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**FEASIBILITY AND ALIGNMENT
STUDY FOR THE NORTHERN
EXTENSION TO THE STAR LAKE
RAILROAD**

Prepared For:

**NORTHWEST NEW MEXICO COUNCIL
OF GOVERNMENTS**

February 28, 1998

By:

Freight Services Incorporated (FSI)

REPRESENTATIONS

This contents of this report reflect the views of *Freight Services Incorporated (FSI)* that is responsible for the facts and accuracy of the data presented herein. The contents do not necessary reflect the official views or policies of the State of New Mexico, the Northwest New Mexico Council of Governments (NWNMCOG), or any of the companies or agencies referenced in the report. The report also does not endorse products or suppliers. Corporate or trade names that may appear herein are cited only because they are considered essential to meet the objectives of the report.

The observations and opinions of *Freight Services Incorporated (FSI)* are based upon discussions with employees and agents of federal, state, and local government agencies, the Navajo Nation, National King Coal, Chaco Energy, Burlington Northern Santa Fe, Bureau of Land Management, NAPI, Star Lake Railroad, Chaco Culture National Historic Park, Public Service Company of New Mexico, New Mexico Highway and Transportation Department, New Mexico State Land Office, Transwestern Pipeline, HDR Engineering, Envirotech, Inc., El Paso Natural Gas, San Juan County Public Works Department, Mid-America Pipeline System, Giant Refinery, San Juan Forum, Texas Utilities, San Juan Economic Development Service, Y&S Candies, Coastal Chemical, Merrion Oil and Gas, Arco Materials, Western Mobile, Rio Grande Cement, Four Corners Drilling, Chevron Lubricants, Dial Oil, Phoenix Cement, Lamb Weston, Unichem, H&M Precision, Unico, Four Corners Management Systems, Robert S. Voyt & Partners, Western Enviro Fuels, San Juan Resource Conservation and Development, MI Drilling Fluids Haliburton Drilling Services, City of Bloomfield, City of Farmington, and members of the former San Juan Basin Transportation Development District. *FSI*, its staff, and subconsultants make no claims or warranties as to the contents of this report.

The secondary economic impacts model results in Appendix E are a work product of the NWNMCOG. Although factors from this study were utilized for the model, the results were derived independently of *FSI*.

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I. INTRODUCTION

I. INTRODUCTION

In September 1997, the Northwest New Mexico Council of Governments (NWNMCOG) entered into an agreement with *Freight Services Incorporated (FSI)* to perform the Feasibility and Alignment Study for the Northern Extension to the Star Lake Railroad. The scope of work requested in this agreement has three major components. The first component is to identify potential corridors for the railroad extension. The second component builds on the first and establishes a preliminary alignment along with the construction cost estimate. The final component is an update of the economic and marketing data relating to private sector companies in the area most likely to have an interest in the proposed railroad extension.

Extending a rail line north from the Burlington Northern Santa Fe (BNSF)¹ mainline to the Four Corners area has been studied and discussed for several decades. With the huge increase in demand for clean burning coal that developed in the 1970s, the focus of significant extensions were structured around a joint venture called the Star Lake Railroad. The Star Lake Railroad was to build northward from the Santa Fe mainline into the Star Lake area and possibly extend westward from there as far as the Burnham Mine southwest of Farmington. The projected markets for the coal that was to be transported by the Star Lake Railroad did not materialize, although several segments of new railroad trackage were built.

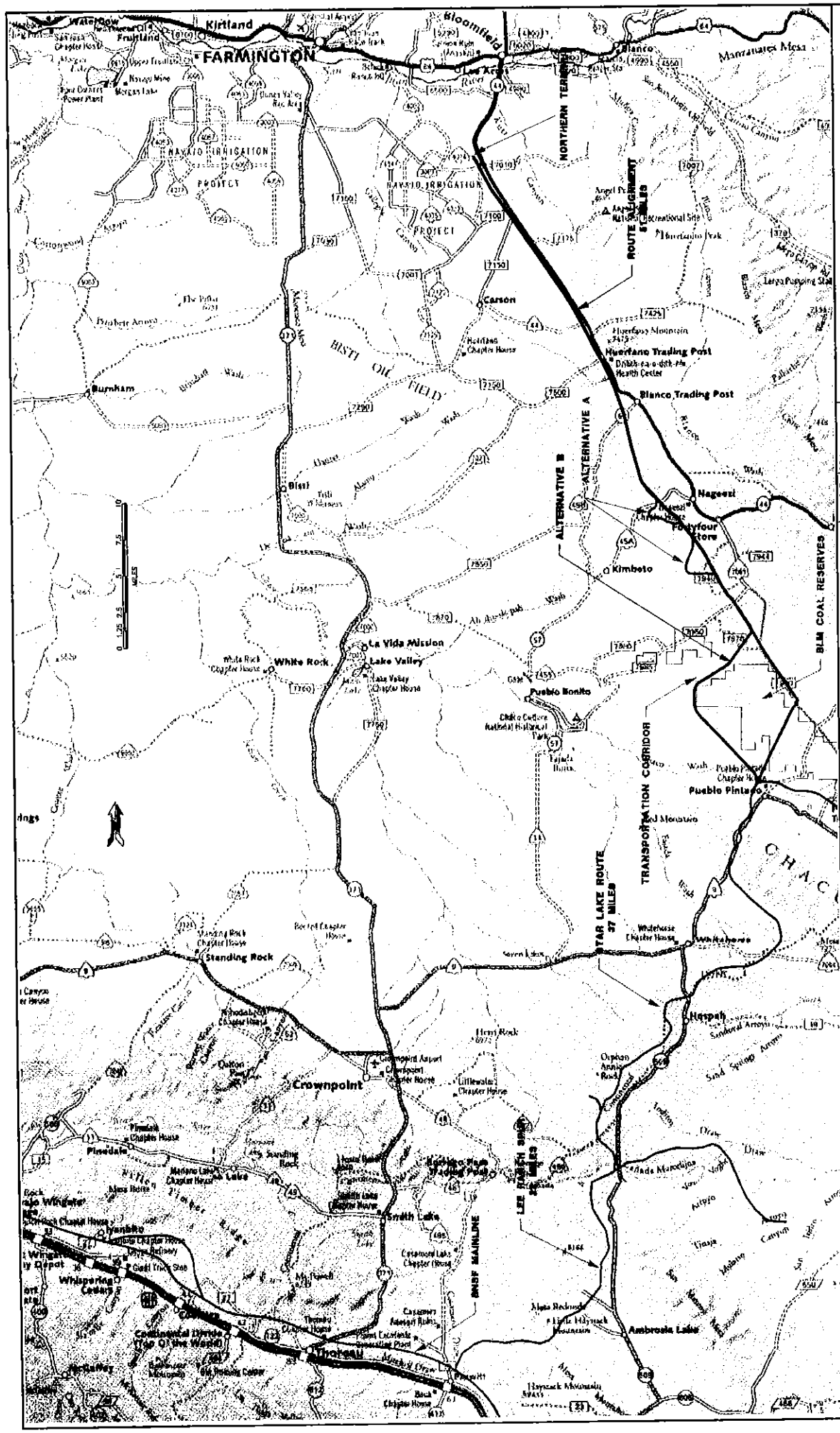
¹Prior to a merger in September 1995, this railroad was the Atchison, Topeka and Santa Fe (ATSF or Santa Fe.)

The first segment was the 43-mile Lee Ranch Spur extending from the BNSF mainline at Prewitt to the Lee Ranch Mine. This spur serves only one customer, the Lee Ranch Mine, that ships steam coal to several power plants in Arizona and New Mexico. In 1997, an eight-mile segment was completed from a junction with the Lee Ranch Spur where the Lee Ranch Spur crosses New Mexico State Route 509 (BNSF Milepost 27) northward to a loop track that would be the location for coal loading for the Chaco Energy reserves. To date, this newly constructed segment has carried no business, and there are no prospects to do so in the foreseeable future. The construction was part of a settlement reached between Texas Utilities and Santa Fe Industries, the parent company of the Atchison, Topeka & Santa Fe and two of the partners in the Star Lake Railroad.

Under existing economics, the holders of coal reserves in this region have no plans for mining them. There are current activities underway by the Star Lake Railroad including the surveying rights to establish an alignment north of the recently built trackage into the Pueblo Pintado/Star Lake area. This activity appears to be due diligence to make the coal reserves more saleable, rather than the first step of actually building a railroad.

One of two key reasons for commissioning this study was the potential for vastly reducing the construction cost by utilizing the Lee Ranch Spur/Star Lake Railroad. However, there is almost no chance in the next 10 years for construction north of the current end of track. Therefore, the potential benefit from utilizing the Lee Ranch Spur and Star Lake Railroad to cut down construction costs for an extension into the Farmington/Bloomfield area is remote. This leaves the distance to reach the existing railroad infrastructure at about 85 miles, or only about 15 miles less than the distance required for the entire Navajo alignment that was considered in the early 1990s.

MAP A



NEW MEXICO VICINITY MAP
 NORTHERN EXTENSION OF THE STAR LAKE RAILROAD
 SAN JUAN BASIN TRANSPORTATION
 DEVELOPMENT DISTRICT

PROJECT	CON
DRAWING	AL
SHEET	1
SCALE	GRAPHIC
DESIGNED	JAR
EDIT DATE	12/19/97
SAVE TIME	11.09

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The other reason for the study related to a major refinery proposed by Western Enviro Fuels. The economic viability for the project required an offset to the cost of the natural gas feedstock. This was attempted through a tax credit, but failed to pass the New Mexico legislature. Western Enviro Fuels then abandoned the Four Corners project and is developing a refinery in Wyoming. The two missing ingredients for the Four Corners site, mainline rail service and state support, are available in Wyoming.

II. EXECUTIVE SUMMARY

II. EXECUTIVE SUMMARY

The economic potential for the Four Corners region of New Mexico has specific limitations, because most key crossroads of commerce pass around this area. The result is a higher cost shipping structure for area businesses. The most significant transportation resource shortfall is the absence of a direct railroad link to the rest of the U.S. rail system.

Two recent events underline the need for lower cost transportation. A major refinery proposed by Western Enviro Fuels was contingent in part on access to direct rail service. Although this project fell through due to a rejection of a tax credit to offset feedstock expenses, similar industrial development or expansion will at best be severely constrained without direct rail access. For example, the proposed NAPI french fry plant will be limited to regional markets, while similar plants farther west served by rail will still enjoy the lowest transportation cost for east coast markets.

A more recent event was the announced closing of the Y&S Candies plant. Both inbound raw materials and outbound finished product would lower the cost of production and distribution if rail service were available in the Farmington area.

Interestingly, about 9,000 carloads of rail freight move to or from the Four Corners area, although through rail/truck transloads located on the BNSF mainline at Gallup, Thoreau, or the Albuquerque area. To build a railroad link

into the Four Corners area would require constructing 85² to 100³ miles of mainline at a cost of about \$1 million per mile. The benefits for the Four Corners area as a result of a rail connection would be significant, however.

