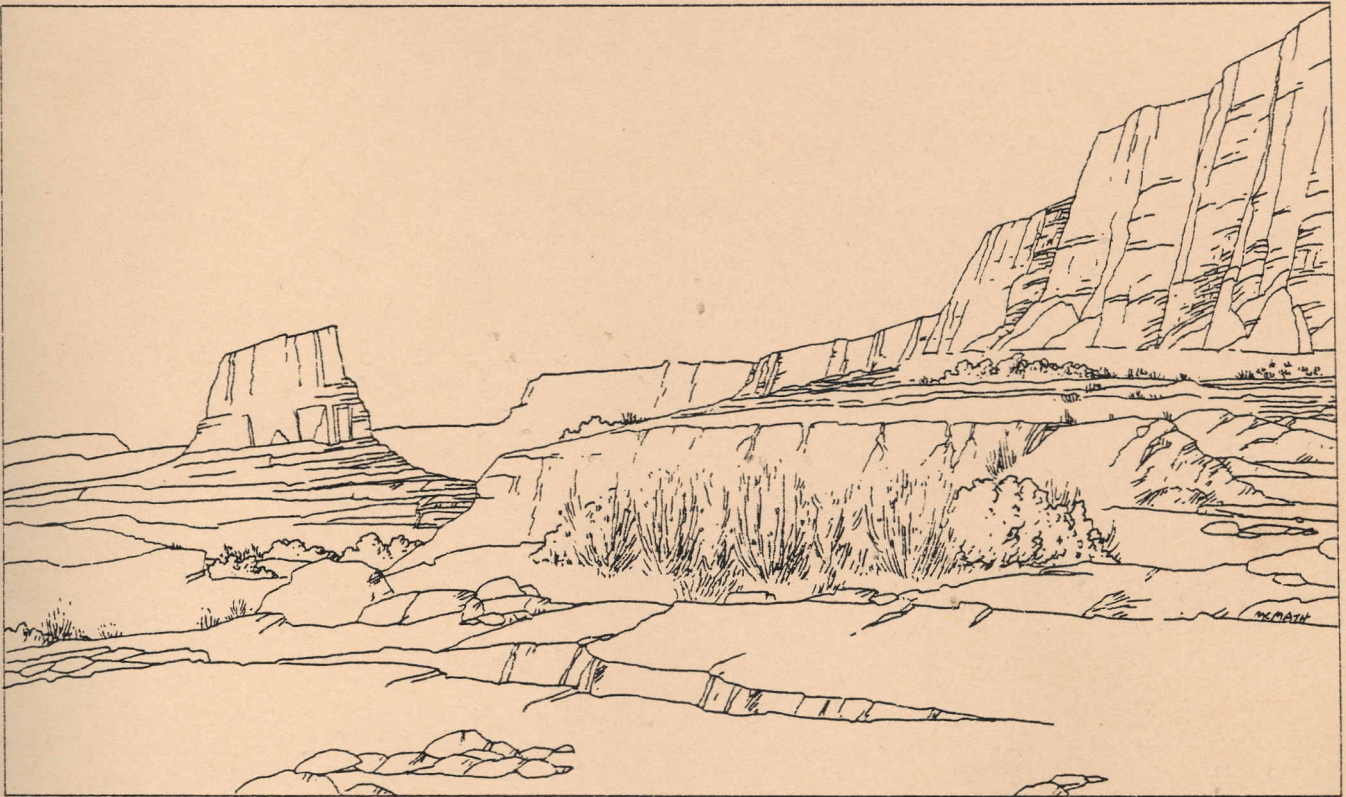




KAIPAROWITS COAL DEVELOPMENT AND TRANSPORTATION STUDY

SUMMARY

FINAL REPORT — AUGUST 1, 1980

ERT

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PREFACE

On August 29, 1979, the Bureau of Land Management (BLM) awarded a contract to Environmental Research & Technology (ERT) to conduct the Kaiparowits Coal Development and Transportation Study. ERT utilized the following subcontractors in completion of the study:

Hydro-Data, Inc.—Surface and Ground-water Hydrology
Sergeant, Hauskins & Beckwith—Geology, Topography and Minerals
Museum of Northern Arizona—Archaeology and Paleontology
Richard Stoffle (University of Wisconsin-Parkside)—Ethnology
Stan Albrecht (Brigham Young University)—Socio-Cultural
Gary Dudley (Applied Conservation Technology)—Technical Consultant
E. Arlo Richardson (Utah State Climatologist)—Existing Climate

Mr. Mike College of the BLM Denver Service Center was the contracting officer and Mr. John Stephenson of the BLM Utah State Office was the Contracting Officers Authorized Representative (COAR). A Federal, state, and local agency Steering Committee was established to insure agency coordination and input to the Kaiparowits Study. The Steering Committee also provided support to the BLM in a guidance and review capacity throughout the Kaiparowits study. The Steering Committee members along with the agencies they represented are presented as below:

Name	Agency
• Gerry Magnuson, Chairman	BLM, Utah State Office

• Morgan Jensen	BLM, Cedar City District
• Jeff Sirmon	U.S. Forest Service
• Phil Wondra	National Park Service
• Milo Barney	Utah Department of Natural Resources
• Jim Butler	Utah State Planning Coordinator's Office
• John Williams	Five-County Association of Governments

The funding and support for this project came from several sources. The BLM provided the basic financial support for the study and the National Park Service contributed additional funding for the air quality studies. The State of Utah provided financial support for socio-economic studies and contracted directly with the Five-County Association of Governments to complete the socio-economic studies.

It should be noted that the study report generally follows the format requirements for an environmental impact statement (EIS) but *it is not* an EIS. The study does not evaluate specific proposed actions, but rather summarizes the potential environmental impacts of various levels of coal development and various modes of coal transportation from the Kaiparowits region.

While ERT has been provided guidance by the Steering Committee, the findings, opinions, or conclusions expressed in this report are those of the authors and do not necessarily reflect the views of specific Federal, state, and local agencies.

SUMMARY

The Kaiparowits Coal Development and Transportation study resulted from an agreement made by the Secretary of the Interior and Governor Scott Matheson of Utah for a cooperative study by the Department and the State of Utah to review the issues raised by potential mining and transportation of coal from the Kaiparowits Plateau. The study concentrated on the following questions:

1. Would the physical impacts from mining Kaiparowits coal cause unacceptable damage to National Park, National Forest, or Bureau of Land Management (BLM) lands?
2. Would the physical impacts of coal transport by rail or coal slurry pipeline within corridors to be identified by the study be inconsistent with preservation of National Park or other Federal land values?
3. How might the population increases that could result from mining affect the use of National Parks and other Federal lands, and what land management steps should be considered to protect the National Parks and other areas from damage that might be caused by increased population?
4. How should Federal resource management decisions—Wilderness, Areas of Critical Environmental Concern, Class I air quality designation, identification of potential transportation corridors or community sites—be coordinated?

Information developed in response to such questions will provide a foundation to help the state and Federal land managers address important policy questions. The study will help the Department, state and local agencies, and the general public understand basic issues such as whether designation of rail or slurry transportation corridors would conflict with National Park or other Federal land management policies. The study will stimulate participating agencies to perform their own analyses of these questions. The study does not look at issues related to mine-mouth use of Kaiparowits coal or economic feasibility of Kaiparowits coal development. Any such end-use questions would be addressed in site-specific environmental impact statements resulting from mine development or transpor-

tation rights-of-way applications to BLM, the Office of Surface Mining (OSM), and other agencies.

The study also provides new environmental analyses specifically directed at coal transportation via various transportation modes and corridor alternatives. It combines information and analysis in one report, including narrative presentation, graphics, and appendices, in such a manner as to be technically correct and yet readily understood by a non-technical reader. Where appropriate, environmental and technical data gaps and opportunities for interagency coordination are identified.

Since the Kaiparowits Coal Development and Transportation Study is a regional planning study, this report does not present a detailed discussion of certain potential impacts that could result from specific projects. However, a detailed analysis would be conducted as part of any site-specific environmental impact statement prepared for a mining plan and/or right-of-way application. The primary intent of the report is to inform the public and decision makers of the most significant impacts, issues, and trade-offs involved with various levels of coal production and transportation in the Kaiparowits region of southern Utah. This information can then be used by Federal, state, and local governments, industry, interest groups, and the general public to determine whether or not various mining locations, coal production levels, and transportation modes are acceptable within the region. This report is intended to present objectively potential impacts and avoids making value judgements about the desirability of coal development or the acceptability of impacts.

