growth is expected to continue in Carbon and Emery counties in the future. Therefore it is likely that development would occur on private lands in the vicinity of the proposed natural gas facilities. The proposed project and other existing and foreseeable natural gas developments would add to the ongoing development of these lands in the counties.

These effects have changed the overall landscape of parts of Carbon and Emery counties from rural to a mixed rural/industrial landscape, and are expected to continue to occur from future growth of the region.

5.3.14 Noise

Cumulative noise effects would be minor in the RFD area under all alternatives. A small and short-term noise increase would occur near State Road 10 when construction vehicles and equipment are traveling south from Price to both the Price CBM Project Area and South Area. The noise would be slightly higher during the morning and evening hours when workers are traveling to the construction sites. Sufficient distance would exist between project facilities such that significant noise levels greater than 55 dBA would not overlap. This is because noise decreases approximately 6 dBA with every doubling of distance from the source. The analysis of the Ferron noise has shown that noise typically drops below a “public comfort” level of 55 dBA at about 1,500 feet from construction activities and at about 200 feet from pumping units. None of the well locations would be closer than 200 feet to each other in the Ferron, Price CBM Project, or RFD scenarios so the effects would not be additive.

5.3.15 Socioeconomics

5.3.15.1 Population

As previously mentioned, a significant amount of natural gas exploration and development activities are currently either ongoing or proposed in the Carbon County and Emery County region. Assuming all of the current proposals are approved and implemented as planned in the near future, it is probable that additional non-local contractors or permanent employees would be needed for the initial construction and installation phase. These workers may relocate to the area for a limited period of time (2–5 years) during the major construction phase of the ongoing and future natural gas projects.

It is assumed that 15 percent of the new permanent employment associated with natural gas development operations and maintenance would be hired from outside the local area. However this percentage would likely increase under the cumulative scenario. Using an average of 2.8 dependants per employee and the employment data provided in **Table 5–9**, a population increase of 80 could be expected due to the cumulative natural gas development scenario. This increase equates to 0.4 percent and 0.8 percent of the current populations of Carbon County and Emery County, respectively.

Using the same assumptions given above, the minimum peak population increase associated with natural gas development combined with given future mining activity within the project area is estimated at 180. This increase equates to approximately 0.9 percent of the current Carbon County population and 1.7 percent of the Emery County population. Population may also increase due to permanent employment increase associated with other future projects in the project area, including community expansion projects, logging projects, and the Narrow Dam Project.

The projected increase in population discussed above is only associated with permanent full-time employees residing in the local analysis area. The increase in non-local short-term and seasonal employees associated with the construction phases of the projects may create a demand for temporary housing. This would increase the demand for motels, mobile home sites, and RV sites locally and in and around specific field development sites.

Although many of the workers associated with oil and gas development projects in Carbon and Emery counties would be required during the construction phase only, the impact to long-term population growth in the region is not expected to be significant. Because the long-term, permanent increase in population growth in Carbon and Emery Counties attributable to the RFFAs would be relatively small and because the projects would be spread out over time, it is anticipated that the development market would have sufficient time to respond to population growth and associated housing needs and no significant cumulative effect would occur.

5.3.15.2 Employment, Wages, and Local Economy

5.3.15.2.1 Employment

Implementation of the proposed project and other RFFAs would create additional opportunities for employment in the Carbon County and Emery County region. Due to the long-term nature of the natural gas development projects, coupled with fluctuating natural gas economics, developing exact projections of employment is difficult. Therefore, the following paragraphs provide a reasonable estimate of what employment impacts would be in the cumulative project scenario.

Completion of natural gas development projects in the region would be realized several years after project initiation. Once complete, the production lifetime of the wells is expected to be in the range of 20 years. The primary influx of employment opportunities associated with the natural gas development projects is expected to occur during the well development stage. With numerous gas companies developing wells on private, state, and federal lands, new seasonal construction-oriented jobs would be available. Some of these jobs may be through the companies directly and many of them would be contractor positions. If employment in the natural gas and mining sectors is realized concurrently, recruitment of workers from outside areas may be necessary.

Once the natural gas wells have been installed, some level of sustained permanent employment would be required for operation and maintenance of the wells and pipelines. Future employment requirements would center around reclamation and abandonment of facilities at the end of the Project period.