The benefits would arise not only for those commodities being trucked to or from the BNSF mainline, but also making it practical to put certain bulk commodities on rail and reduce the shipping costs accordingly. With the rail link in place, it is realistic to project the usage rate of 18,000 carloads annually within a 10-year period. Furthermore, the synergistic benefits from the rail link would open opportunities for businesses that currently shun the Four Corners area due to the absence of rail service.

CORRIDOR OPTIONS AND ISSUES

The first feasibility issue was to evaluate the corridor between the Pueblo Pintado area where a connection with the Star Lake Railroad would be made and a northern terminus that was placed about seven miles south of Bloomfield, a 50-mile straight line distance. Discussions were held with the major land management entities through this corridor: the Bureau of Land Management (BLM) for federally owned property and New Mexico State Land Office for state owned property, private ownership, and Indian lands.

Discussions with these parties quickly determined that the BLM land would be the least expensive to lease, while the Indian land would be by far the most expensive. BLM leases land at a flat fee of \$6.97 per acre in San Juan

²Star Lake Extension

³Navajo Alignment

County and \$13.98 per acre in McKinley County. All but a few miles of the corridor are in San Juan County. The state lease rate depends on the fair market value of comparable leases, which could be very expensive if the current right-of-way leases from various tribal lands were used as the comparable value. For example, MAPCO recently leased 12 miles of right-of-way from a Navajo entity for a new pipeline at the equivalent of \$208,000 per mile.

Locational issues were also considered. Key concerns in this category include topography, communities, air strips, established roads, pipelines and oil wells, utilities, and various current land uses. The latter includes the Envirotech Land Farm, Angel Peak Recreation area, and the Navajo Agricultural Products Inc. (NAPI) facilities near the north end of the corridor.

It was determined that a relatively direct corridor from Pueblo Pintado was feasible and would be primarily on BLM land. However, the local Navajo Chapters were not interested in granting leases for a railroad unless there was some direct benefit. It would appear that this benefit would be in relatively high lease rates, given the freight transported by the railroad would have virtually no direct benefit to landowners south of NAPI.

One possible mitigating element to the cost of a railroad right-of-way would be utilizing it for other purposes in addition to the railroad. For example, consideration is now underway for a fiberoptic cable to be placed between Albuquerque and the Four Corners area. Railroad right-of-ways are an ideal location for fiberoptic cables. In fact, the vast majority of railroad right-of-ways throughout the country have fiberoptic cables as well as pipelines buried adjacent to the track. Given the higher value that fiberoptic cables could

justify paying for a right-of-way, the relative cost to the railroad for use of the right-of-way might be reduced.

PRELIMINARY ALIGNMENT

Utilizing the general corridors developed in the first phase of the feasibility analysis, a preliminary alignment with several options was identified. This analysis produced alignments ranging between 51 to 55 miles in length. The fundamental standards for the railroad are to be a 30 mile per hour freight hauling line with no grades greater than 1.5 percent and no curves in excess of six degrees. Another key concern is where practical to obtain lower cost materials and reduce grading to still meet the design criteria, but cut the cost of construction.

The most practical way to cut the track construction is to utilize relay or used rail and other track materials, such as tie plates and bolts. This reduces the cost of this material by about 25 percent. The second cost-cutting effort was to reduce the amount of grading. By making two deviations in the most direct route (Alternatives A and B) and adding four miles to the total distance, the cost of grading and right-of-way preparation was reduced by about one-third, and the BLM coal lease area is bypassed.

A summary of the total construction cost for the four route options is summarized below.

ALTERNATIVE	NEW RAIL AND FASTENERS	RELAY RAIL AND FASTENERS
Base Route	\$69,452,980	\$66,341,980
Base with Alternative A	\$61,281,180	\$57,987,180
Base with Alternative B	\$69,522,700	\$66,350,700
Base with Alternatives A & B	\$61,350,850	\$57,995,850

The construction cost for the Star Lake extension would normally be a lower amount compared to the cost for the Navajo alignment due to considerably lower tie costs compared to the early 1990s. From the standpoint of the actual mainline track construction, this is true with a 3 percent decrease per mile between the two options. However, the non track portion of the construction relating to clearing and grubbing, excavation and embankment, bridges and culverts, and grade crossings even after offsetting costs from reduced bridge construction is projected to be 86 percent higher per mile for the Star Lake extension.

Construction Cost Per Mile Comparison			
Item	Star Lake	Navajo	Percent Change
Mainline Track (relay rail and new ties)	\$442,155	\$455,906	-3
Non-Track	506,090	272,160	+86
Total Mainline Construction	\$948,245	\$728,066	+30

This makes the total per route mile cost of the Star Lake extension 30 percent higher than the Navajo alignment, offsetting some of the shorter distance for the total mainline construction cost.

Furthermore, discussions with key parties associated with the Star Lake development indicated that there appeared to be virtually no chance that there would be any additional construction, at least in the next 10 years, beyond the current end of track near South Hospah. The reason for this is that the market for the coal reserves in this region are not likely to be economically viable compared to existing sources that are available at a lower cost per million BTUs. In fact, leaseholders are current seeking to transfer their position to others. With this being the case, an additional 30 miles of construction would be required to fill in the gap between the end of track near South Hospah and the point near Pueblo Pintado where the northern extension would begin.

Based on similar construction costs for the South Hospah to Pueblo Pintado segment, an additional \$33 million for construction would be necessary, bringing the entire northern extension project to \$100.7 million. After adjusting the mainline construction for the Navajo alignment for price changes that have occurred since the 1992 estimates, the total cost of construction between the two alternative alignments would be very similar.

EXHIBIT A		
Capital Components Comparison		
	Star Lake	Navajo
Mainline Construction	\$52,153,475	\$72,806,600 ⁴
Right-of-Way Fencing	1,742,400	3,168,000
Sidings	1,530,000	2,295,000
Yard	1,725,000	1,725,000
Connection to BNSF	815,000	815,000
Engineering and Construction Admin.	5,500,000	7,300,000
Locomotives	1,500,000	1,500,000
Track Maintenance Machines	285,000	285,000
Buildings (office, shop)	200,000	200,000
Startup Capital	2,000,000	2,000,000
Subtotal	\$67,450,875	\$92,094,600
South Hospah-Pueblo Pintado (30 miles)	33,232,281	----
TOTAL	\$100,683,156	\$92,094,600

MARKET ANALYSIS UPDATE

Updating the market analysis relied heavily on interviews with key businesses in the Four Corners area. A listing of these interviews can be found in Appendix B. The general tone of the interviews was very upbeat, with considerable interest in bringing a railroad to the Farmington/Bloomfield area. This interest was manifested primarily in reduced costs for bulk commodities

⁴Not adjusted for inflation, since these elements were calculated in 1992.

and also increase market options beyond what is now possible with an all truck or rail/truck transport.

With the opportunity for existing and prospective businesses to consider new rail options, there will no doubt be additional opportunities beyond those in the forecast. For example, companies using distribution centers in places, such as Denver or Albuquerque, that cover the Four Corners area may find that establishing a satellite distribution center in the Farmington/Bloomfield area is more effective than trucking into the region.

Two pieces of business originally identified as highly promising will likely cease before the new railroad could be completed. Y&S Candies announced the closure of its plant by early 1999. This facility could have shipped several hundred carloads. An even bigger likely loss comes from the all but certain conversion of the Stone Container's Snowflake, Arizona, paper mill from wood chips to waste paper. Currently, over 450 carloads of wood chips are trucked from Southwestern Colorado to Gallup for rail loading. Undoubtedly, the shifting economic sands will bring future additions and deletions to the traffic projection.

Exhibit B summarizes the commodity groups that resulted from the interviews. It should be noted that about 9,000 carloads are currently moving or will be within the next few years on a rail/truck transfer basis, making them extremely susceptible to benefiting from the railroad extension. Most of the rest of the commodities are moving in bulk and make good candidates for conventional rail service. It should be noted that with the exception of the frozen potato processing plant, all of this business is currently moving to or from the Four Corners region.

EXHIBIT B

Star Lake Railroad Extension Traffic Forecast

FORECAST PROJECTION: Low Mid High	Year 3 Year 2 Year 2		Year 6 Year 4 Year 3		Year 9 Year 6 Year 4		Year 12 Year 8 Year 5		Year 15 Year 10 Year 6	
	IB ⁵	OB ⁶	IB ³	OB ⁴	IB ³	OB ⁴	IB ³	OB ⁴	IB ³	OB ⁴
	Coal	--	5,500	--	6,000	--	7,000	--	8,000	--
Metallic Ore	--	--	--	--	--	--	--	--	--	--
Non-Metallic Mining Products	1,675	900	2,500	1,100	3,700	1,200	3,850	1,300	4,050	1,500
Agricultural Products	--	200	--	250	--	350	--	400	--	550
Manufactured Food Products	--	--	50	10	100	25	150	200	200	800
Chemical and Fertilizers	335	--	345	--	360	--	360	--	360	--
Petroleum and Petroleum Products	1,290	500	1,400	600	1,870	750	2,150	800	2,720	900
Metal Products	--	--	--	--	--	--	--	--	--	--
Machinery	55	--	55	--	55	--	55	--	55	--
Lumber and Wood Products	150	--	200	--	200	--	250	--	300	--
Total Carloads by Direction	3,505	7,100	4,550	7,960	6,285	9,325	6,815	10,700	7,685	12,750
Grand Total All Carloads	10,605		12,510		15,610		17,515		20,435	

⁵ IB = Inbound to Four Corners area.

⁶ OB = Outbound from Four Corners area.

The annual operating cash flow generated under the three forecast scenarios compared to the annual debt service to build the Pueblo Pintado to Bloomfield segment are summarized in Exhibit C. The difference or gap between the operating cash flows and the annual debt service is the cash shortfall that would need to be made up from other funding sources. Exhibit C also illustrates the additional cash flow requirement if the entire route cost from South Hospah (the current end of the track) were to be the responsibility of the line extension for the entire 85 miles to reach the Bloomfield area.