STUDY SCENARIOS AND TRANSPORTATION CORRIDORS

Unlike an environmental impact statement which has a set of distinct alternatives for evaluation, the Kaiparowits Coal Development and Transportation Study does not have a specific development proposal or "proposed action" on which to base impact analysis. Therefore, it was necessary to develop study scenarios which included different levels of coal development, mining methods, and transportation modes. In addition, it was important to select transportation planning corridors within the study area.

Three study scenarios which would define the potential type of development in the study area were identified (Table 1). These scenarios

TABLE 1
STUDY SCENARIOS

Lease Area	Coal Production (10 ⁶ T/yr.)	Mining Method	Transportation Mode
Low Level			
Alton	2	surface	truck
North Kaiparowits	1	underground	truck
South Kaiparowits	2	underground	truck
TOTAL	5		
Medium Level			
Alton	9 ^a	surface & underground	slurry pipeline
North Kaiparowits	15 ^b	surface & underground	slurry pipeline
South Kaiparowits	30	underground	rail
TOTAL	54		
High Level			
Alton	9 ^a	surface & underground	slurry pipeline
North Kaiparowits	30 ^c	surface & underground	rail
South Kaiparowits	45	underground	rail
TOTAL	84		

Source: ERT Project Team Years

^aYears 1-20 all surface mining
 Year 21, 75% surface, 25% underground
 Year 22, 50% surface, 50% underground
 Year 23, 25% surface, 75% underground
 Years 24-40, all underground mining

^b2 million tons/year surface mining

^c3 million tons/year surface mining

deal primarily with coal production levels, mining methods, coal transportation modes, and development levels. The coal production levels chosen for evaluation in the scenarios were based on two major considerations: (1) the capacity of the specific coal transportation modes and (2) the diligent development requirements contained in the Code of Federal Regulations (43CFR 3500.0-5 f). In addition, many Federal, state, and industry representatives were contacted before the eight coal production levels were recommended to the Kaiparowits Steering Committee. The coal transportation corridors and truck haul routes developed for the study are shown on Map 2-1. The corridors and haul routes were further divided into 18 transportation corridor segments and 16 truck haul route segments. Coal transportation directions are outlined in Table 2.

The coal transportation corridors were identified by a constraint mapping process. A series of constraint maps for each discipline was developed. A composite constraint map

was subsequently prepared and corridor segments avoiding the constraints were delineated.

GENERAL ENVIRONMENTAL SETTING

The geological history of southern Utah plays a strong role in shaping the environment evident today. The land is dominated by severe topography in the forms of deeply cut river canyons, long escarpments, high mesas, and sharply rising mountain ranges. The climate is characterized by hot summers, mild winters, and low amounts of precipitation at the lower elevations and cool summers and cold, snowy winters at the higher elevations. Air quality and visibility are characteristically excellent. Much of the region's precipitation falls in the form of summer thundershowers. These precipitation patterns have limited soil development, especially on steep slopes. The best developed soil in the region occurs in the alluvial valleys. Surface water is scarce and

TABLE 2
COAL TRANSPORTATION AND DESTINATION

Geographical Coal Lease Areas	Possible Corridor Directions Railroads and Coal Slurry Pipelines
Alton	northwest, west, south
North Kaiparowits	north, south, west, northwest
South Kaiparowits	north, south, west, northwest
<i>Possible Corridor Direction</i>	<i>Railroad Destination</i>
North (C9)	Denver & Rio Grande Western RR spurline at Salina, Utah
Northwest (C4)	Union Pacific RR mainline at Milford, Utah
West (C1)	Union Pacific RR spurline at Cedar City, Utah
South (C18)	Santa Fe RR mainline at Flagstaff, Arizona

Source: ERT Project Team

much existing water has been appropriated for human use. Groundwater supplies are thought to be good, especially in the Navajo sandstone which is a very deep aquifer; however, Navajo sandstone recharge rates are unknown at the present time.

Vegetation communities range from desert shrub associations of shadscale, rabbitbrush, sagebrush, and creosote bush, to pinyon-juniper woodlands, and at higher elevations to ponderosa pine and aspen forests. A number of plants with limited habitats have evolved in the region. Many of these are currently being reviewed for protection under the Endangered Species Act. One cactus species (*Pediocactus sileri*) is listed as endangered. Many wildlife species inhabit the wide variety of vegetation communities. Common big game animals include mule deer, elk, antelope, and mountain lion. Endangered species include the bald eagle, peregrine falcon, and Utah prairie dog. The region's fisheries are limited by the scarcity of surface water. Higher mountain streams support small populations of trout and slower, warmer rivers contain species such as suckers or shiners. The only fish classified as endangered is the woundfin minnow found in the Virgin River.

The area is sparsely settled and inhabited areas, including the small population centers, are rural in character. The economic base is centered around ranching and other agricultural pursuits. A significant portion of local income (over 58 percent in Kane County and 34 percent in Garfield County) is derived from the tourist industry, particularly in the larger towns of the region. There is also a limited

amount of mining and timber harvest activity. Much of the population is of the Mormon faith and lifestyle is predominantly conservative in nature with a strong religious influence. Land use reflects the socioeconomic conditions with a large majority of the land used for grazing; cropland is also an important though proportionally much smaller land use. Much of the public lands and National Forests are used for recreation. Sizeable parcels have been designated as National Parks, National Recreation Areas, and state parks and set aside permanently for public enjoyment. The parks, National Monuments, and other recreation areas encompass blocks of land with outstanding geologic and scenic qualities, although many features outside these areas are also high in scenic quality. Significant portions of the region are currently being evaluated for wilderness potential. The region offers a great deal of recreation opportunity and records a high number of visitor-use days, especially in the National Parks.

Native American habitation in the region has occurred since prehistoric time and resources considered sacred by these groups are plentiful and occur throughout the area. Such resources include artifacts, animals, burials, petroglyphs and pictographs, places, plants, and trails. The transportation system consists primarily of local roads connecting the small and scattered population centers and major highways traversing the region. Much of the area is accessible only on unimproved roads. Noise levels are generally low with noise production occurring primarily along the more travelled roadways.

ENVIRONMENTAL CONSEQUENCES

Impact analysis for this study concentrated on the expected impacts resulting from three potential levels of coal production on the three lease areas and from three different modes of coal transportation off these lease areas to existing transportation systems and/or market areas. Only those resource elements which would be significantly affected by coal development and transportation were discussed. In most cases, physical impacts were limited to lease areas, transportation corridors, and truck haul routes. However, certain elements such as air quality and visibility, visual resources, transportation, socioeconomics, and recreation required analysis over a broader area due to the regional nature of potential impacts.

Since this was a regional planning study lacking a well-defined proposed action, it was necessary to develop assumptions on which to base impact analysis. Even with these assumptions, it was sometimes not possible to quantify potential impacts or describe their significance. This would be accomplished when site-specific proposals are analyzed. It should be noted that air quality and ground-water modeling based on specific mining and reclamation plans could generate results which would be different from those presented in this report. Detailed discussion of the environmental impacts can be found in Chapter 4 (Environment Consequences). However, a summary of the environmental impacts of the scenarios is presented in Table 3. Where data were not available in the Environmental Consequences chapter to quantify impacts, a qualitative description of the impact has been included.

SIGNIFICANT ENVIRONMENTAL ISSUES

Introduction

Development of coal resources in the Kaiparowits study area could result in significant environmental impacts. The significance of these impacts would be dependent upon several factors including the level of coal production, location of coal development, and type and location of coal transportation facilities. However, based on the conclusions of this study in which a series of scenarios were analyzed, it is apparent that there are six major environmental elements which could be significantly impacted. These impacts would have to be considered and evaluated by appro-

priate Federal and state agencies before site-specific coal development decisions in the study area are made. The six major environmental elements are as follows:

- Air Quality
- Visibility
- Water Resources
- Wilderness Resources
- Transportation
- Socioeconomics

A detailed discussion of the impacts to other environmental elements which were judged to be less significant in a regional planning sense can be found in Chapter 4 and summarized in Table 3. A summary discussion of the six most significant issues follows:

Air Quality

Modeling results indicate that unmitigated emissions from the development and transport of coal resources at each of the three production levels would result in violations of National Ambient Air Quality Standards (NAAQS) and Prevention of Significant Deterioration (PSD) increments for total suspended particulates (TSP). Mitigation measures must achieve high levels (88-96 percent) of emission reductions so that PSD increments and NAAQS would not be violated. The effectiveness of individual mitigation measures in reducing TSP emissions varies. Mitigation techniques for fugitive dust sources range from preventive measures which limit the disturbance of dust-producing soils to modifications of the emitting surface by watering or paving. Appendix J of this report contains a listing of different mitigation measures and their estimated control efficiency.