An estimate of the number of employees required to implement the cumulative project scenario is provided in **Table 5-9**. Of this total, a large percentage of employment is associated with natural gas development and projected employment during the construction and installation period is estimated at 419 employees. It is estimated that, of these 419 employees, about 167 would be hired from the local area and 197 would come from outside the local area (Cox 1998). The average peak well development employment of 419 workers represents about 33 percent of 1995 employment in the mining, oil and gas, and construction sectors in Carbon County and 31 percent of these sectors in Emery County. This would be a draw on the workforces in Carbon and Emery Counties. However, the construction phase of the Price CBM and Ferron Natural Gas projects may overlap, which could allow for sharing of employment resources, reducing the impact on the workforces of the Counties. The operation and maintenance phase of the natural gas development scenario is estimated to require 291 employees per day over the life of the project (approximately 20 years). About 247 of these would be local hires and 44 would be hired from outside the area (Cox 1998).

Employment in Carbon and Emery counties also may increase as a result of future cumulative projects in the area, including proposed and potential mines, community expansion development, logging, and the Narrow Dam Project development. Due to the lack of detailed information available for these future projects, it is difficult to project total employment increases. However, at least 238 employees are expected to be required to meet the employment demand of future mining projects (**Table 5-9**).

5.3.15.2.2 Wages and Local Economy

Implementation of the cumulative project scenario would contribute to the local economy through the generation of earnings, which would be spent on items such as housing, food, goods and services. Based on full development of cumulative projects, spending would likely increase over current levels. However, this increase may be balanced if mines in the area close, resulting in a decrease in spending. In addition, economic benefits would occur as a result of the companies' spending on purchases of equipment and supplies from local area vendors.

Payroll earnings would increase in the region, which, in turn, would result in growth in the local economy. Although it is difficult to determine precise cumulative payroll earnings, the average project payroll would amount to about \$2,200,000 (\$900,000 for Ferron Natural Gas Project and \$1,300,000 for Price CBM Project) annually during the first several years of the development stage. Thus, the cumulative project scenario would likely generate an increase in payroll earnings.

Direct project employment and associated earnings would also create new jobs in local communities during the construction phase of the future projects. Secondary job creation would occur primarily in the service and trade sectors, with a few additional jobs in finance, insurance, real estate, transportation, and public utilities. It is projected that about 82 secondary employment positions would be created as a result of project activities during peak natural gas development projects employment. This calculation is based on the assumptions used in the Price CBM EIS (BLM 1997c). Because the vast majority of service and retail trade activity occurs in the Price area, it is assumed that most of these jobs would be created in Price, or nearby communities in Carbon County.

**Table 5–9
Cumulative Projects — Employment and Project Schedule Information**

Project	# of Proposed Wells (Gas Development)/ Surface Disturbance (acres) for mines	Number of Employees	Timing
<i>Natural Gas Development</i>			
Price CBM Project	521	116 const., 98 operation ¹	Early stages of development - app. 30-year lifespan
Ferron Project	353	98 const. 43 operation ²	Near future - app. 20y lifespan
Reasonable Foreseeable Development Scenario	923	205 const. 150 operation ³	Assumes near future and 20- year lifespan
<i>Total</i>	<i>1,791</i>	<i>419 const., 291 operation</i>	<i>-</i>
<i>Coal Mines</i>			
Willow Creek Mine	20	0	Under construction
Dugout Canyon Mine	10	0	NA
C Canyon Mine	10	0	NA
Horizon Mine	10–20	40-50	NA
Horse Canyon South	20–30	70-80	Inactive - ROW appl. submitted, No mine plan submitted
Columbia Mine Reopening	NA	70-80	Inactive - ROW appl. submitted, No mine plan submitted
Des-Bee Dove Mine Reopening	NA	NA	No information submitted
Co-op Mine Expansion	NA	NA	No information submitted
<i>Total</i>	<i>70-90</i>	<i>180-210</i>	<i>-</i>
<i>Other Mines</i>			
Chalk Hills Mine	5	NA	Inactive
BJ Mine	71	3	Active
Eagle Canyon Mine	30	6	Active
Kimball Draw Mine	107	NA	EIS in progress
San Rafael Desert Mine	1	2	Active
Lone Tree Wedge (Hebe) Mine	5	4	Active
Last Chance Mine	4-5	3	Active
<i>Total</i>	<i>227-228</i>	<i>18</i>	<i>-</i>

Notes:

1. Assumes implementation of the Price CBM Proposed Project as provided in the EIS (BLM 1997c).
2. Estimated Proposed Project employment as provided in Table 2-2.
3. Assumes a factor of 0.34 employees per well required for construction, and 0.15 employees per well required for operation. This projected ratio of employees per well is consistent with project employment.
4. NA = Not Available

5.3.15.2.3 Potential for Boom/Bust Cycle

Implementation of the cumulative project scenario would create both primary and secondary employment opportunities, contribute to the local economy, and provide a significant source of revenues for local agencies through the collection of taxes. If current estimates and plans are realized, employment opportunities would occur primarily in the first several years of the projects, while revenues may extend for as long as 20 to 30 years. At which time, project activities and gas production would slow or cease and so would the associated economic benefits.