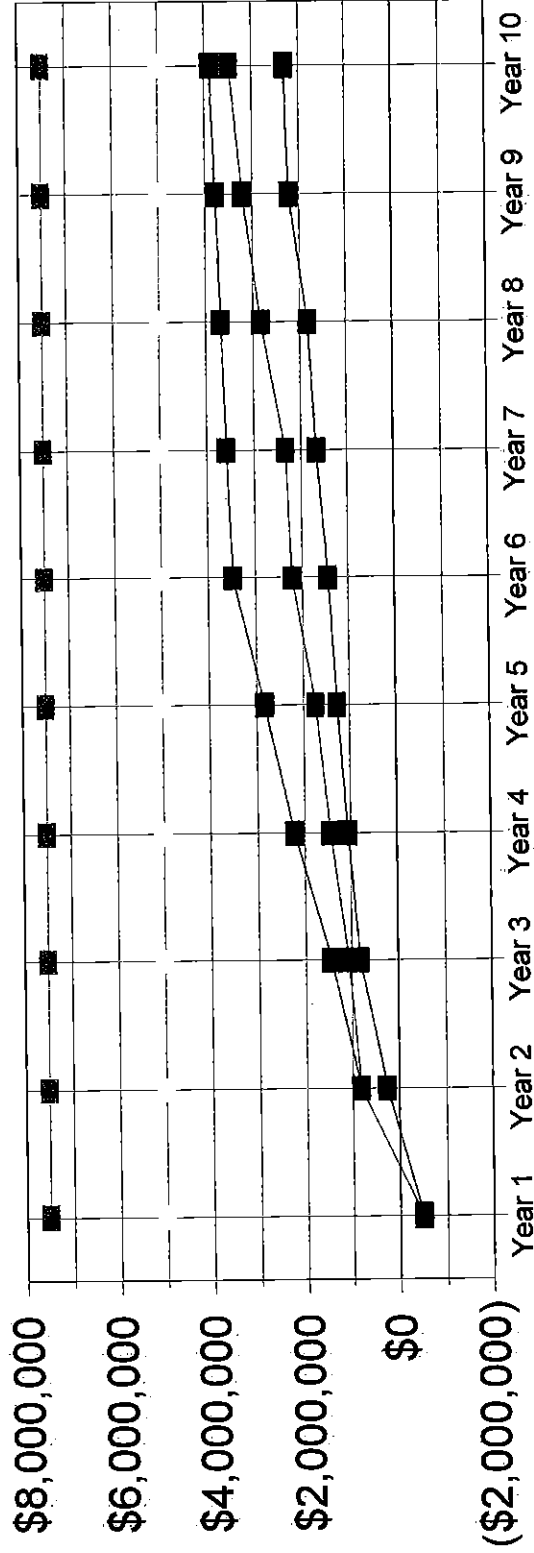
Based on a 40-year payback period, the following table summarizes the average portion of the total debt service covered by railroad operations. The cash necessary to cover the deficit would need to come from external sources.

Coverage Ratio for Debt Service 40-Year Average Per Mile Comparison		
Traffic Forecast	Pueblo Pintado- North Terminus (55 Miles)	South Hospah- North Terminus (85 miles)
Low	58%	39%
Mid	63%	42%
High	74%	50%

Even under the most optimistic forecast, the operating cash flow does not provide total coverage for the debt service. As previously noted, common carrier freight transporters that use publicly provided facilities do not bear the full burden of the construction and in some cases maintenance. However, a

EXHIBIT C

Annual Cash Flow Projection



■ Operating Cash Flow - High Forecast

■ Operating Cash Flow - Mid Forecast

■ Operating Cash Flow - Low Forecast

■ Annual Debt Service for Pueblo Pintado

■ Annual Debt Service for South Hospah

private sector railroad has a significant capital threshold requiring high business levels to pay back the initial capital cost.

REGIONAL ECONOMIC IMPACTS

The railroad construction and its subsequent operations will have a major benefit for the Four Corners area. The GRA Economic Impact Model projected the following benefits during the first decade, beginning with the first year of construction.

- 1,000 new jobs
- \$30 million in wages
- \$334,000 in new tax revenue
- \$165 million increase in total output

Additionally, the economic growth that a railroad would attract to the region has not been included in this analysis. It can be assumed that the secondary economic benefits of the Star Lake Railroad Northern Extension far exceed the benefits calculated above.

SUMMARY

The results from the investigation for extending a rail line into the Four Corners area via the Star Lake alignment revealed that due to higher construction costs, the economies of using this somewhat shorter route compared to the Navajo alignment were more than offset by higher construction costs. Furthermore, the proposal for a low sulphur fuels plant proposed by Western Enviro Fuels was lost when the needed tax relief failed in the state legislature. However, the enthusiastic interest on the part of the key businesses that were surveyed indicates a broad support base. Alternate uses for the right-of-way, such as fiberoptic cables, would further strengthen the coalition to support the project.

Without a "keystone" user, such as Western Enviro Fuels, there will be a greater challenge to harness support for the railroad. However, treating the group of businesses that would benefit from rail service as the "keystone," there may even be more impact than if it appeared the project would benefit only a few very big businesses.

Given these results, the following steps are recommended should a decision be made to continue the development process.

1. Establish a "Railroad Coalition" that would provide a focus for the parties interested in a railroad extension, as well as those interested in the right-of-way for other purposes such as a fiberoptic cable.

2. Utilize the "Railroad Coalition" to establish state and federal political support that could include funding to fine-tune the preliminary estimates contained in this report.
3. Develop a public relations program to sell the regional benefits of the railroad extension to the Four Corners region, including the Navajo Nation.
4. Identify economic expansion and development options that would materialize if rail service were available in the Four Corners region.
5. Work with federal officials to include the railroad extension as part of the reauthorization of the Intermodal Surface Transportation Efficiency Act (ISTEA) or similar legislation to provide a basis for the public support.
6. Maintain a support resource to perform timely due diligence on issues that the "Railroad Coalition" needs to address, including additional economic development that would come to the Four Corners area.
7. Move forward on a timely basis, or the current window of opportunity, particularly as it relates to ISTEA, may be lost soon.

In 1992, Senator Pete Domenici was given a briefing for the work then underway for a railroad extension into the Four Corners area. The Senator indicated that with adequate local support, there was a reasonable possibility to assemble a public/private coalition to support the project. At the time, the cash flow generated by the railroad did not appear to be adequate to justify the public involvement. However, the most recent update of the traffic

projections indicates a higher level of business that would reduce the public support considerably.

This review has identified considerable interest as well as significant benefits. Further progress will require leadership and commitment to realize the projected benefits for the Four Corners area.

III. CORRIDOR
OPTIONS AND
ISSUES

III. CORRIDOR OPTIONS AND ISSUES

The purpose of this analysis is to identify potential corridors for a freight railroad linking the proposed Star Lake Railroad (in the vicinity of Pueblo Pintado) with the Farmington/Bloomfield area. Identifying the potential corridors has taken several factors into account. These include:

- Land ownership,
- Location of existing transportation corridors,
- Location of communities, farmland, and structures,
- Location of environmentally sensitive sites, and
- Topography.

To conduct the analysis, a great deal of data was collected on the local environment, including a number of maps showing the locations of roads, pipelines, utilities, and other features, as well as land ownership and Navajo chapter boundaries. Meetings were held with a number of affected parties to determine their position on the railroad. There was also extensive field reconnaissance. A list of references and the names of persons contacted for this information can be found in Appendix A.

LOCATION

The project area is located in the northeastern portion of the San Juan Basin in northwestern New Mexico. The bulk of the project would be located in

eastern San Juan County. A small portion of the project is located in northeastern McKinley County.

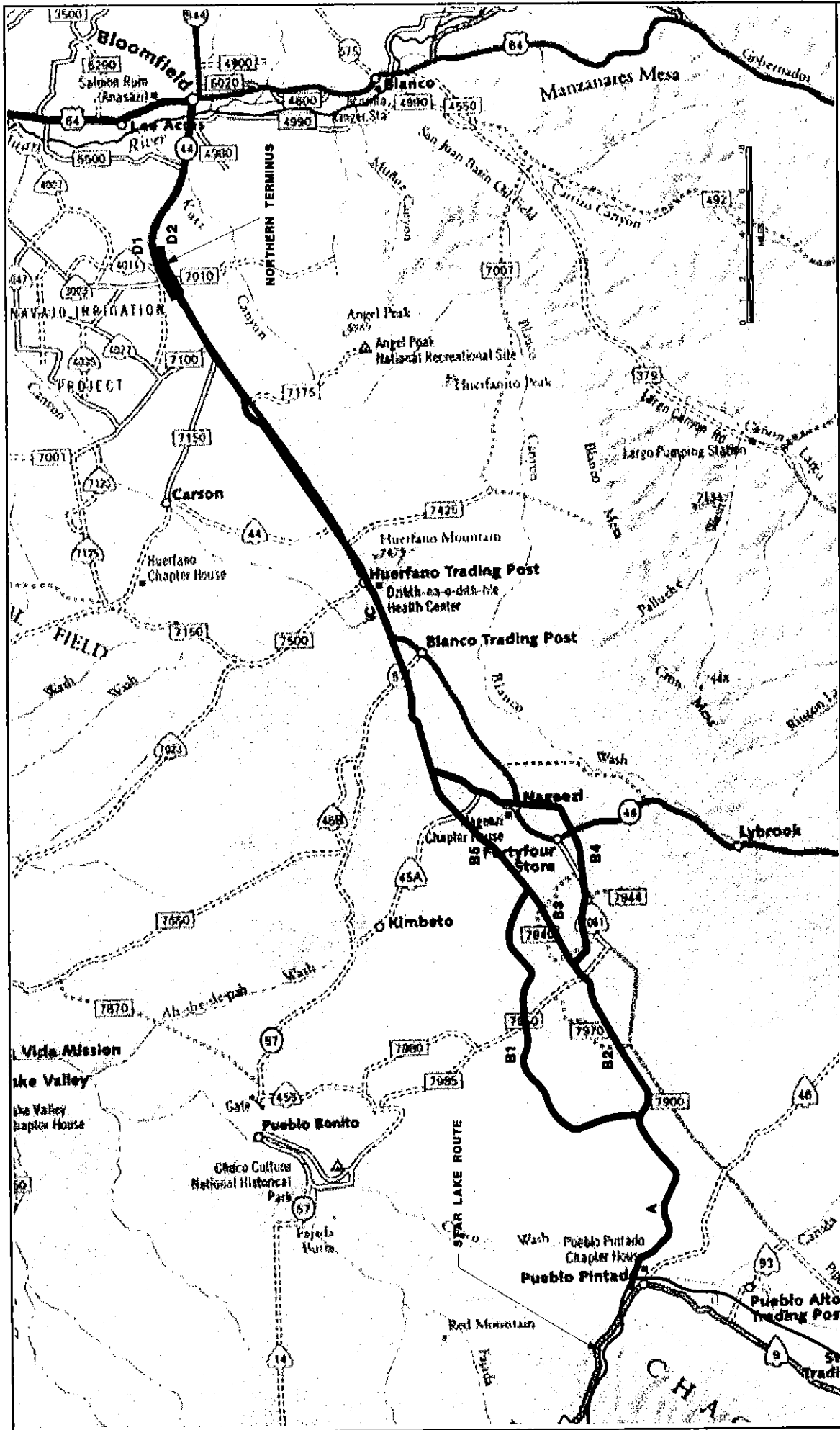
In the immediate vicinity of the project area are the Navajo communities of Pueblo Pintado, Nageezi, and Huerfano. Pueblo Pintado is located at the intersection of three highways: NM509, N9, and N46. Nageezi and Huerfano are located north of Pueblo Pintado, on NM44, the major highway in the project area. Several businesses, as well as a school and health clinic, are located along NM44. Navajo Agricultural Products Industries (NAPI), an irrigated agricultural project, is located west of NM44, just south of Bloomfield.