Dust emissions (TSP) from direct mining and transportation sources must be reduced by 88 percent in the low (5 MTY) scenario, 94 percent in the medium (54 MTY) scenario, and 96 percent in the high (84 MTY) scenario in order to meet the PSD increment and NAAQS. Implementation of mitigation measures adequate to achieve these levels of emission reductions would require advance planning and use of best available control technology (BACT). If reduction of direct mining emissions to the requisite levels proves infeasible, control of secondary sources (through such things as zoning laws, land use planning, traffic control, etc.) may be necessary. Air quality control strategies would require enforcement measures and cooperation among Federal, state, and local agencies and industry.

TABLE 3
SUMMARY COMPARISON OF IMPACTS FOR STUDY SCENARIOS

Low Production Level (5 MTY) Truck Haulage "See Brown Section"	Medium Production Level (54 MTY) Slurry Pipelines & Railroad "See Beige Section"	High Production Level (84 MTY) Slurry Pipeline & Railroads "See Green Section"	Significant Data gaps
In stagnant, worst case situations unmitigated Alton TSP emissions are projected to exceed PSD Class I and II annual increments by 2 to 5 times. Mitigation of 88% would reduce TSP values and avoid violating any Federal or State air quality standards. Truck transport coal blow-off is expected to approach 90% of PSD limiting values at Bryce Canyon (Utah 12) and east of Kanab (U.S. 89) when unmitigated. No impact from non-TSP pollutants project.	Unmitigated TSP mine emissions in all lease areas would exceed Class I increments locally by as much as 20 times and NAAQS by 2 to 3 times. Unmitigated rail coal blow-off would exceed Class II increment at levels exceeding 10 MTY coal hauled. Regional 24-hr TSP concentrations exceeding 100 mg/m³ would occur up to 10 mi NE of all lease areas. Mitigation of 88% would be sufficient to meet air quality standards at North Kaiparowits, but additional mitigation would be required for South Kaiparowits (91%) and Alton (94%) to reduce emissions to a level that would not violate Class I or II increments. No impact from non-TSP pollutants is projected.	Unmitigated TSP mine emissions in all lease areas would exceed Class I increments locally by as much as 20 times and NAAQS by 2 to 5 times. Mitigation of 88% would be sufficient to meet air quality standards at North Kaiparowits, but additional mitigation would be required for South Kaiparowits (96%) and Alton (94%) to reduce emissions to a level that would not violate Class I or II increments.	None
Air Quality			
No projected visual range reduction for either mitigated or unmitigated cases for any year.	Increase in TSP concentrations under unmitigated conditions would reduce the visual range for the Bryce Point to Navajo Mountain Vista from 200 to 109 km (124 to 68 mi). With 88% mitigation, visual range would be reduced to 177 km (110 mi) which represents a 12% reduction. Navajo Mountain would be visible 50% of the time as compared to 75-85% of the time at present. No effect on other vistas in the study area.	Increase in TSP concentrations under unmitigated conditions would reduce the visual range for the Bryce Point to Navajo Mountain Vista from 200 to 49 km (124 to 30 mi). With 88% mitigation, visual range would be reduced to 177 km (110 mi) as was described for the medium scenario. No effect on other vistas in the study area.	Baseline visibility data needs to be expanded. The overall impact of decreased visibility on visitation at the National Parks needs to be investigated.
Visibility			

TABLE 3
SUMMARY COMPARISON OF IMPACTS FOR STUDY SCENARIOS—Continued

Low Production Level (5 MTY) Truck Haulage "See Brown Section"	Medium Production Level (54 MTY) Slurry Pipelines & Railroad "See Beige Section"	High Production Level (84 MTY) Slurry Pipeline & Railroads "See Green Section"	Significant Data gaps
Geology/Topography/Minerals			
Mining would result in the nonrecovery of 3 MTY in the underground mines and 0.13 MTY in the surface mines. Topography would be modified due to surface mining in the Alton area resulting in high walls as high as 150 feet and creation of spoil piles up to 225 feet high. An unquantifiable amount of subsidence would occur over the underground mined area. Underground mines would require 0.016 MTY of limestone for dusting shaft walls.	Impacts on topography and subsidence would be similar to the low production scenario except greater volume of coal mined would result in proportionately greater impacts. Volume of nonrecoverable coal would range from 43 to 52 MTY in underground mines and about 0.7 to 0.13 MTY in surface mines. Volume of limestone required would range from 0.25 to .29 MTY. Ballast requirements for rail road bed would be approximately 9,000 tons/mile.	Impacts on topography and subsidence would be similar to but larger than those identified for the medium production. Volume of nonrecoverable coal would range from 72 to 81 MTY in underground mines and about 0.19 to 0.77 MTY in surface mines. Volume of limestone required would range from 0.40 to .45 MTY. Ballast requirements would be the same as medium scenario.	The effects of blasting in the Alton lease area on geologic formations in Bryce Canyon National Park need to be assessed.
Soils			
Approximately 4,992 acres of soil would be disturbed by mining and 1,111 acres disturbed by expansion of existing communities.	Approximately 19,338 acres would be disturbed by mining and 7,195 acres disturbed by urban development.	Approximately 23,563 acres would be disturbed by mining and 9,678 acres disturbed by urban development.	
Water Resources			
Impacts on groundwater quality and quantity would not be significantly affected. Sediment movement from spoil piles would not adversely affect water quality in the streams. Overall water requirements would be minimal with no significant impacts on the regional water availability.	Construction of railroads and slurry pipelines would result in temporary increases in runoff and sediment. A potential pipeline rupture could adversely affect water quality in streams receiving discharge. Operation of coal slurry pipeline would affect the groundwater stored in the Navajo Sandstone. In the Alton lease area, water level drawdown in the	Impacts would be similar to those identified for the medium scenario except water requirements would decrease for the North Kaiparowits lease area. This would result in a smaller decrease in the Navajo Sandstone water level for that area. The one-foot drawdown point of the cone of depression would extend 10.9 miles from the center of either well field.	
Additional field testing should be conducted to determine more accurately the storage coefficients and recharge rates for the Navajo Sandstone aquifer.			

TABLE 3
SUMMARY COMPARISON OF IMPACTS FOR STUDY SCENARIOS—Continued

Low Production Level (5 MTY) Truck Haulage "See Brown Section"	Medium Production Level (54 MTY) Slurry Pipelines & Railroad "See Beige Section"	High Production Level (84 MTY) Slurry Pipeline & Railroads "See Green Section"	Significant Data gaps
Approximately 4,992 acres of wildlife habitat would be lost for the life of the project (40 years). An additional 1,111 acres would be lost permanently due to urban development. Increased traffic (load trucks and passenger vehicles) would result in loss of 325 deer/year (52% more over the road base rates). Mineral and hydrocarbon impacts are expected due to construction of well pads and roads. Increased population in southern Utah would result in increased legal and illegal game harvest and increased pressure on wildlife resources. Approximately 4,992 acres of vegetation would be removed from production at the mine areas over the project period. An additional 1,111 acres would be lost due to expansion of existing communities. Approximately 2,353 AUMs would be lost over the project period. This would represent less than 1% loss of Federal AUMs in the three planning units affected. Threatened or endangered plant species could be potentially affected.	immediate vicinity of the well field would reach 350 feet after 40 years of pumping. Regional effect would be a 1-foot drawdown extending to a 11.8-mile radius from either of the well fields analyzed. This drawdown would eventually reduce flow by 25% to 50% in the East Fork of the Virgin River and reduce output or interrupt flows in Johnson Canyon Springs. In the North Kaiparowits area, drawdown would reach 450 feet after 40 years of pumping. The 1-foot cone of depression would extend an estimated radius of 12.7 miles. Overall drawdown in Navajo Sandstone would not affect shallower aquifers and would not affect existing wells.	Approximately 23,563 acres of wildlife habitat would be lost for the life of the project (40 years). An additional 9,678 acres would be lost permanently due to urban development. Increased traffic would result in loss of 538 deer/year (185% over current road base rates). Impacts on the East Fork of the Virgin River would be the same as described for medium scenario. Impacts associated with human activity would be similar to the low scenario, only greater in magnitude. Approximately 23,563 acres of vegetation would be removed from production at the mine areas over the project period. An additional 9,678 acres would be lost to urban development. Approximately 11,323 AUMs would be lost over the project period. This would represent a nearly 2% loss of the Federal AUMs in the planning units affected. Potential impact to threatened or endangered plant species would be slightly higher than for the low medium scenarios.	More detailed information on the locations of endangered species is needed.
Approximately 19,338 acres of vegetation would be removed from production at the mine areas over the project period. An additional 7,195 acres would be lost to urban development. Approximately 9,217 AUMs would be lost over the project period. This would represent about a 1% loss of the Federal AUMs in the three planning units affected. Although potential impacts to threatened or endangered plant species is not directly related to area disturbance, there would be an increase in potential impacts over the low scenario.	Approximately 19,338 acres of vegetation would be removed from production at the mine areas over the project period. An additional 7,195 acres would be lost to urban development. Approximately 9,217 AUMs would be lost over the project period. This would represent about a 1% loss of the Federal AUMs in the three planning units affected. Although potential impacts to threatened or endangered plant species is not directly related to area disturbance, there would be an increase in potential impacts over the low scenario.	Approximately 23,563 acres of vegetation would be removed from production at the mine areas over the project period. An additional 9,678 acres would be lost to urban development. Approximately 11,323 AUMs would be lost over the project period. This would represent a nearly 2% loss of the Federal AUMs in the planning units affected. Potential impact to threatened or endangered plant species would be slightly higher than for the low medium scenarios.	More detailed information on the locations of endangered species is needed.