At a minimum, the natural gas development scenario alone would result in a peak of 328 new jobs for the study area, representing 14 percent of the mining and construction sector jobs in Carbon and Emery counties. After the completion of the development stage, there would be a period of layoffs and employment would decline. If project activities are staggered and begin and end in a gradual fashion, major lay-offs or royalty reductions would be reduced or avoided. In addition, there are a number of other ongoing economic activities and concerted efforts by local authorities to diversify the local economy. These factors all lead to the conclusion that while the completion of project activities would create a temporary increase in employment and the economy, implementation of the projects would not increase the potential for a boom/bust cycle.

5.3.15.3 Housing

To the extent the cumulative project scenario employment results in a concentrated housing demand or shortage, either short or long term, the effect would be considered significant. Effects would be experienced on both local and regional levels. If transient housing, e.g. man camps or motel rooms, is required for short-term accommodations for construction or other laborers and is currently not available, the effect would be significant.

Because many of the workers recruited for the development of projects are expected to be local, existing residents or short-term seasonal workers, it is not expected that a marked demand for housing would be experienced. Also, activities would be spread out over a two-county area. Therefore, it is unlikely that a large concentration of workers would be seeking homes all at one time, in one particular location. As the demand for additional housing opportunities or motels increases, it is expected that the local development community would respond.

Use of non-local contract workers for specialized construction activities may increase the demand for and availability of temporary housing. It is not expected that this demand would represent a significant impact because most of these workers would not have dependants accompanying them and they would most likely stay in motels, recreational vehicles, and mobile homes. Many of these workers may already be in the Project Area constructing wells on state and private lands, reducing the likelihood of a major influx of workers all seeking temporary housing at one time. An assessment of baseline conditions indicate that the combination of existing housing vacancy rate with ongoing new development would provide sufficient housing opportunities for workers seeking permanent residences.

5.3.15.4 Community Facilities and Services

5.3.15.4.1 Roads

Access to portions of the proposed and other cumulative projects from state and federal highways would require the use of certain roads in Carbon and Emery counties. Project activities could result in increased traffic and use of roads, including additional wear and tear from heavy vehicles. The increased use of county roads may increase maintenance costs to the Counties' special districts. Both paved and non-paved roads may be affected. The royalty payments from the various developments projects should compensate for any increased maintenance costs to Carbon and Emery counties.

5.3.15.4.2 Public Schools

The increase in labor demands of the cumulative projects scenario would result in immigration of workers and their families to the Project Area, thereby increasing the number of students requiring educational services. As is difficult to determine how many workers will permanently relocate to the area with their families, it is difficult to determine the extent of the increase in the number of students. However, the school districts in Carbon and Emery Counties have some capacity to accommodate additional students. The Price CBM EIS reported that each of the schools in Carbon County are generally nearing, or currently at capacity levels. However, after years of declining enrollments between 1991 and 1995, some additional capacity may be available. Similar to Carbon County, enrollment in Emery County School District has generally shown small decreases annually for the last five years. If this increase in the number of students is greater than current capacity of the school districts, the counties may have to expand facilities and hire more staff.

5.3.15.5 Public Finance

5.3.15.5.1 Federal Mineral Royalties, and State and Local Revenues

The cumulative projects scenario would generate additional federal royalties, resulting in additional revenues for State and local governments. If all of the RFD cumulative scenario would be developed, royalties from gas activities would approximately double the level of the Ferron Natural Gas and price CBM Projects. While some increase in the demand for services and facilities is likely, local governments would also receive significant royalty payments from resource extraction activities, which could be used to fund necessary improvements.

5.3.15.5.2 Local Ad Valorem Tax Revenue

Additional project revenues would be generated through the collection of an ad valorem/property tax levied on improvements constructed by the Proposed Project and other cumulative projects. Because this assessment would be based on value added to property, revenues associated with cumulative natural gas development would increase based upon the number and location of wells. No estimate of the assessment of improvements associated with well development was available, however, assessed values would be determined as a percentage of the actual costs of the facilities (Ferderber 1998). Theoretically, revenues would gradually increase over the first several years of development in both counties, providing a steady revenue stream for a period of years, and then decline as facilities are dismantled and reclaimed. These projections are subject to the number, location, and life span of facilities and gas production. The ad valorem/property tax revenues for the cumulative project scenario would increase over those associated with only the Proposed Project.