The land is primarily used for grazing, with portions of the project area comprised of steeply eroded badlands. Other major land uses are the NAPI irrigated farmlands and home sites for Navajo families. The land is rich in minerals and features oil and gas wells and coal deposits.

TERMINI

The southern terminus of the rail line is with the proposed Star Lake Railroad in the vicinity of Pueblo Pintado, in northeastern McKinley County. Representatives of the Star Lake Railroad have completed negotiations with representatives of the Pueblo Pintado Chapter for surveying rights. It is anticipated that the surveying will be finished in September 1998. The next step will be right-of-way acquisition. It is expected that the final alignment will either be located north of Pueblo Pintado, on the south side of Chaco Wash, or south of town, on the south side of NM509/N9. The southern terminus will be at an elevation of approximately 6,500 feet.

MAP B



CORRIDOR MAP
 NORTHERN EXTENSION OF THE STAR LAKE RAILROAD
 SAN JUAN BASIN TRANSPORTATION
 DEVELOPMENT DISTRICT

PROJECT	ICON
FILE	IN/OUT/DWG
SHEET	A-1
SCALE	GRAPHIC
DESIGNED	JAR
EDIT DATE	12/19/97
SAVE	TIME 10.98

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NO.	DATE
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	ORIGINAL

The northern terminus of the rail line is about seven miles south of Bloomfield and approximately 50 miles north of Pueblo Pintado. Bloomfield is located in the San Juan Valley, at approximately 5,400 feet in elevation. Because of Bloomfield's location in the valley, the northern terminus was located at the northern end of NAPI, just north of Mile Marker 145 on NM44, at an elevation of 6,100 feet. This more southerly terminus will avoid the need to descend 700 feet in elevation in 5 miles. It will also avoid crossings of the San Juan River and Kutz Canyon. The northern terminus could be located either on the west side of NM44, on NAPI land, or on the east side of NM44, on BLM land, as discussed below. The latter option would require the railroad to cross NM44 and incur the cost of a grade separated intersection. The cost of this structure was not included in the proposed railroad's construction costs.

POSITION OF AFFECTED PARTIES

The land within the project area falls into four major categories:

- Public domain (administered by the BLM),
- State of New Mexico (administered by the State Land Office),
- Private, or
- Indian.

There is also one parcel, a portion of Chaco Culture National Historical Park (Chaco Park), administered by the National Park Service.

The Indian lands fall into three major subcategories:

- Navajo Tribal Trust Lands, held in trust by the BIA,

- Navajo Tribal Fee Lands, leased out to tribal members, and
- Allotments, which were given to tribal members under the General Allotment Act of 1887 and are held in trust for the members and their heirs; frequently numerous heirs jointly own an allotment.

In this section, we examine the positions of the land owners and other affected parties regarding the construction of a railway in the project area.

Bureau of Land Management

If a railroad were built, an environmental assessment (EA) would be required for the project. The Bureau of Land Management (BLM) would be the lead agency for an EA. BLM staff in the Farmington District Office have indicated that they would not object to the construction of a railroad in the project area. They do not expect that any major problems would arise to prevent construction of the project.

BLM prefers that transportation projects use the designated BLM "windows" through the coal belt, but would not necessarily require the use of the windows. They would be concerned about not impacting the Great North Road from Chaco Park. While it would be preferable to avoid the Angel Peak Recreation Area, they would probably grant a right-of-way across it. The Continental Divide National Scenic Trail Corridor would be located to the south and east of the project and would not be crossed by the proposed railroad extension.

BLM has a standard lease rate for right-of-ways, depending on the County in which the land would be leased. The annual rate for San Juan County is

\$6.97 per acre. The annual rate for McKinley County is \$13.98 per acre. (Typically, each mile of the proposed railroad's right-of-way has 18 acres.)

National Park Service

A portion of Chaco Cultural National Historical Park is located just northwest of Pueblo Pintado. (The land northeast of Pueblo Pintado, which is still shown as Park Service land on some maps, is no longer part of the Park.) The Park Service is concerned about vibrations from the construction and operation of a rail line adversely impacting cultural resources in the Park. They would prefer that a rail line be located at least one mile from the cultural resources.

State Land Office

The State Land Office would not object to the construction of the railroad across their lands. They would prefer that existing corridors be used where possible. Their lease rate depends upon the fair market value of comparable leases.

NAPI

NAPI is interested in shipping freight on the proposed railroad; therefore, they would prefer the rail line to run close to their property. If the line could be located on NAPI land without greatly disrupting agricultural operations, an alignment on the west side of NM44 would be best. NAPI also indicated an interest in having the northern terminus located on their lands. If the terminus

were instead located east of NM44, it might be necessary to construct a spur line between NAPI and the terminus.

Navajo Nation

The Navajo Nation has allowed many right-of-ways across its lands. In granting such right-of-ways, the Nation seeks to maximize revenues, while minimizing impacts on tribal members. The Nation will be sensitive to concerns expressed by chapters and allottees. It is to be expected that protracted negotiations would be required to obtain right-of-ways from the tribe. Support for the railroad from NAPI might help expedite this process.

The Navajo Nation recently negotiated a lease for a pipeline compressor station, granting five acres at \$200,000 per year. A pipeline right-of-way (with a 50-foot width) typically leases for \$700 per rod (equivalent to \$224,000 per mile). MAPCO recently leased 12 miles of right-of-way for its new pipeline for \$2.5 million (equivalent to \$208,000 per mile). Typically, adjustment provisions for inflation are built into these agreements. Often, the tribe also negotiates for a percentage of the value of the resource being conveyed.

If there is a permittee utilizing Navajo fee land, the permittee is typically reimbursed \$400 per acre per year for disturbances to the land in addition to the payment to the tribe. NAPI is itself a permittee and could ask for such a payment.

Affected Navajo Chapters

The three affected chapters are Pueblo Pintado, Nageezi, and Huerfano. The Pueblo Pintado Chapter has recently completed negotiations for surveying rights with the Star Lake Railroad. This surveying is scheduled to be completed in the latter part of 1998. Once completed, it is anticipated that negotiations for right-of-way leases will commence. Frank Chee Willetto, chairman of the Pueblo Pintado Task Force (which is negotiating with Star Lake), indicated that the chapter would likely oppose the construction of a rail line which would not be seen to benefit the chapter. Similar positions were stated by Virginia Harrison, a clerk with Nageezi Chapter, and Wilson Ray, president of Huerfano Chapter.

The chapter representatives perceived that the proposed rail line would benefit NAPI and communities to the north, but would not benefit the chapters themselves. They expressed concern about the loss of grazing land to right-of-way and the visual, noise, and safety impacts of a railroad. They did not indicate that they would favor one alignment over another, but generally opposed any alignment.

Allottees

When a right-of-way is required on an allotment, it is necessary to obtain the permission of a majority of the heirs to that allotment. Allottees will be concerned about not disturbing home sites, corrals, wells, plant gathering areas, and sacred sites. Because of the large number of heirs to some allotments, it may be difficult to obtain a majority approval of a lease.

Allottees are likely to be influenced by the positions taken by their chapters on the right-of-way issue.

Pipeline Companies

The railroad will cross a number of pipelines and could possibly utilize the right-of-ways set aside for other pipelines. Several pipeline companies were contacted regarding their position on utilizing their right-of-ways for a rail line. In general, they expressed concern about the potential impact of a railroad on their pipelines due to stress load and vibrations. They also indicated that they could not, in turn, grant their leased right-of-way to a third party.

LOCATION ISSUES

Several corridor options were identified. The factors that were considered in the selection process are reviewed below.

Topography

Topography greatly impacts the feasibility of a rail corridor. In this country of badlands and washes, it will often be necessary to take a circuitous route in order to avoid geologic features and reduce grade. The most difficult topography is found north of NAPI and south of NM44. The corridors south of NM44 are traversed by five washes, and each will require a crossing structure. These washes are (from south to north) Chaco Wash, Cañada Alemita, Escavada Wash, Betonnie Tsosie Wash, and Kimbeto Wash. The

most challenging of these, from an engineering perspective, is Betonnie Tsosie Wash.

Land Ownership

The acquisition of a right-of-way can delay a project and, depending upon the lease rate, increase its cost. For this reason, corridor selection was prioritized giving heavy consideration to the least costly to obtain. The order of preference is:

- BLM lands,
- State lands,
- Private lands, and
- Indian lands.

Impact on Communities

There are three major communities in the project area. The proposed corridors would pass Pueblo Pintado to the west, Nageezi to the west or northeast, and Huerfano to the west.

Airstrips

Two airstrips need to be avoided. One of these is north of Pueblo Pintado. The other is southwest of Blanco Trading Post (south of Huerfano).

Roads

As mentioned earlier, a number of roads pass through the area. These include NM44, NM509, NM57, N9, N46, and numerous county roads. If the railway crosses NM44, it will be necessary to construct an expensive crossing structure.

Improvements are planned for two roads, NM44 and NM509. NM44 is to be widened to four lanes for its entire length. A typical section will be comprised of four 12-foot lanes and a six-foot median, with climbing lanes as needed. The existing right-of-way is, for the most part, 200 feet. NM 509 is to be extended northward to NM44 near Nageezi; several possible alignments have been identified. The right-of-way for NM 509 is expected to be 200 feet in width.

Pipelines and Wells

The rail line would cross pipelines and pass near many oil wells and other facilities. Care must be taken not to disturb these structures. In some cases, it may be necessary to relocate gathering lines.

Utilities

There are a number of transmission lines and distribution lines, as well as several water lines, in the project area. Some of these lines may need to be raised or relocated, while others can be avoided.

NAPI Facilities

The NAPI lands contain roads, power lines, canals, irrigation systems, and other facilities. Care should be taken to minimize the impact on these facilities and on the available agricultural acreage.

Envirotech Land Farm

Envirotech operates a land farm for remediating soils contaminated by oil spills. The farm is located along the road to Angel Peak (County Road 7175), just east of NM44. The farm should be avoided to the extent possible.

Angel Peak Recreation Area

The Envirotech land farm is located on private land within the Angel Peak Recreation Area. BLM has indicated its intention to acquire this private parcel. While it would be preferable to avoid this parcel, BLM would likely grant a right-of-way if they should acquire it.

Coal Belt/BLM Windows

BLM has identified several "windows" through the coal belt north of Pueblo Pintado, where they would prefer transportation corridors be located. One of these windows is located between Cañada Alemita and Escavada Wash, at the junction of Townships 21N and 22N and Ranges 8W and 9W. The rail corridor should be located within the window if practicable.

Chaco Park

A portion of Chaco Park is located to the northwest of Pueblo Pintado. This parcel should be bypassed as far as possible to avoid impacts from vibrations.