TABLE 3
SUMMARY COMPARISON OF IMPACTS FOR STUDY SCENARIOS—Continued

Low Production Level (5 MTY) Truck Haulage "See Brown Section"	Medium Production Level (54 MTY) Slurry Pipelines & Railroad "See Beige Section"	High Production Level (84 MTY) Slurry Pipeline & Railroads "See Green Section"	Significant Data gaps
Wildlife			
Approximately 4,992 acres of wildlife habitat would be lost for the life of the projects (40 years). An additional 1,111 acres would be lost permanently due to urban development.	Approximately 19,338 acres of wildlife habitat would be lost for the life of the projects (40 years). An additional 7,195 acres would be lost permanently due to urban development.	Approximately 23,563 acres of wildlife habitat would be lost for the life of the projects (40 years). An additional 9,678 acres would be lost permanently due to urban development.	More detailed information on the location and habitat requirements of endangered species is needed.
Increased traffic (coal trucks and personal vehicles) would result in loss of 105 deer/year (62% increase over current loss rates).	Increased traffic would result in loss of 165 deer/year (97% increase over current conditions).	Increased traffic would result in loss of 316 deer/year (186% over current conditions).	
Mining could indirectly impact aquatic ecosystem due to introduction of sediments or toxic materials.	Operations of coal slurry pipelines would result in flow reductions in the East Fork of the Virgin River in the vicinity of Alton. The flow reductions would result in moderate to severe impacts to all aquatic species near Alton.	Impacts on the East Fork of the Virgin River would be the same as described for medium scenario.	
Increased population in southern Utah would result in increased legal and illegal game harvest and increased access to remote areas would lead to increased wildlife disturbance.	Impacts associated with human activity would be similar to the low scenario, only greater in magnitude.	Impacts associated with human activity would be similar to the low scenario, only greater in magnitude.	
Paleontology			
Direct impacts to significant fossils may result from disturbances of overburden by mining activities.	Impacts would be similar to the low scenario but greater in magnitude because of the larger area disturbed by mining activities.	Impacts would be similar to those described for the low scenario but would be greater in magnitude because of the larger area disturbed by mining activities.	Site-specific proposals would require detailed surveys to locate paleontological resources.
Indirect impacts would result from increased population growth and subsequent collection of resources by rock hounds.			

TABLE 3
SUMMARY COMPARISON OF IMPACTS FOR STUDY SCENARIOS—Continued

Low Production Level (5 MTY) Truck Haulage "See Brown Section"	Medium Production Level (54 MTY) Slurry Pipelines & Railroad "See Beige Section"	High Production Level (84 MTY) Slurry Pipeline & Railroads "See Green Section"	Significant Data gaps
Archaeological Resources			
Projections indicate 116 archaeological sites would be disturbed by development of coal resources. Appropriate mitigation measures (e.g., avoidance of known sites) would significantly reduce the number of sites disturbed.	Approximately 434 to 457 archaeological sites would be disturbed by coal development, construction of railroad line or slurry pipeline and development of the new community near East Clark Bench.	Approximately 556 to 579 archaeological sites would be disturbed by coal development, construction of railroad line or slurry pipeline and development of the new community near East Clark Bench.	Site-specific proposals would require detailed surveys to locate archaeological sites.
	Construction of coal slurry pipeline or railroad could potentially impact sites either on or nominated to the National Register of Historic Places.	Potential impacts to National Register of Historic Places sites would be the same as described for the medium scenario.	
	Appropriate mitigation measures or careful siting of the rights-of-way would significantly reduce the number of sites disturbed.	Appropriate mitigation measures or careful siting of the rights-of-way would significantly reduce the number of sites disturbed.	
Native American			
Development of coal resources could adversely affect the following native American sacred resources: 1) burial sites 2) sacred plant resources such as native American basket plants 3) sacred places and trails The number of resources impacted and significance of impact would be dependent upon location of mining and related activities.	Impacts would be similar to those described for the low scenario but would be greater because of the larger area disturbed by mining activities. Additional impacts would be associated with construction of railroads or slurry pipelines in the corridors.	Impacts would be similar to those described for the medium scenario but would be greater because of the larger area disturbed.	Native American groups should be contacted to review site-specific proposals for identification of concerns.
Visual Resources			
Surface mining at the Alton lease area would exceed the BLM visual class standards for Class II areas. The Class II area of the Alton field is extremely sensitive because it is in the foreground for Yovimpa Point.	Impacts to the Alton lease area would be similar to the low scenario. Surface mining in the northerly sections of the North Kaiparowits field would not meet visual resource standards.	Impacts would be similar to impacts for the medium scenario but would be greater in magnitude.	None

TABLE 3
SUMMARY COMPARISON OF IMPACTS FOR STUDY SCENARIOS—Continued

Low Production Level (5 MTY) Truck Haulage "See Brown Section"	Medium Production Level (54 MTY) Slurry Pipelines & Railroad "See Beige Section"	High Production Level (84 MTY) Slurry Pipeline & Railroads "See Green Section"	Significant Data gaps
Recreation			
Recreation traffic would conflict with mine employee traffic.	Recreation traffic conflicts with coal production employee traffic would be much more severe than at the low scenario.	Recreation traffic conflicts with coal production employee traffic would be substantially more severe than the medium scenario.	Effects of mining and visual quality changes on tourism and visitor satisfaction are not well understood and should be investigated further.
Increased recreation demand from coal-related population growth would result in excessive use pressure on developed facilities such as campgrounds which are currently used at or over capacity.	Other impacts would be similar to those described under the low scenario but the degree of impact would be significantly greater due to greatly increased local population. Long distance views from scenic overloads would be reduced slightly which would have a slight effect on visitor satisfaction.	Other impacts would be similar to those described under the medium scenario. Visual effects would be approximately the same. Other effects would be substantially more severe due to greatly increased population	
Many forms of recreation would suffer decreased quality of the recreation experience and there would be more conflicts between incompatible uses such as hiking and motorcycling due to increased population.			
Mining activities in the Alton lease area would degrade visual quality from Yovimpa Point which could reduce visitor satisfaction and, possibly, decrease tourism somewhat.			
Wilderness			
Proposed wilderness study area at the northeast corner of the South Kaiparowits field would, if approved, preclude development of surface facilities on about 10% of that field.	In addition to the South Kaiparowits lease area conflict described under the low scenario, portions of corridor segments C1, C6, C7, C10, C13, C14 and C15 are under study for wilderness designation. These areas would be unavailable for use as rights-of-way unless and until they were released from wilderness consideration.	Same as medium scenario.	Wilderness study areas will not be officially designated in southern Utah until November 1980. Actual wilderness designation may not take place until the 1990s. Exact effects on corridor segments can not be determined at this time.