5.3.15.5.3 Sales and Use Tax Revenues

Sales and use tax revenues would be generated throughout Carbon and Emery counties as a direct result of spending on goods and services in various cities throughout the Project Area. It is projected that sales and use tax revenues generated annually by the Proposed Project would range from \$23,830 to \$404,478. The addition of other cumulative projects in the area would increase these revenues.

5.3.15.6 Quality of Life

5.3.15.6.1 Local Economy

Over time, the proposed project would result in effects that would be considered to both aid and deter from a common perception of a desirable quality of life. It has been concluded that over the 20-year expected life span of the Proposed Project, increased employment in certain sectors would be realized. Many jobs associated with the Proposed Project could be filled by unemployed or underemployed workers currently residing in the Project Area. These jobs would subsequently contribute to a local economy. Employment opportunities and economic stability would increase in the Project Area with the addition of other cumulative projects.

5.3.15.6.2 Open Space and Visual Effects

The Proposed Project, with cumulative natural gas development projects, would noticeably increase activities on federal lands throughout the Project Area. It is expected that there would be numerous ongoing drilling operations, which would increase noise, dust, and pose local visual impairment. Well pads, pumping units, new roads, and pipeline corridors would be noticeable in certain areas. These features would affect the perception of quality of life in terms of a visual impact experienced primarily during outdoor recreational experience.

5.3.15.6.3 Traffic Congestion

The Proposed Project and other cumulative projects would result in an increase in traffic on federal, state, and local roads. Truck and heavy equipment traffic on federal lands, as well as state highways and county roads would increase. Some additional traffic on local community roads may also occur over time as new employees and project activities create additional trips. In addition, recreation vehicle traffic may increase as well development activities make certain areas more accessible. Due to the large geographic coverage and time frame of the project, it is extremely difficult to predict what level of increased traffic may be expected and what effect this traffic may have on overall quality of life.

5.3.15.6.4 Community Facilities and Services, Community Values

As described in previous sections, the proposed project and other cumulative projects would generate revenues currently not available to both Carbon and Emery counties. These revenues would likely be used for a variety of purposes, including funding for additional community facilities and services. Revenues would offset the demands for services placed on such things as school additions, parks and recreation facilities, additional law enforcement officers and other services and facilities.

Individuals in favor of no-growth or limited growth policies may view growth projected under the cumulative scenario as a negative impact to their values. Under the cumulative scenario, significant employment and

economic development is likely to occur in the region. While this growth may occur over an extended period of time and may be only relatively short term in nature, some community growth would be inevitable. This is not unprecedented for the area. The regional economy has historically been dependant on resource extraction and has experienced periods of employment fluctuations.

5.3.16 Health and Safety

Cumulative effects resulting from the implementation any of the three alternatives of the Ferron Natural Gas Project in combination with the Price CBM Project and the RFD would mainly affect traffic safety and the probability of gas flowline ruptures. Other health and safety issues such as H₂S releases, encountering abnormally high pressures and well fires are considered low probability events (see [Section 4.17](#)) and are independent of each other. The occurrence of one of these events would not have a cumulative effect on another event occurring.

Traffic during construction activities would be expected to increase by one to two percent over present levels on major roads near the Ferron Natural Gas Project Area. The level of development of the Price CBM Project would be approximately twice that of the Ferron Project. Therefore, it can be assumed that the traffic level on major roads leading to the Price CBM Project would increase by two to four percent. Because the Ferron and Price projects' construction activities would overlap for about three years, it can be assumed that the cumulative probability of traffic accidents during these three years of overlap could increase by about five percent on SR 10, the road that most of the vehicles would use traveling to both project areas from Price.

Extra wells constructed under the RFD would most likely be constructed after completion of the Price CBM and Ferron Natural Gas projects. Therefore, the RFD well construction would not cumulatively increase the probability of traffic accidents. However, the period of time when increased traffic accidents would continue through the construction phase of RFD wells.

The probability of a gas flowline rupture would cumulatively increase. According to the Department of Transportation (see [Section 4.17](#)), an average of one rupture annually could be expected for every 5,000 miles of pipeline. The pipeline construction level of development under the RFD would be approximately triple that of the Ferron Natural Gas Project. The probability of a pipeline rupture for the Ferron Natural Gas Project was estimated as one rupture over the lifetime of the Project. Therefore, over the lifetime of the RFD, it is estimated that three pipeline ruptures could occur.