Other Archeological Sites

A number of other archeological sites and Chacoan roads are located in the area. The Great North Road crosses NM44 north of Huerfano and runs north along the east side of NM44. Efforts should be made to avoid all such archeological sites.

ALTERNATIVE ROUTES

Various locational issues described in the previous section were utilized to select alternative corridors. As much as possible, those corridors:

- avoid difficult topography,
- avoid Indian lands,
- follow existing pipeline or road corridors,
- avoid the three major communities,
- avoid the two airstrips,
- minimize road crossings,
- avoid NAPI and Envirotech facilities,
- avoid Chaco Park and other archeological sites, and
- utilize BLM windows.

Each of the alternative corridors is described below.

Corridor A

Corridor A begins at the southern terminus at Pueblo Pintado in McKinley County. It proceeds in a generally north-northeast direction into San Juan County, paralleling a pipeline and transmission line in part. The corridor crosses Chaco Wash and Cañada Alemita. It crosses BLM land and Indian land.

Corridor B1

Corridor B1 proceeds in a westerly direction from Corridor A, just north of Cañada Alemita. It proceeds through the BLM window, before proceeding in a generally northern direction. It crosses Escavada and Betonnie Tsosie Wash. The corridor is located largely on BLM and State lands, as well as two parcels of Indian land.

Corridor B2

Corridor B2 proceeds north from Corridor A before proceeding north/northwest along the main gas pipeline in the area. It crosses Betonnie Tsosie Wash. It is located entirely on BLM and State lands.

Corridor B3

Corridor B3 is a continuation of Corridor B2, along the gas pipeline. It crosses Betonnie Tsosie Wash. It is located on BLM land and two parcels of Indian land.

Corridor B4

Corridor B4 extends generally north from B2, crossing Betonnie Tsosie Wash and proceeding in the vicinity of County Road 7900 through the badlands south of NM44. The corridor crosses NM44 and Kimbeto Wash, where it turns to the west, along the new MAPCO pipeline corridor, skirting Nageezi and recrossing NM44, prior to joining up with the main pipeline corridor. It crosses mostly BLM and State lands, as well as two parcels of Indian land. This corridor would also cross State Highway 44 twice and would require two grade separations.

Corridor B5

Corridor B5 is a continuation of Corridor B3, along the gas pipeline west of Nageezi. It crosses Kimbeto Wash and is located on BLM and Indian land.

Corridor C

Corridor C begins from Corridors B4 and B5, northwest of Nageezi. It parallels the gas pipeline (a continuation of Corridor B5), reaching NM44 at

Huerfano. The corridor continues along NM44 and the pipeline, until reaching NAPI. The route could run either east or west of NM44. The corridor runs mostly on BLM land, with a small amount of Indian land.

Corridor D1

Corridor D1 is a continuation of Corridor C on Indian land through NAPI, along the west side of NM44. It would terminate at the northern edge of NAPI.

Corridor D2

Corridor D2 is a continuation of Corridor C on BLM land along the east side of NM44. It would terminate on the plateau, north of the NAPI pipeline. This corridor would require at least one grade separation with State Highway 44.

IV. PRELIMINARY ALIGNMENT
FOR THE NORTHERN
EXTENSION OF THE
STAR LAKE RAILROAD

IV. PRELIMINARY ALIGNMENT FOR THE NORTHERN EXTENSION OF THE STAR LAKE RAILROAD

DESIGN CRITERIA

The design criteria is established to define the shape and character of the right-of-way, the structures, the track and other features included in the corridor. Design criteria have been established for previous railroad studies done in the area. These criteria have generally followed the requirements of the former Santa Fe Railway that is now part of the Burlington Northern Santa Fe Railroad.

The maximum allowable grades have the biggest impact on selecting and engineering the actual route of a railroad. On a typical railroad, the grades would be balanced in both directions, so that the motive power requirements for a given size train are independent of the direction of travel. If the line is used for unit train movements, such as coal, that are loaded in one direction, then consideration can be given to having unbalanced grades. Unbalanced grades allow steeper, higher numeric grades in the direction of the empty train than the grades in the direction of the loaded trains.

For this conceptual study, grades are balanced to provide maximum flexibility for future feasibility and detail design preparation. The main features of the criteria are as follows.

- Maximum Curvature
- Maximum Grade
- Cut and Fill Slope Ratios
- Structure Capacities

The design criteria used to develop the plan and profile alignment is presented as follows:

1. Curvature:

Maximum degree of curve shall not exceed 6° (six degrees). In exceptional circumstances curvature up to $9^{\circ} 30'$ (nine degrees, thirty minutes) will be allowed in rugged terrain. All curves are defined using the chord definition method. All curves following a switch must begin after the last tie in the switch set. In areas of reversing curves, tangents between curves should be 500 feet in length where practical and a minimum of 100 feet in length.

2. Grades:

Grades shall be limited to a maximum of 1.5% (one and a half percent). Every effort should be made to keep grades as gentle as possible and under 1.0% where practical. Grades above 1.5% should only be used in extreme conditions.

3. Vertical Curves:

Vertical curves must be provided at all breaks in profile grade. The rate of change shall not exceed 1° in summit and sag vertical curves. Vertical curves shall not extend into the limits of turnout switch ties.

4. Embankments:

Embankment slopes in common excavation and fill shall be a minimum of 2:1. Embankment slopes shall be compacted to a minimum dry density of 95% of maximum dry density. Cut slopes in rock excavation shall be designed in accordance with the geotechnical report guide lines during detailed design but shall not be steeper than 1/4:1.

5. Structures:

Bridges, drainage structures, track hoppers, retaining wall and revetments shall be designed to carry the Cooper E 80 loading. Structures shall be designed per American Railway Engineering Association (AREA) standards.

6. Track:

Rail shall not be less than 132 lb. section on mainline tangent or curve track. Ties shall be size No. 5 (7" x 9" x 8") on 19.5 inch centers. Rail anchorage shall be provided at a minimum rate of 32 anchors per 39' panel. Each rail will be spiked with two spikes per tie plate on tangent staggered with inside spikes to the east or the north and outside spikes

to the west or the south. On curves, a third spike is required on the gauge side of the rail.

7. Turnouts:

Turnouts off the mainline for passing tracks shall be number twenty (No. 20) size. Turnouts for sidings and spurs off the mainline or passing track shall be number eleven (No. 11) size. Turnouts shall have double reinforced switch points, manganese insert frogs and be of the same or greater weight as the running rail.

8. Ballast and Walkways:

Ballast for mainline, passing and siding tracks shall be produced from quarry rock and meet the AREA specifications for size No.4 rock ballast. Walkways on bridges and adjacent to switches shall be AREA size No. 5 and comply with State of New Mexico and federal regulations.

9. Derails:

A derail shall be placed on all tracks connecting with a mainline, siding or industrial lead. Derails shall be switch point type and shall be installed so that the derailed car is directed away from the mainline trackage. Derails shall be placed a minimum of 50 feet behind the clearance point.

10. Clearances:

The legal clearance requirements for the State of New Mexico are:

Track Centers

Main tracks	14.0 feet
Tracks Adj. to Mainline	15.0 "
Lead & Repair Tracks	14.0 "
Team Tracks in Pairs	13.0 "

Vertical Clearance from Top of Rail

General	22.5 feet
Thru Bridges	22.0 "
Highway Bridges	22.5 "
Tunnels	23.0 "

Horizontal from Centerline of Track

General	8.5 feet
Thru Bridges	8.0 "
Highway Bridges	8.5 "
Tunnels	8.0 "
High Signals	8.5 "
Poles	8.5 "

11. General:

Loading and unloading tracks should be designed so that they are completely independent of railroad operating lines and passing tracks

such that loading and unloading operations in no way interfere with train operations.

Pipelines under track are to be encased to at least meet AREA requirements. Wire lines are to be installed to meet state and federal safety codes.

The effects on sight distance must be considered when planning construction of trackage in the vicinity of any grade crossings. The required sight distance should be determined and preserved when performing and designing for construction near any grade crossing.

The railroad design will include passing tracks, spaced initially at 20-mile intervals, for trains to meet and pass each other. During future feasibility and detailed design this spacing can be refined to meet the actual operating requirements.

Drainage and hydrology are major factors in the consideration of design and expense. Although the topography is primarily desert, with an annual rain fall of 15 to 20 inches in the higher elevations, more than three inches of rainfall have been known to fall within a 24-hour period, causing flash flooding. Drainage structures should be signed to accommodate extreme conditions, including the 100-year storm.

ROUTE ANALYSIS

DESIGN PROCESS

The engineering and design process for selecting railroad alignments through the transportation corridors starts with the design criteria. The design criteria, which is presented in the "Design Criteria" section of this report, defines the physical properties and limitations of the railroad curvature, gradient as it is developed on the topography in the corridors. A field inspection of the corridors is then conducted to look at the lay of the land and verify and locate any physical features that affect the design work of the alignment. The alignment is developed by setting the horizontal alignment in a segment of the corridor and plotting the vertical profile of the original ground or topography of the alignment. The profile of the top rail of the track is manipulated on the profile to minimize cut and fill depths and determine if the alignment is feasible. The process of adjusting the horizontal alignment to develop an acceptable profile is continued until the alignment is complete.

CORRIDOR ANALYSIS

Chapter III identified the viable railroad corridors based on geopolitical considerations such as land ownership, current land use, potential land use, environmental concerns, and tribal requirements.

The possible corridors are alphanumerically identified and shown in the Corridor Map on page 22. The corridor options are as follows.