TABLE 3
SUMMARY COMPARISON OF IMPACTS FOR STUDY SCENARIOS—Continued

Low Production Level (5 MTY) Truck Haulage "See Brown Section"	Medium Production Level (54 MTY) Slurry Pipelines & Railroad "See Beige Section"	High Production Level (84 MTY) Slurry Pipeline & Railroads "See Green Section"	Significant Data gaps
Land Use			
Development would result in conversion of approximately 4,992 acres of cropland, grazing land, and forest land to mining and mining related activities. Loss of cropland in the Alton lease area would be a significant adverse impact. Loss of grazing land would not be a significant regional impact. Urban expansion would require approximately 1,111 acres.	Development would result in conversion of approximately 19,338 acres of cropland, grazing land, and forest land to mining and mining related activities. Loss of cropland in the Alton lease area (approximately 4 x greater than low scenario) would be a significant adverse impact. Loss of grazing land would not be a significant regional impact. Population increase associated with this level of development would create demand to convert land (approximately 7,195 acres) to urbanized uses. Expansion of communities would create additional land use conflicts.	Development would result in conversion of approximately 23,563 acres of cropland, grassland, and forest land to mining and mining related activities. Significance of loss of cropland in the Alton lease area and grazing land would be the same as identified for the medium scenario. Population increases would be greater and demand for additional land converted to urbanized use (approximately 9,678 acres) would be greater.	None
Transportation			
Coal development would generate increased levels of traffic in the study area. Projected peak hour demand would exceed Utah Department of Transportation Standards for Level of Service B for U.S. 89 between U-9 and U-14. Approximately 125 to 150 more accidents per year could occur due to additional coal-related traffic.	Increased traffic from the North Kaiparowits lease area would exceed standards on U-12 between Tropic and Escalante and could impede recreational traffic on U-12 between Escalante and Bryce Canyon. Combined impact of recreation travel and coal development traffic would exceed standards on U.S. 89 east of Kanab and result in reduced operating speeds with periods of back-ups during the a.m. and p.m. peak hours. Approximately 200 to 225 more accidents per year could result. Unit coal train operations would result in traffic flow delays and create a potential for vehicle-train accidents.	Increased traffic from North Kaiparowits would exceed the Level of Service B volume standard on U-12 and exceed the theoretical capacity for two-lane highways in the vicinity of Escalante. Projected traffic would exceed Level of Service B volume of standard for following road segments a) U.S. 89 between U-9 and U-14 b) U.S. 89 between Kanab and Page. Cumulative impacts of Alton and South Kaiparowits mine employee traffic would occur on U.S. 89 west of Kanab. Approximately 350 to 370 additional accidents per year could result. Unit coal train operations would result in traffic flow delays and create a potential for vehicle-train accidents.	None

TABLE 3
SUMMARY COMPARISON OF IMPACTS FOR STUDY SCENARIOS—Continued

Low Production Level (5 MTY) Truck Haulage "See Brown Section"	Medium Production Level (54 MTY) Slurry Pipelines & Railroad "See Beige Section"	High Production Level (84 MTY) Slurry Pipeline & Railroads "See Green Section"	Significant Data gaps
Socioeconomics			
Significant positive socioeconomic effects under this scenario would be as follows: Approximately 1,990 new permanent jobs would be directly created in mining and coal transportation; An estimated \$35 million annually in direct salaries and wages would be added to the area economy; Kane and Garfield Counties would experience operating revenue surpluses	Significant positive socioeconomic effects under the medium scenario would be as follows: approximately 13,130 new permanent jobs would be directly created in mining and coal development; an estimated \$251 million annually in direct salaries and wages would be added to the area economy; county level operating revenue surpluses would be substantially higher than under the low scenario for Kane and Garfield Counties.	Significant positive socioeconomic effects under this scenario would be as follows: Approximately 21,600 new permanent jobs would be directly created in mining and coal transportation; an estimated \$413 million annually in direct salaries and wages would be added to the area economy; operating revenue surpluses for Kane and Garfield Counties would be substantially greater than at the medium scenario level.	A housing analysis is needed to examine the supply and condition of existing housing, the housing production capacity of the area, the availability of mortgage credit and the quantity of housing needed to accommodate growth. Local zoning has not been thoroughly investigated for effects it might have on coal development or development of communities to accommodate population growth.
Significant negative socioeconomic effects would be as follows: Current residents on fixed incomes would be adversely affected by above average price increases for goods and services; highway maintenance requirements would increase substantially; county level capital improvements needs would be accelerated; All communities affected by coal related growth would experience significant revenue shortfalls at current tax rates, some would require doubling projected revenues to maintain service levels; many communities would face significant capital improvements needs, in particular, water system, waste water treatment and school needs would have to be in place prior to population growth which would pose significant "front-end" financing problems.	Significant negative socioeconomic effects would be as follows: adverse effects on fixed income residents would be substantially more severe than under the low scenario because of much higher price pressures; county level capital improvement needs would be substantially greater than under the low scenario; community level operating revenue shortfalls would be substantially more severe under the medium scenario since service demands tend to increase faster than population growth while revenues do not keep pace with population growth; front-end financing problems for community capital improvement needs would be substantially more serious and would affect nearly all communities; areas affected by transportation facilities construction in Beaver and Washington Counties would experience short-term, "boom bust" conditions due to construction activities.	Significant negative socioeconomic effects would be: adverse effects on fixed income residents would be much more severe; county level capital improvement needs would be substantially greater; all study area communities would experience substantially greater operating revenue shortfalls; front-end financing problems and capital improvement needs at the community level would be substantially more severe and would affect essentially all communities; Beaver and Washington County effects would be essentially the same as under the medium scenario.	Secondary economic effects have not been included in the analysis.
Significant socioeconomic effects with both positive and negative connotations would be substantial, rapid population growth of communities and an alteration of the employment structure of the area economy.	Significant socioeconomic effects with both negative and positive aspects would be: very substantial, very rapid population growth in study area communities; a substantial alteration of	Significant socioeconomic effects with positive and negative aspects would be: population increases in all communities, ranging as high as 26 times greater than baseline population projections; the employment structure of the area economy would be significantly altered with mining becoming the dominant sector.	

TABLE 3
SUMMARY COMPARISON OF IMPACTS FOR STUDY SCENARIOS

Low Production Level (5 MTY) Truck Haulage "See Brown Section"	Medium Production Level (54 MTY) Slurry Pipelines & Railroad "See Beige Section"	High Production Level (84 MTY) Slurry Pipeline & Railroads "See Green Section"	Significant Data gaps
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the employment structure of the area economy. It is assumed that a new town of 31,000 people would be built near Glen Canyon City.

Socio-Cultural

Coal development would result in population growth of small communities and would result in some changes in local lifestyle but none of the changes would be significant under low scenario.

Least significant socio-cultural impacts are likely to occur in Cedar City, St. George and Page. Most significant impacts would occur in small rural communities of Kane and Garfield.

Positive impacts to all communities would occur under this scenario because former residents and children of current residents would return because of new employment opportunities.

Coal development would result in "boomtown" conditions in Garfield and Kane Counties. There would be significant increases in social problems such as local crime rates, truancy and delinquency, increased drinking and drug abuse, and more frequent occurrences of family problems.

Impacts would be similar to medium scenario but greater in magnitude.

None

Noise

Construction and operation of the mines would produce noise levels between 75 and 95 dBA (at 50 feet). However, the noise levels would not exceed levels associated with normal construction activities.

Additional truck traffic would create noise levels within accepted noise standards, except under worst-case nighttime conditions near sensitive receptors such as hospitals.

Same as low production level for the mine construction and operation. However, there would be increased noise levels associated with construction of the coal slurry pipeline or railroad but the noise levels would not exceed acceptable noise standards.

No significant noise impacts would be associated with operation of the slurry pipeline.

Rail lines would pass sensitive receptors but traffic volumes at the medium production level would maintain noise levels at an acceptable level.

Same as medium production level except that the largest rail traffic would occur with this scenario. A train pass-by could occur every 35 minutes on the route from South Kaiparowits to Milford. This would result in noise levels exceeding acceptable standards.

Under worst-case conditions, nighttime sound levels could be above 55 dBA for a distance of 3 miles and exceed maximum levels for sensitive receptors such as hospitals.

None

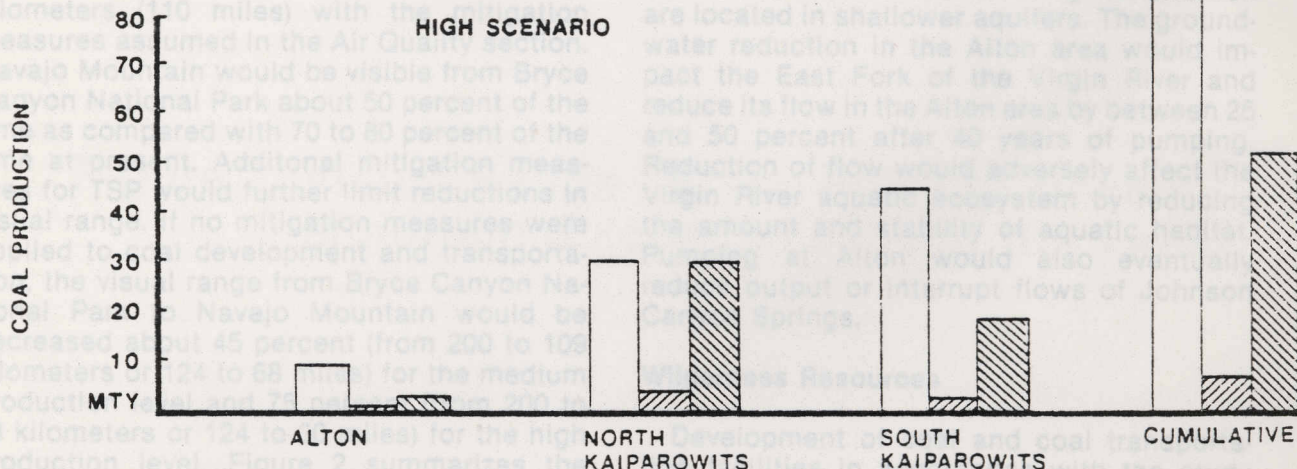
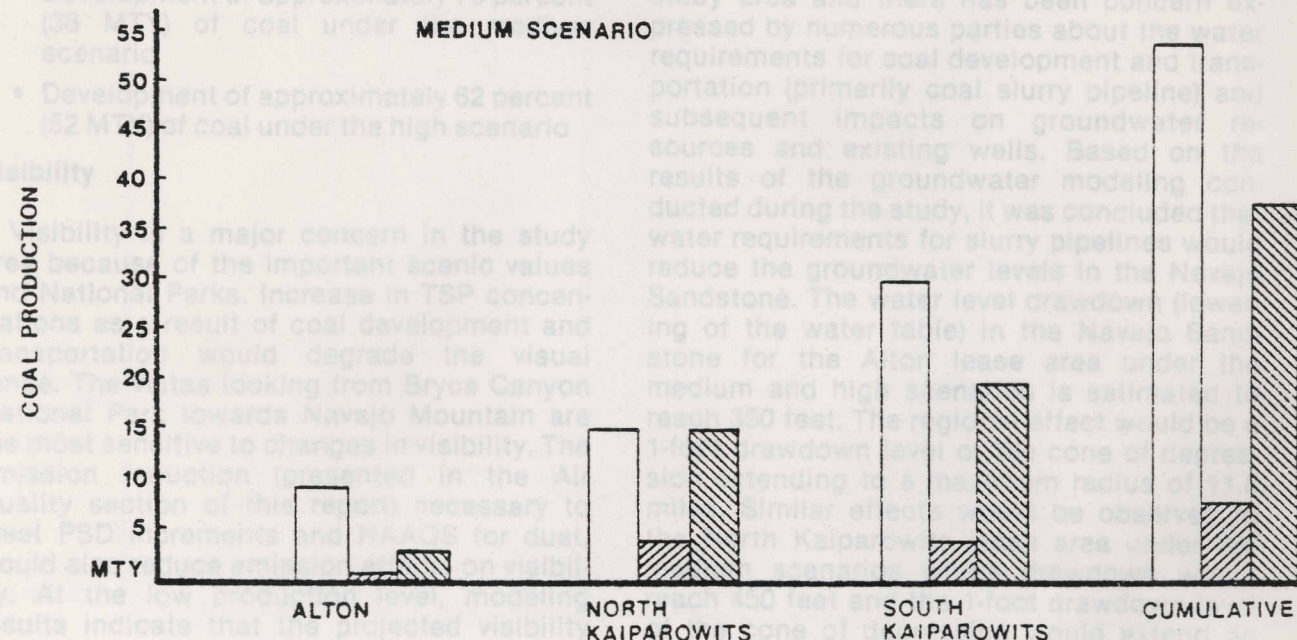
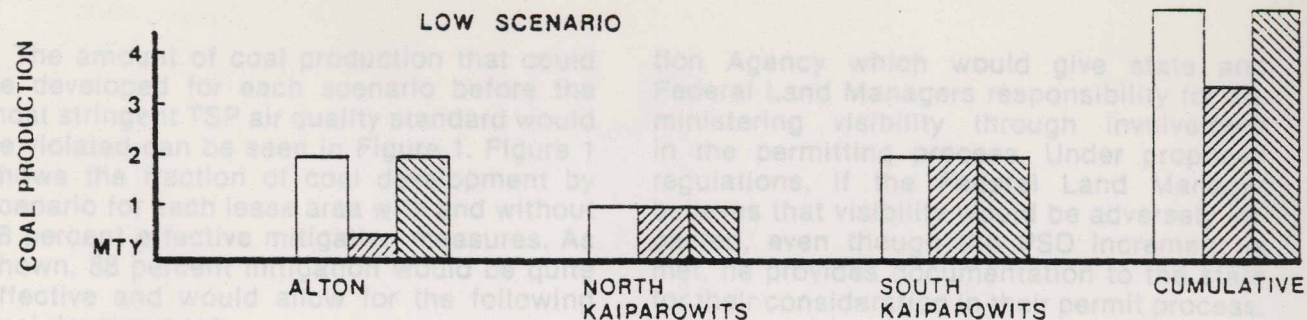


Figure 1. Allowable Coal Development With and Without Mitigation.

COAL PRODUCTION FOR SCENARIO
 WITHOUT MITIGATION
 WITH MITIGATION

The amount of coal production that could be developed for each scenario before the most stringent TSP air quality standard would be violated can be seen in Figure 1. Figure 1 shows the fraction of coal development by scenario for each lease area with and without 88 percent effective mitigation measures. As shown, 88 percent mitigation would be quite effective and would allow for the following coal development:

- Development of all coal under low scenario (5 MTY)
- Development of approximately 70 percent (38 MTY) of coal under the medium scenario
- Development of approximately 62 percent (52 MTY) of coal under the high scenario

Visibility

Visibility is a major concern in the study area because of the important scenic values and National Parks. Increase in TSP concentrations as a result of coal development and transportation would degrade the visual range. The vistas looking from Bryce Canyon National Park towards Navajo Mountain are the most sensitive to changes in visibility. The emission reduction (presented in the Air Quality section of this report) necessary to meet PSD increments and NAAQS for dust, would also reduce emission effects on visibility. At the low production level, modeling results indicate that the projected visibility impacts can be mitigated. However, at the medium and high production levels, the modeling results indicate that the mean visual range would be reduced by 12 percent to 177 kilometers (110 miles) with the mitigation measures assumed in the Air Quality section. Navajo Mountain would be visible from Bryce Canyon National Park about 50 percent of the time as compared with 70 to 80 percent of the time at present. Additional mitigation measures for TSP would further limit reductions in visual range. If no mitigation measures were applied to coal development and transportation, the visual range from Bryce Canyon National Park to Navajo Mountain would be decreased about 45 percent (from 200 to 109 kilometers or 124 to 68 miles) for the medium production level and 75 percent (from 200 to 49 kilometers or 124 to 30 miles) for the high production level. Figure 2 summarizes the potential visibility effects.

Currently there are no visibility standards for PSD Class I areas such as Bryce Canyon and Zion National Parks. Regulations have been proposed by the Environmental Protec-

tion Agency which would give state and Federal Land Managers responsibility for administering visibility through involvement in the permitting process. Under proposed regulations, if the Federal Land Manager believes that visibility would be adversely impacted, even though the PSD increment is met, he provides documentation to the state for their consideration in their permit process.

Water Resources

Groundwater resources are scarce in the study area and there has been concern expressed by numerous parties about the water requirements for coal development and transportation (primarily coal slurry pipeline) and subsequent impacts on groundwater resources and existing wells. Based on the results of the groundwater modeling conducted during the study, it was concluded that water requirements for slurry pipelines would reduce the groundwater levels in the Navajo Sandstone. The water level drawdown (lowering of the water table) in the Navajo Sandstone for the Alton lease area under the medium and high scenarios is estimated to reach 350 feet. The regional effect would be a 1-foot drawdown level of the cone of depression extending to a maximum radius of 11.8 miles. Similar effects would be observed in the North Kaiparowits lease area under the medium scenarios where drawdown would reach 450 feet and the 1-foot drawdown level of the cone of depression would extend an estimated radius of 12.7 miles (see Map 3-3 and Figure 4-18).

The overall drawdown in the Navajo Sandstone would not affect existing wells which are located in shallower aquifers. The groundwater reduction in the Alton area would impact the East Fork of the Virgin River and reduce its flow in the Alton area by between 25 and 50 percent after 40 years of pumping. Reduction of flow would adversely affect the Virgin River aquatic ecosystem by reducing the amount and stability of aquatic habitat. Pumping at Alton would also eventually reduce output or interrupt flows of Johnson Canyon Springs.