- A B1 B5 C D1
- A B1 B5 C D2
- A B2 B3 B5 C D1
- A B2 B3 B5 C D2
- A B2 B4 C D1
- A B2 B4 C D2

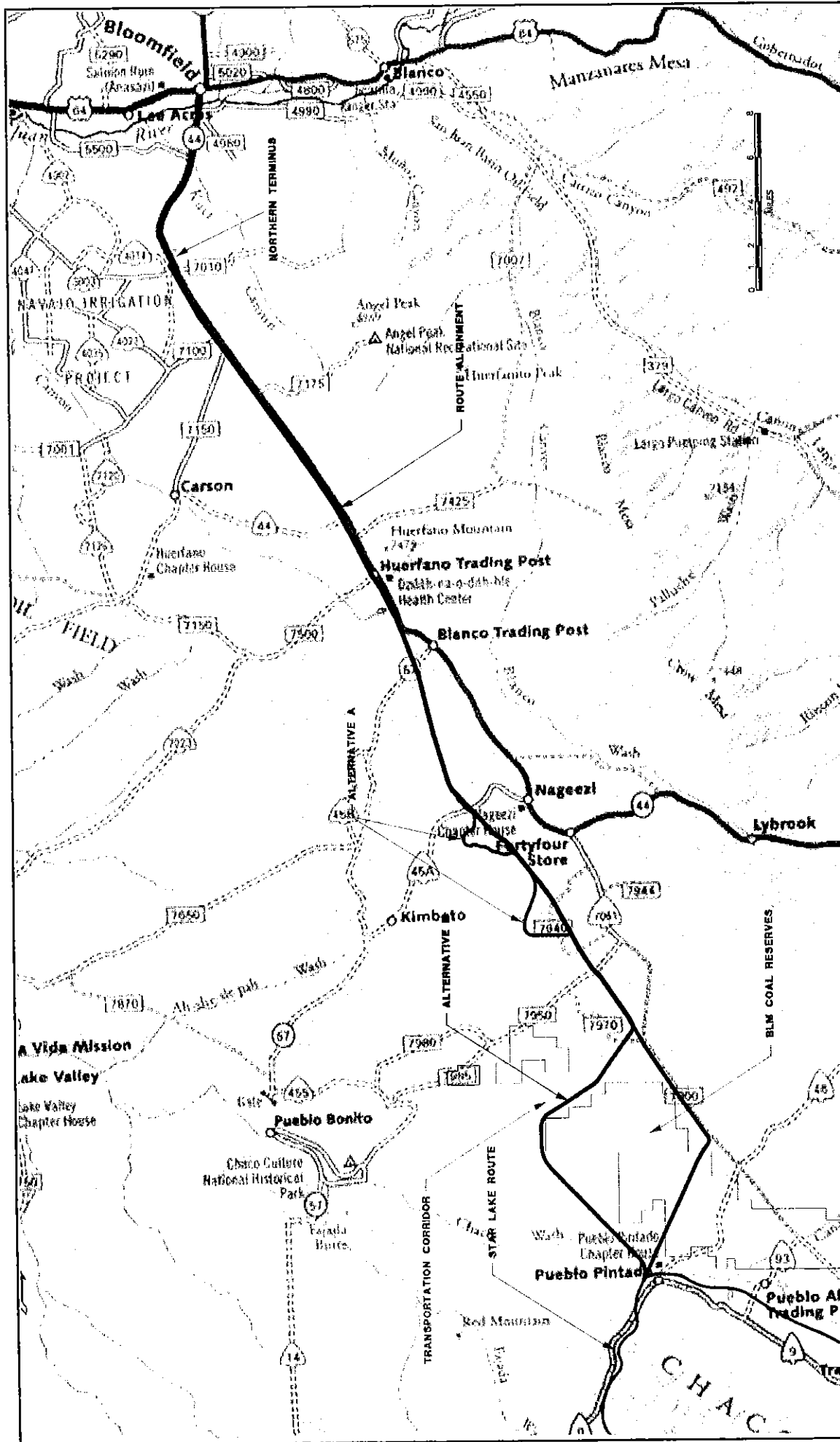
There are six possible corridors. At the north end, the termination of the railroad on the west side of Highway 44, the D1 corridor, eliminates a crossing of the highway and appears to suit the intended use of the railroad. If future detailed studies show a requirement for a termination on the east side of Highway 44, it is a viable option. For this report, the termination is on the D1 corridor.

The B4 Corridor was eliminated based on two considerations. The first is the crossing of Highway 44 twice. The second is no advantages in topographic gradient while being a longer route.

The B1 corridor is also a longer corridor with no appreciable advantage in gradient over the combined B2 B3 combination. With B1 B4 and D2 eliminated, the route for the basis of the plan and profile study is segments A B2 B3 B5 C D1.

Route Alternative B was developed to show the viability of avoiding coal lease land. Alternative A was developed to reduce the original ground gradient along the centerline of the alignment, and thus reduce excavation and embankment quantities and construction costs.

MAP C



PRELIMINARY ROUTE ALIGNMENT
 NORTHERN EXTENSION OF THE STAR LAKE RAILROAD
 SAN JUAN BASIN TRANSPORTATION
 DEVELOPMENT DISTRICT

PROJECT	CON
FILE	INVESTIG
SHEET	GRAPHIC
DESIGNER	WAS
DATE	12/7/97
SAVE TIME	10:11

GMB CONSULTANTS
 7225 N.W. 1361 AVENUE, WARCENNER, WA 98855 (360) 688-3343

FRIGHT SERVICES INCORPORATED
 Post Office Box 608 • Biggs, Oregon 97820

VERSION	NO.	DATE	NOTES

1 27 NOV 97 ORIGINAL

CONSTRUCTION COSTS

The cost of construction has been estimated using the following building blocks:

- Unit prices for heavy construction in the area
- Definition of the scope of construction work
- Estimated quantities of each type of work

The unit prices have been developed from data summarized by the transportation departments in the states of New Mexico and Arizona. This data is compiled from public works projects that have been designed, bid, and awarded.

To build a cost file for this conceptual study, individual work item unit costs have been compiled into larger component unit cost as described as follows:

1. Clearing and Grubbing:

Clearing and Grubbing includes removal and disposal of trees and brush from excavation and embankment areas and excavation of a shallow layer of topsoil that contains vegetation other organic material. The Unit Price for this work is **\$1,250.00 per acre** based on the open semi arid growth in the area.

2. Excavation and Embankment:

The individual elements of the combined excavation and embankment cost item are erosion control, excavation, hauling, placing, watering/dewatering, compaction, slope protection and seeding. The Unit Price for this work is **\$3.00 per cubic yard** and is based on the large volume of excavation that will increase productivity.

3. Subballast:

Subballast is well-graded material with 2 inch maximum particle size that will seal the top of the subgrade in preparation for the track ballast. The material is made by screening native material or by crushing and screening native material to obtain the required gradation. The Unit Price is **\$12.00 per Ton** which includes processing, hauling, placing and compaction.

4. Bridges:

Bridges are a composite of foundations, piers or piling, caps, stringers or deck, hand rails and slope protection of abutments. The alignment crosses long shallow washes that must be allowed to drain freely. The pier or piling spacing can therefore be set at an optimum distance for economical bridge construction. The Unit Price is **\$2,500.00 per lineal foot** along the railway alignment.

5. Culverts:

There will be several different sizes of culverts when the final detailed design of the drainage through embankments is performed. For this preliminary study, an average size of 36 inch diameter is used. The Unit Price is **\$45.00 per lineal foot** which includes outfall protection.

6. Right-of-Way Fencing:

A fence of four strand barbed wire four feet high will be installed on the right-of-way line on both sides of the railroad track. The Unit Price of **\$15,840.00 per mile** includes gates or cattle guards at the grade crossings.

7. Track Work:

The track structure is designed with relay welded 132-pound rail, 7-3/4" x 14" tie plates, 7' x 9' x 8' cross ties and AREA size No. 4 ballast. A detailed break down with used rail options is included later in the section. The Unit Price for track work is **\$95.00 per track foot** for new rail and **\$83.50 per track foot** for relay rail.

8. Sidings and Yards:

The lump sum price for sidings and yards is based on \$83.50 per track foot for track construction, \$50,000.00 for mainline turnouts and \$35,000.00 for yard turnouts. The scope and quantities are described in the following section. The Lump Sum Amount is **\$4,100,000 for sidings and yards.**

9. Grade Crossings:

The grade crossing price includes roadway material through the track, warning signs and connection to existing roadway. The unit price is **\$7,200.00 per location.**

The quantities of work for the various items of the construction cost estimate were calculated based on the horizontal route alignment and vertical profile. Each item is described as follows:

1. Clearing and Grubbing:

The clearing and grubbing acreage is base on a minimum 100-foot right-of-way width that is increased as needed to accommodate the deep cuts and high fill slopes. The average width used is 150 feet for a total clearing and grubbing quantity of 926 acres for Base Route, 976 acres for Alternative A, 954 acres for Alternative B and 1,003 acres the combined Alternatives A & B Route.

2. Excavation and Embankment:

The excavation and embankment quantities are estimated using cross sections for cut and fill areas that have 2:1 slopes per the design criteria. The areas of the sections were calculated based of the relationship of the profile railroad grade to the original ground line. The volumes of excavation and embankment were calculated using the distance between cross sections. The total excavation quantity is 10,200,000 Cubic Yards for the Base Route and the embankment quantity will be slightly less in the final design so no borrow material is

required. The excavation quantities for Alternative A, B and A & B are 6,900,000; 9,900,000; and 6,600,000 Cubic Yards respectively.

3. Subballast:

The subballast material is 24 feet in width across the top of the subgrade and is one foot thick. The quantity for the mainline is 358,700 Tons for Base Route, 377,000 Tons for Alternative A, 369,300 tons for Alternative B and 388,400 Tons for Alternative A & B.

4. Bridges:

The initial review of the drainage areas indicates that Canada Alemita, Escavada, Betonnie Tsosie and Kimbeto washes are likely candidates for bridges. Chaco Wash will be crossed with culverts sized similar to the highway 44 crossing of Chaco Wash. During detail engineering and design it may be determined that one or more additional washes may be crossed with culverts also. The quantity of bridges used for the construction cost estimate is four. Each bridge is estimated to be 180 feet in length.

5. Culverts:

Culverts will vary in size based on the detailed final design. The quantity of culverts has been determine by analyzing the profile and providing culverts in all fill areas to eliminate the possibility of impounding water and to provide natural passage of runoff in existing channels. The quantity of culverts is calculated to be 50 each. The average length of each culvert set at 104 feet.

6. Right-of-Way Fencing:

Both sides of the right-of-way will be fencing with a four strand barbed wire fence four feet high to define the right-of-way line and control grazing cattle. The quantity of fence is estimated at two times the route length.

7. Track Work:

Track work will connect the yard area south of Bloomfield with the Northern Extension of the Star Lake Railroad at Pueblo Pintado. The length of track is 269,000 feet along the proposed alignment for Base Route, 283,300 track feet for Alternative A, 277,000 track feet for Alternative B and 291,300 track feet for the combined A & B Route.

8. Sidings and Yard:

The northern terminus of the railroad will be a rail yard with 15,000 feet of track and 10 switches or turnouts. The mainline track will have a set out siding at the connection in Pueblo Pintado and two passing sidings spaced evenly between the northern rail yard and the connection.

9. Grade Crossings:

Grade crossing will be provided at ten locations in addition to the four bridge locations for access to the oil field equipment and the other land uses on each side of the railroad.

COST SUMMARY

The excavation and embankment item is the largest single item in the construction cost estimate. Half of the excavation quantity is in a nine-mile segment from station 850+00 to station 1,300+00. Alternative A alignment was developed that loops away from Highway 44 to decrease the grading quantities. The total cost for each alignment is presented below.