Wilderness Resources

Development of coal and coal transportation facilities in accordance with the study scenarios would conflict with potential wilderness areas and wilderness study areas at several locations in the Kaiparowits study area. An area of the Dixie National Forest in corridor segment C1 has been recommended

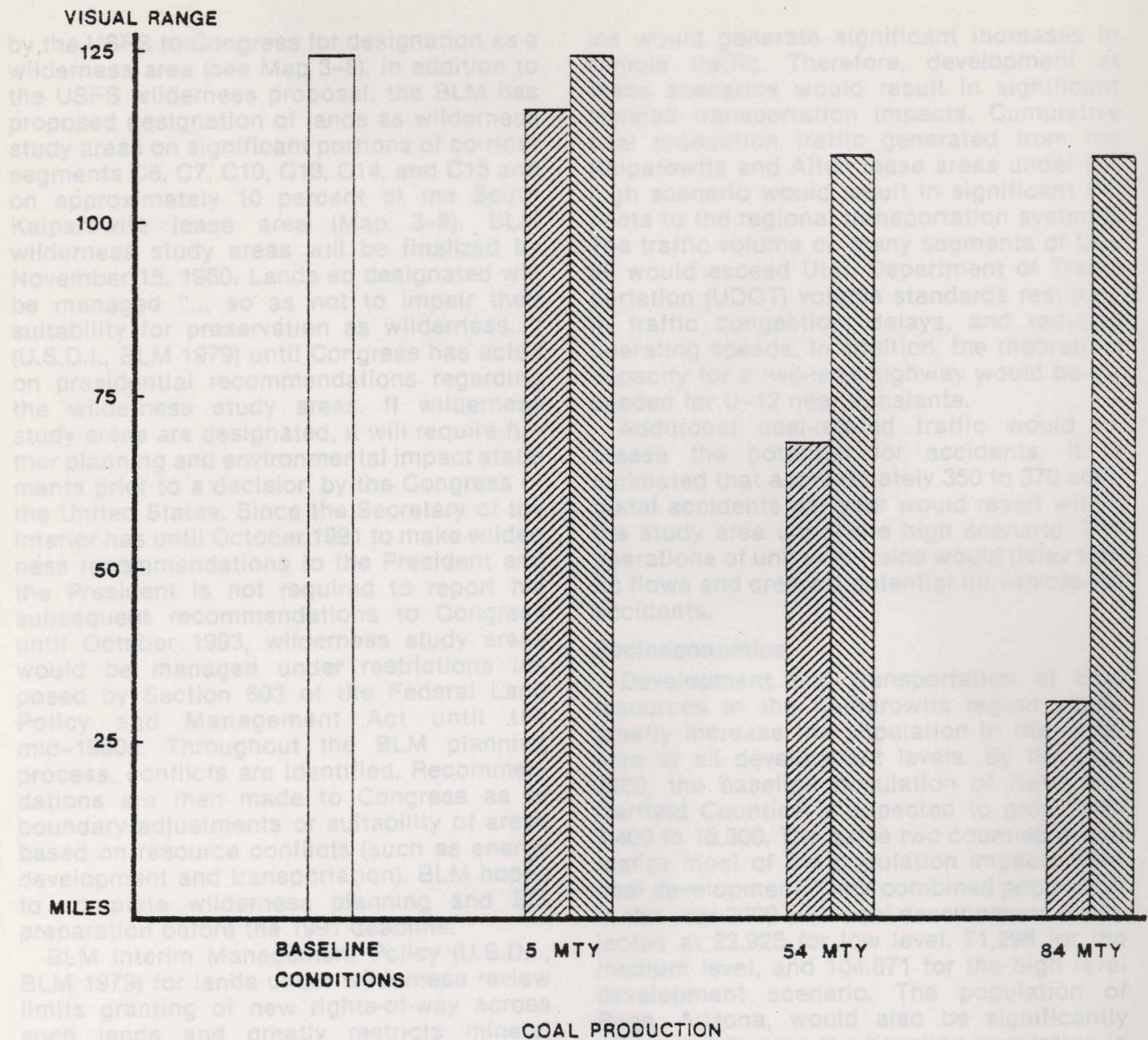


Figure 2. Visual Range - Bryce Point to Navajo Mountain (Exceeded 50% of the Time)

by the USFS to Congress for designation as a wilderness area (see Map 3-8). In addition to the USFS wilderness proposal, the BLM has proposed designation of lands as wilderness study areas on significant portions of corridor segments C6, C7, C10, C13, C14, and C15 and on approximately 10 percent of the South Kaiparowits lease area (Map 3-8). BLM wilderness study areas will be finalized by November 15, 1980. Lands so designated will be managed "... so as not to impair their suitability for preservation as wilderness..." (U.S.D.I., BLM 1979) until Congress has acted on presidential recommendations regarding the wilderness study areas. If wilderness study areas are designated, it will require further planning and environmental impact statements prior to a decision by the Congress of the United States. Since the Secretary of the Interior has until October 1991 to make wilderness recommendations to the President and the President is not required to report his subsequent recommendations to Congress until October 1993, wilderness study areas would be managed under restrictions imposed by Section 603 of the Federal Land Policy and Management Act until the mid-1990s. Throughout the BLM planning process, conflicts are identified. Recommendations are then made to Congress as to boundary adjustments or suitability of areas based on resource conflicts (such as energy development and transportation). BLM hopes to complete wilderness planning and EIS preparation before the 1991 deadline.

BLM Interim Management Policy (U.S.D.I., BLM 1979) for lands under wilderness review limits granting of new rights-of-way across such lands and greatly restricts mineral development uses. The most significant conflicts between proposed wilderness study areas and transportation planning corridors occur in corridor segments C10, C13, C14, and C15 where terrain acts in combination with the proposed wilderness study areas to greatly restrict possible development of rail and slurry lines. Corridor segments C1, C6, and C7, although greatly narrowed by the proposed wilderness study areas, would be less significantly affected because the most accessible terrain for construction of rail or slurry lines is not recommended for further wilderness review.

Transportation

The highway system in the study area is designed primarily for traffic volumes associated with rural areas. Development of coal in the study area at the medium and high scenar-

ios would generate significant increases in vehicle traffic. Therefore, development at these scenarios would result in significant adverse transportation impacts. Cumulative coal production traffic generated from the Kaiparowits and Alton lease areas under the high scenario would result in significant impacts to the regional transportation systems. The traffic volume on many segments of U.S. 89 would exceed Utah Department of Transportation (UDOT) volume standards resulting in traffic congestion, delays, and reduced operating speeds. In addition, the theoretical capacity for a two-lane highway would be exceeded for U-12 near Escalante.

Additional coal-related traffic would increase the potential for accidents. It is estimated that approximately 350 to 370 additional accidents per year would result within the study area under the high scenario. The operations of unit coal trains would delay traffic flows and create a potential for vehicle-rail accidents.

Socioeconomics

Development and transportation of coal resources in the Kaiparowits region would greatly increase the population in the study area at all development levels. By the year 2000, the baseline population of Kane and Garfield Counties is expected to grow from 9,400 to 16,300. The same two counties would realize most of the population impacts from coal development. Their combined population in the year 2000 with coal development is projected at 22,925 for low level, 71,298 for the medium level, and 104,671 for the high level development scenario. The population of Page, Arizona, would also be significantly affected. Whereas the baseline population in 2000 is projected at 4,878, coal development at the low, medium or high scenario levels would increase that to a projected 7,629, 8,734, and 10,542, respectively. Of greatest significance, much of the population growth would occur in a 5-to 8-year period, qualifying even the low development scenario as a very rapid growth condition. The most extreme growth example would be the assumed New Town on East Clark Bench where no current population exists. The New Town is projected at 45,315 people by the year 2000 under the high coal development scenario. The existing town of Cannonville would realize growth under the high level scenario to as much as 26 times the projected baseline population in the year 2000 when the population would begin to stabilize. Several other communities would observe populations 10 times the baseline level or more (see Figure 3).

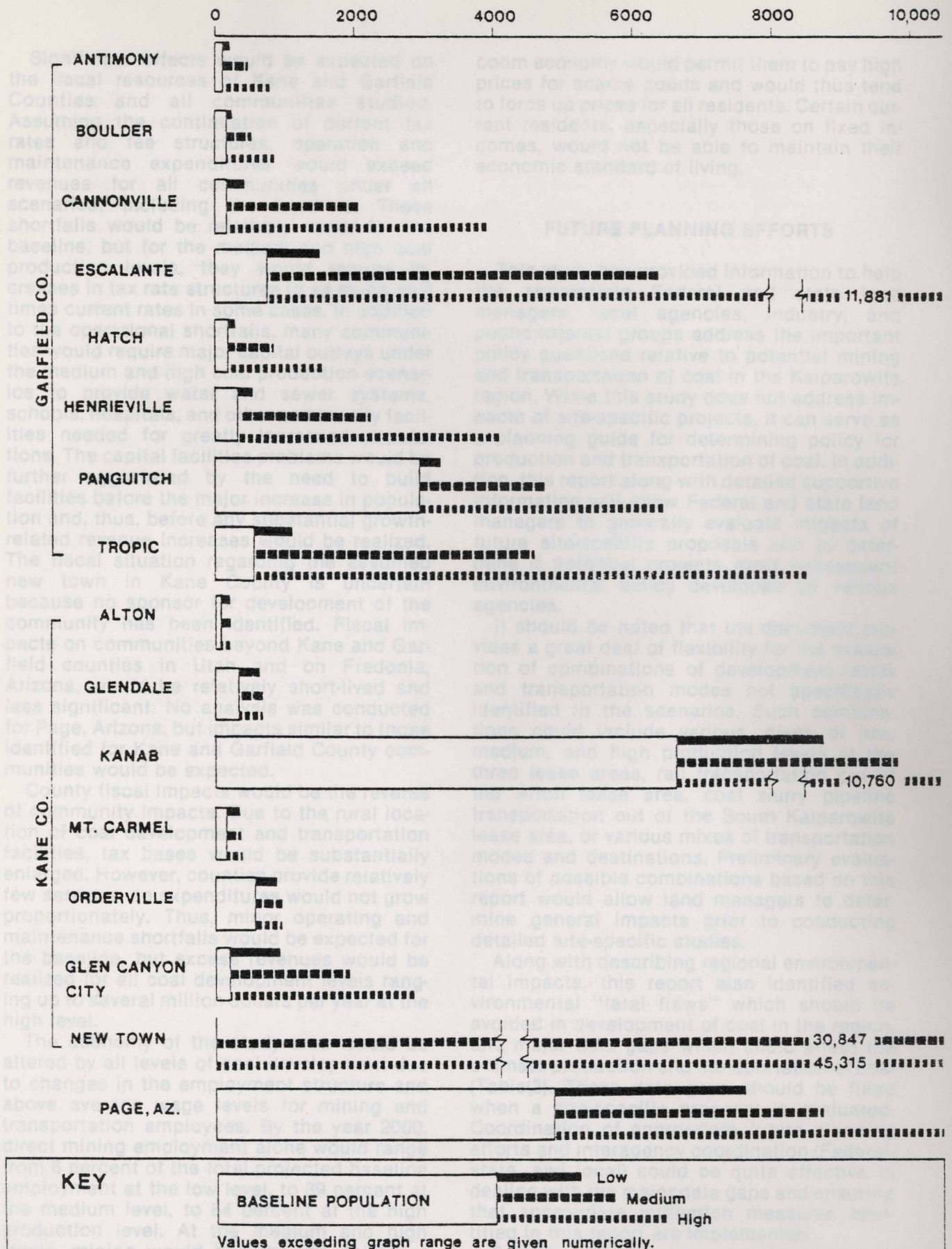


Figure 3. Population Projections Showing Growth Associated with Three Levels of Coal Development — Year 2000.

Significant effects would be expected on the fiscal resources of Kane and Garfield Counties and all communities studied. Assuming the continuation of current tax rates and fee structures, operation and maintenance expenditures would exceed revenues for all communities under all scenarios, including the baseline. These shortfalls would be relatively minor for the baseline, but for the medium and high coal production levels, they would require increases in tax rate structures to as much as 3 times current rates in some cases. In addition to the operational shortfalls, many communities would require major capital outlays under the medium and high coal production scenarios to provide water and sewer systems, schools, hospitals, and other community facilities needed for greatly increased populations. The capital facilities problems would be further aggravated by the need to build facilities before the major increase in population and, thus, before any substantial growth-related revenue increases would be realized. The fiscal situation regarding the assumed new town in Kane County is uncertain because no sponsor for development of the community has been identified. Fiscal impacts on communities beyond Kane and Garfield counties in Utah and on Fredonia, Arizona, would be relatively short-lived and less significant. No analysis was conducted for Page, Arizona, but impacts similar to those identified for Kane and Garfield County communities would be expected.

County fiscal impacts would be the reverse of community impacts. Due to the rural location of coal development and transportation facilities, tax bases would be substantially enlarged. However, counties provide relatively few services, so expenditures would not grow proportionately. Thus, minor operating and maintenance shortfalls would be expected for the baseline, but excess revenues would be realized for all coal development levels ranging up to several million dollars per year at the high level.

The economy of the study area would be altered by all levels of coal development due to changes in the employment structure and above average wage levels for mining and transportation employees. By the year 2000, direct mining employment alone would range from 6 percent of the total projected baseline employment at the low level, to 39 percent at the medium level, to 64 percent at the high production level. At the medium and high levels, mining would become the dominant economic sector in the area economy. High wage levels for mining related employees in a

boom economy would permit them to pay high prices for scarce goods and would thus tend to force up prices for all residents. Certain current residents, especially those on fixed incomes, would not be able to maintain their economic standard of living.

FUTURE PLANNING EFFORTS

This study has provided information to help the appropriate Federal and state land managers, local agencies, industry, and public interest groups address the important policy questions relative to potential mining and transportation of coal in the Kaiparowits region. While this study does not address impacts of site-specific projects, it can serve as a planning guide for determining policy for production and transportation of coal. In addition, this report along with detailed supportive information will allow Federal and state land managers to generally evaluate impacts of future site-specific proposals and to determine if potential projects meet subsequent environmental policy developed by various agencies.

It should be noted that the document provides a great deal of flexibility for the evaluation of combinations of development levels and transportation modes not specifically identified in the scenarios. Such combinations could include various mixes of low, medium, and high production levels at the three lease areas, rail transportation out of the Alton lease area, coal slurry pipeline transportation out of the South Kaiparowits lease area, or various mixes of transportation modes and destinations. Preliminary evaluations of possible combinations based on this report would allow land managers to determine general impacts prior to conducting detailed site-specific studies.

Along with describing regional environmental impacts, this report also identified environmental "fatal flaws" which should be avoided in development of coal in the region, and major data gaps which could affect the ultimate production and transportation of coal (Table(3). These data gaps should be filled when a site-specific proposal is evaluated. Coordination of appropriate future planning efforts and interagency coordination (Federal, state, and local) could be quite effective in dealing with the major data gaps and ensuring that appropriate mitigation measures identified in this report are implemented.

Specific interagency coordination and future planning efforts should be initiated for the six significant environmental issues

previously identified in this summary. These efforts could proceed immediately or concurrently with the review of site-specific proposals and should include the following:

- *Air Quality and Visibility.* The National Park Service (NPS), Environmental Protection Agency (EPA), Bureau of Land Management (BLM), Office of Surface Mining (OSM), and State of Utah should work together to define existing visibility, determine potential impacts to visitor use as a result of decreased visibility, and assure that specific air quality mitigation measures suggested in this report are implemented to achieve an 88 percent reduction of TSP emissions.
- *Water Resources.* The BLM, OSM, U.S. Geological Survey (USGS) and State of Utah should initiate additional groundwater modeling studies and field testing programs to determine storage coefficients and recharge capabilities of the Navajo Sandstone.
- *Wilderness.* The BLM, OSM, state, and industry should work together to expedite the review of wilderness study areas which could restrict the development of coal transportation facilities. This review could answer many questions for BLM and industry planners and

help to determine the feasibility of coal development.

- *Socioeconomics.* The State of Utah and Five-County Association of Governments, along with appropriate affected counties and towns, should undertake land use, housing, and zoning analyses and indicate where "front-end" money for planning analysis is necessary. Planning should develop measures to accommodate growth and reduce significant socioeconomic impacts associated with rapid growth.
- *Transportation.* The Forest Service, NPS, State of Utah, and BLM should initiate a cooperative program to determine policy on the location of new roads associated with coal development transportation. Specific mitigation measures to reduce TSP emissions from rural roads should be identified.

The existing Federal, state, and local agency Kaiparowits Steering Committee should be continued to ensure that appropriate inter-agency coordination and future planning efforts are implemented. The committee should be expanded to include representation from the OSM, EPA, and counterparts in state government. This is important because OSM has authority to approve site-specific mining and reclamation plans and EPA is involved in the approval of PSD applications.