CONSTRUCTION COST ESTIMATE				
BASE ROUTE ALIGNMENT - 51 MILES				
NORTHERN EXTENSION OF THE STAR LAKE RAILROAD				
ITEM	QUANTITY	UNIT	UNIT PRICE	EXTENSION
1. Clearing and Grubbing	926	AC	\$1,250	\$1,157,500
2. Excavation and Embankment	10,200,000	CY	\$3	\$30,600,000
3. Subballast	358,700	TN	\$12	\$4,304,400
4. Bridges	4	EA	\$450,000	\$234,000
5. Culverts	50	EA	\$4,680	\$234,000
6. R/W Fencing	102	MI	\$15,840	\$1,615,680
7. Track Work	269,000	TF	\$95	\$25,555,000 ⁷
8. Sidings and Yard	1	LS	\$4,100,000	\$4,100,000
9. Grade Crossings	12	EA	\$7,200	\$86,400
Base Route Total:				\$69,452,980
Cost Per Mile - New Rail:				\$1,361,823
Cost Per Mile - Relay Rail:				\$1,300,823

⁷As stated earlier in this section, the track is based on all new material. If used rail, tie plates and rail anchors were used in conjunction with new cross ties and spikes, the savings per mile would be \$61,000 per mile.

CONSTRUCTION COST ESTIMATE				
BASE ROUTE WITH ALTERNATIVE B - 52 MILES				
NORTHERN EXTENSION OF THE STAR LAKE RAILROAD				
ITEM	QUANTITY	UNIT	UNIT PRICE	EXTENSION
1. Clearing and Grubbing	954	AC	\$1,250	\$1,192,500
2. Excavation and Embankment	9,900,000	CY	\$3	\$29,700,000
3. Subballast	369,300	TN	\$12	\$4,431,600
4. Bridges	4	EA	\$450,000	\$1,800,000
5. Culverts	50	EA	\$4,680	\$234,000
6. R/W Fencing	105	MI	\$15,840	\$1,663,200
7. Track Work	277,000	TF	\$95	\$26,315,000 ⁸
8. Sidings and Yard	1	LS	\$4,100,000	\$4,100,000
9. Grade Crossings	12	EA	\$7,200	\$86,400
Base Route with Alternative B Total:				\$69,522,700
Cost Per Mile - New Rail:				\$1,336,975
Cost Per Mile - Relay Rail:				\$1,275,975

⁸As stated earlier in this section, the track is based on all new material. If used rail, tie plates and rail anchors were used in conjunction with new cross ties and spikes, the savings per mile would be \$61,000 per mile.

CONSTRUCTION COST ESTIMATE				
BASE ROUTE WITH ALTERNATIVE A - 54 MILES				
NORTHERN EXTENSION OF THE STAR LAKE RAILROAD				
ITEM	QUANTITY	UNIT	UNIT PRICE	EXTENSION
1. Clearing and Grubbing	976	AC	\$1,250	\$1,220,000
2. Excavation and Embankment	6,900,000	CY	\$3	\$20,700,000
3. Subballast	377,700	TN	\$12	\$4,532,400
4. Bridges	4	EA	\$450,000	\$1,800,000
5. Culverts	50	EA	\$4,680	\$234,000
6. RW Fencing	107	MI	\$15,840	\$1,694,880
7. Track Work	283,300	TF	\$95	\$26,913,500 ⁹
8. Sidings and Yard	1	LS	\$4,100,000	\$4,100,000
9. Grade Crossings	12	EA	\$7,200	\$86,400
Base Route with Alternative A Total:				\$61,281,180
Cost Per Mile - New Rail:				\$1,134,837
Cost Per Mile - Relay Rail:				\$1,073,837

⁹As stated earlier in this section, the track is based on all new material. If used rail, tie plates and rail anchors were used in conjunction with new cross ties and spikes, the savings per mile would be \$61,000 per mile.

CONSTRUCTION COST ESTIMATE				
BASE ROUTE WITH ALTERNATIVES A AND B - 55 MILES				
NORTHERN EXTENSION OF THE STAR LAKE RAILROAD				
ITEM	QUANTITY	UNIT	UNIT PRICE	EXTENSION
1. Clearing and Grubbing	1,003	AC	\$1,250	\$1,253,750
2. Excavation and Embankment	6,600,000	CY	\$3	\$19,800,000
3. Subballast	388,400	TN	\$12	\$4,660,800
4. Bridges	4	EA	\$450,000	\$1,800,000
5. Culverts	50	EA	\$4,680	\$234,000
6. R/W Fencing	110	MI	\$15,840	\$1,742,400
7. Track Work	291,300	TF	\$95	\$27,673,500 ¹⁰
8. Sidings and Yard	1	LS	\$4,100,000	\$4,100,000
9. Grade Crossings	12	EA	\$7,200	\$86,400
Base Route with Alternatives A & B Total:				\$61,350,850
Cost Per Mile - New Rail:				\$1,115,470
Cost Per Mile - Relay Rail:				\$1,054,470

NAVAJO AND STAR LAKE ALIGNMENT COMPARISONS

Comparing the unit cost of constructing the Northern Extension to the Star Lake Railroad with the previously developed cost of constructing the Navajo alignment provides an interesting perspective. The following exhibit breaks the construction costs into two components: one directly associated with the

¹⁰As stated earlier in this section, the track is based on all new material. If used rail, tie plates and rail anchors were used in conjunction with new cross ties and spikes, the savings per mile would be \$61,000 per mile.

track, such as the rails, ties, and ballast, and one associated with the preliminary preparation necessary before the track can be built, primarily grading. In both cases, the track construction is based on relay or used rail and other track material, but new ties.

Construction Cost Per Mile Comparison			
Item	Star Lake	Navajo	Percent Change
Track (relay rail and new ties)	\$442,155	\$455,906	-3
Non-Track	506,090	272,160	+86
Total Mainline Construction	\$948,245	\$728,066	+30

The cost of building the Star Lake extension mainline is about 3 percent less than the cost of building the Navajo alignment. This is from a decrease in material costs.

The more significant change, however, is in the non track costs, which are nearly double those for the Navajo alignment. The largest, single factor relates to the grading work that requires the movement of considerably greater amount of earth for the Star Lake extension compared to the Navajo alignment. The vast majority of the Navajo alignment is flat and requires minimal preparation for the track construction. However, numerous areas for the Star Lake extension require considerable earth moving to maintain the grade standards, increasing the cost accordingly. Combining these two major factors produces a total per mile construction cost that is 30 percent higher for the Northern Extension to the Star Lake Railroad compared to the previously studied Navajo alignment.

Although no specific reconnaissance was performed on the Star Lake extension between South Hospah and Pueblo Pintado, the nature of the topography is similar to that at the south end of the alignment for the northern extension toward Bloomfield. Therefore, track construction costs for that segment will likely be very similar.

Exhibit D also provides a comparison between the capital components of the Star Lake extension and Navajo alignments, including supporting structures and facilities and startup capital. This table indicates that for the 55-mile segment from Pueblo Pintado northward, compared to the 100-mile Navajo alignment, the total construction cost would be 27 percent less for the Star Lake extension. However, if the 30-mile distance between Pueblo Pintado and South Hospah were to be built solely for the purpose of connecting the current end of track to the Northern Extension at Pueblo Pintado, the total construction cost would increase another \$33 million to a total of \$100.7 million. This is \$8.6 million higher than the Navajo alignment capital requirements. Clearly, the distance economics that were contemplated with the Star Lake option have been heavily offset with the higher cost of grading.

EXHIBIT D		
Capital Components Comparison		
	Star Lake	Navajo
Mainline Construction	\$52,153,475	\$72,806,600 ¹¹
Right-of-Way Fencing	1,742,400	3,168,000
Sidings	1,530,000	2,295,000
Yard	1,725,000	1,725,000
Connection to BNSF	815,000	815,000
Engineering and Construction Admin.	5,500,000	7,300,000
Locomotives	1,500,000	1,500,000
Track Maintenance Machines	285,000	285,000
Buildings (office, shop)	200,000	200,000
Startup Capital	2,000,000	2,000,000
Subtotal	\$67,450,875	\$92,094,600
South Hospah-Pueblo Pintado (30 miles)	33,232,281	----
TOTAL	\$100,683,156	\$92,094,600

¹¹Not adjusted for inflation since these elements were calculated in 1992.

V. GALLO WASH
ALIGNMENT
REVIEW

V. GALLO WASH ALIGNMENT REVIEW

This section reviews and compares this study and several aspects of the Gallo Wash Alignment (part of the Star Lake Route) in the report titled "SAN JUAN BASIN TRANSPORTATION OPTIONS UPDATE STUDY" dated September 30, 1990 which was prepared for the New Mexico State Transportation Authority and the San Juan Basin Transportation Development District.

A description of the Gallo Wash Alignment from the referenced study follows:

The Star Lake Alignment starts between Mileposts 27 and 28 on the BNSF Railroad's Lee Ranch coal spur and heads north/northeast for 38 miles along the Continental Divide, then down Pueblo Pintado Canyon to Pueblo Pintado. The first 38 miles is a combination of up and down grades, though the general trend is down, dropping 254 feet at an average grade of 0.14 percent. There are in this segment, however, four miles of grades between 1 percent and 1.5 percent, two miles of grades between 1.5 percent and 2.0 percent, and one mile of 2.38 percent grade. The next five miles descends Pueblo Pintado Canyon at grades between 1.14 percent and 1.98 percent, averaging 1.34 percent.

At Pueblo Pintado, the main alignment turns northwest, while a spur turns southeast for approximately nine and one-half miles toward the Star Lake Trading Post to the proposed Star Lake and East Star Lake Mines. The main alignment would cross into Gallo Wash, descend for approximately seven miles, pass one to two miles outside the boundaries of Chaco Canyon

National Monument, across Escavada, Ah-shi-sle-pah, tsaya and De-na-zin Washes to enter Hunter Wash. The tracks would descend four miles into Hunter Wash. This northern half of the Star Lake Route (north of Pueblo Pintado) would be 45 miles long and would consist of alternating sections of up and down grade, though the overall trend would be down. This segment would have an average grade of 0.32 percent down headed north. However, there would be 12 miles of grades between 1 percent and 1.5 percent, nine miles of grades between 1.51 and 2.0 percent and one mile of 2.31 percent grades.

The comparison will center around:

- Design Criteria
- Exceptions to Design Criteria
- Cost Comparison
- Update Track Portion of Gallo Wash Estimate

DESIGN CRITERIA

A comparison of the design criteria shows the following similarities and differences.

DESCRIPTION	GALLO	THIS STUDY
Curvature	5 Degrees	6 Degrees
Gradient	1.5% Empties 1.8% Loads	1.0 % Desired 1.5 % Maximum
Rail Bed Section	ATSF Railway*	BNSF Railroad*
Structures	Cooper E80 Loading	Cooper E80 Loading
Switches	No. 20 ML No. 9 Yards	No. 20 ML No. 9 Yards
*Virtually the same.		

EXCEPTIONS TO THE DESIGN CRITERIA

The curvature on both routes is less than the design criteria with most curves in the three to four degree range. The gradient of the Gallo Alignment is 1.5% and there are several locations in the current alignment that are 1.5 % so the gradient for all practical purposes is the same for each route. The desired gradient of 1% on the current alignments cannot be met and stay within the proposed railroad corridors. To meet the gradient requirement, would require a considerable lengthening of the route and much more looping around the ridges and up the washes.

COST COMPARISON

The Gallo Wash Alignment study used \$1,100,000 per mile for construction costs made up of \$600,000 for grading and drainage, and \$440,000 for track

and \$60,000 for centralized train control. These numbers can be brought from 1990 to 1997 using inflation rates based on the Consumer Price Index. The yearly inflation rates from 1990 through 1996 are 1.043, 1.030, 1.030, 1.026, 1.028 and 1.030 respectively. For 1996 to 1997, 1.025 is used. The forward conversion factor becomes 1.232. The Gallo Wash Alignment construction costs updated to 1997 are \$739,300 for grading and drainage, and \$542,100 for track and \$73,900 for centralized train control for a total per mile cost of \$281,400.

The construction costs per mile for the Base Alignment and Alternatives of this study vary from a low of \$1,213,000 for the Base Route with Alternatives A & B to \$1,244,600 for the Base Route with Alternative A to \$1,427,100 for the Base Route with Alternative B to a high of \$1,466,800 for the Base route.

In comparing the viability of the two corridors, the preliminary construction costs are right together in the same range of plus or minus \$1.3 million per mile.

VI. MARKET
ANALYSIS
UPDATE

VI. MARKET ANALYSIS UPDATE

Updating the market data for the potential business on a rail line into the Four Corners area involved interviews with over two dozen businesses in the Farmington/Bloomfield area. In addition, telephone interviews were conducted with companies that have proposed to open major facilities in the Four Corners area within the last few years.

The results of the interviews indicated wide support for rail service. Interestingly, the somewhat negative tone to many similar interviews conducted over six years earlier had largely turned to a positive perspective. The range of commodities represented by those interviewed ranged widely, although bulk materials, such as coal, nonmetallic minerals, and petroleum-related products, are clearly in the majority.

It is also noteworthy that the majority of these shipments are already moving in part by rail. These movements involve truck/rail transfer facilities located along the BNSF mainline mostly in either the Albuquerque area, Thoreau, or Gallup. In fact, those companies currently using a transfer between truck and rail forecast about 10,000 annual carloads of business by the end of the Century.

Exhibit E summarizes the commodities projected for the railroad extension by customer and commodity. All of this business is currently moving by truck or a combination of rail/truck, with the exception of the cooking oil and frozen potatoes for NAPI. The outcome of current deliberations for this project will determine whether this business materializes.

EXHIBIT E

Projected Business for Star Lake Railroad

Customer	Commodity	Movement Direction
Giant Refinery	MBTE	Outbound
	Refined Petroleum Products	Outbound
	Crude Oil	Inbound
Westkem-Hall	Methanol and Other Chemicals	Inbound
Phoenix Cement	Fly Ash (Note 1)	Outbound
CME Quarry	Limestone	Inbound
Stone Container	Wood Chips	(Note 2)
Four Corners Power Plant	Lime	Inbound
National King Coal	Coal	Outbound
NAPI	Grain	Outbound
	Fertilizers	Inbound
	Hay	Outbound
	Cooking Oil	Inbound
	Frozen Potatoes	Outbound
Chemical Distributors	Chemicals	Inbound
Coastal Chemical	Chemicals	Inbound
Hanover Compressors	Steel/Machinery	Inbound
Western Tank	Steel	Inbound
RioGrande Cement	Cement	Inbound
Mobile Oil & Lubricants	Lubricants	Inbound
Dial Oil	Lubricants	Inbound
	Diesel Fuel	Inbound
Graves Oil and Butane	Lubricants/LPG	Inbound
Oil Field Service Companies	Drilling Mud	Inbound
	Sand	Inbound
Building Materials Suppliers	Lumber	Inbound

Note 1: Availability of fly ash at sole discretion of power plant where the material is produced.
 Note 2: Plans to convert mill from wood chips to waste paper will end this business by 2002.

The important fact is that this business is already moving to or from the Four Corners area. With the one noted exception: this business is not dependent upon future events. However, this does not imply that realizing these shipments would be accomplished without substantial marketing efforts on the part of the railroad. The current transporters of most of this business will not relinquish their revenues easily. There is, however, the opportunity for much of the trucking to be reorganized, because few if any of the customers using the railroad will receive rail service directly to their loading or unloading dock.

It is anticipated that an industrial park would be developed around the northern terminus of the railroad. The industrial park would be a magnet for new business, particularly if rail service is desired, as well as providing the traditional transloading and warehousing functions. The park concept opens up the opportunity for a new business that would provide these services for users of the industrial park.

BUSINESS FORECAST

The high, mid, and low forecasts start with the same base. The key difference between the three forecasts is in the time frame in which the traffic volume is realized. For example, in the high forecast, the peak forecast is reached in year six. To reach the peak volume this quickly would require a very aggressive marketing program and exceptional cooperation among the various customers. The mid forecast is reflective of a more likely scenario where the high end volume is reached in ten years after startup. To do so would still require a relatively aggressive marketing effort and considerable interest on the part of the customers identified.

The low forecast projects the high end business not to be realized until 15 years after startup or 50 percent longer than the mid forecast. The low forecast reflects greater obstacles in the way of the railroad to capitalize on the projections provided by the shippers and receivers of freight in the Four Corners area. Exhibit F shows the growth trends by the commodity classification.

EXHIBIT F

Star Lake Railroad Extension Traffic Forecast

FORECAST PROJECTION: Low Mid High	Year 3 Year 2 Year 2		Year 6 Year 4 Year 3		Year 9 Year 6 Year 4		Year 12 Year 8 Year 5		Year 15 Year 10 Year 6	
	IB ¹²	OB ¹³	IB ¹⁰	OB ¹¹	IB ¹⁰	OB ¹¹	IB ¹⁰	OB ¹¹	IB ¹⁰	OB ¹¹
Coal	--	5,500	--	6,000	--	7,000	--	8,000	--	9,000
Metallic Ore	--	--	--	--	--	--	--	--	--	--
Non-Metallic Mining Products	1,675	900	2,500	1,100	3,700	1,200	3,850	1,300	4,050	1,500
Agricultural Products	--	200	--	250	--	350	--	400	--	550
Manufactured Food Products	--	--	50	10	100	25	150	200	200	800
Chemical and Fertilizers	335	--	345	--	360	--	360	--	360	--
Petroleum and Petroleum Products	1,290	500	1,400	600	1,870	750	2,150	800	2,720	900
Metal Products	--	--	--	--	--	--	--	--	--	--
Machinery	55	--	55	--	55	--	55	--	55	--
Lumber and Wood Products	150	--	200	--	200	--	250	--	300	--
Total Carloads by Direction	3,505	7,100	4,550	7,960	6,285	9,325	6,815	10,700	7,685	12,750
Grand Total All Carloads	10,605		12,510		15,610		17,515		20,435	

¹² IB = Inbound to Four Corners area.

¹³ OB = Outbound from Four Corners area.

KEY MARKET OPPORTUNITIES

The target markets for the railroad extension are largely those movements that have four common factors: relatively low value, move in bulk quantities, are not time sensitive, and have a movement distance greater than 500 miles. Commodities with these characteristics generally are good candidates for conventional rail shipments. Other railroad business opportunities that do not fit these characteristics were excluded from the forecast. Examples of the latter include consumer goods, such as setup automobiles and trucks and retail store merchandise.

The following comments summarize the nature of the larger sources of business for the railroad based on the interviews.

National King Coal

While coal is forecast to be less than half of the total commodities, this commodity nevertheless represents the biggest, single source of carload volume. National King Coal, located west of Durango, Colorado, is aggressively marketing its very high quality product to industrial users, most recently in California where service disruptions by the Union Pacific opened a unique opportunity. National King has a sales goal of one million annual tons by the beginning of the next Century. By shortening the trucking distance from the mine to the current loadout location west of Gallup, National King will have the opportunity to reach farther distance markets more competitively.

Phoenix Cement

Phoenix Cement opened a new fly ash terminal at the Four Corners Power Plant in 1997. Fly ash is an additive to cement that increases quality through better binding and lighter weight. Fly ash has a very low value, however, and transportation generally determines its marketability. Utilizing a fly ash source well over 100 miles from a railhead is only viable due to the fact the Four Corners Power Plant receives lime inbound. So, the same trucks that bring the lime to the power plant take a load of fly ash back to the Gallup truck/rail transload terminal at a low incremental cost.

Due to the trucking economics, however, the volume of fly ash that can be obtained from the power plant is effectively restricted to the inbound volume of lime currently at about 80,000 annual tons. Therefore, with a lower cost rail service, the opportunity to increase fly ash sourcing from the Four Corners area is considerably improved.

The total availability of the fly ash is subject to the prior need of the power plant. This could restrict total volumes exported in future years.

CME Quarry

The San Juan Generating Power Plant is converting to a new scrubbing system that will be heavily dependent upon limestone. The limestone that will be used is from a quarry south of Grants and will be trucked to the power plant. The trucking economics for this movement are substantially enhanced

based on the use of the trucks hauling National King's coal to Gallup, triangulating across to Grants and returning north with the limestone.

Given the need to truck the limestone a short distance to a rail loadout in the Grants area and then again truck the limestone from the railroad extension's northern terminal to the power plant, the head-to-head economics next to a truck backhaul are not favorable to rail. However, with the shifting of National King Coal to a loadout at the northern end of the railroad extension, this changes. The coal trucks could be used to move the limestone from the railhead to the power plant as is currently contemplated, leaving the establishment of a loadout facility in the Grants area that will likely require some development time. However, the heavy volume of limestone is ideally suited for rail movement

Stone Container

Another major rail user that loads in the Gallup area is Stone Container. Wood chips from southwestern Colorado are trucked to Gallup and then moved to Stone's paper plant in Arizona. Unfortunately for a future railroad extension, this paper mill is projected to convert this key raw material to waste paper by 2002. It is not considered likely that the Four Corners area would be a substantial source of waste paper.

Western Enviro Fuels

One of the promising sources of business for the Star Lake extension was presented by Western Enviro Fuels. This company planned to build a demonstration plant to convert natural gas into various petrochemicals and sulphur-free fuels to serve key areas such as Los Angeles and Texas. However, to do so successfully requires the natural gas feedstock to be obtained at a very low cost. Generally, the value of natural gas is too high for such a process. Low-priced gas is generally only available in offshore or remote areas.

Discussions with Western Enviro Fuels indicated that without certain tax concessions and other factors to render the net cost of the feedstock at an attractive level, the plans for the Bloomfield area were abandoned. Western Enviro Fuels is currently in the development and construction phase of a demonstration plant in southeastern Wyoming for the same purpose proposed for Bloomfield. Western Enviro Fuels did not see a likelihood for them to develop a plant in the Four Corners area now that the Wyoming plant is underway.

SUMMARY

To capitalize on the forecast business volumes will require considerable work with shippers and receivers even prior to the beginning of new rail operations. It is anticipated that prior to revenue operations, three to five years will be required for construction and other development. During this time, it is critical

that preliminary marketing efforts also be underway so that facility design and location, particularly for the transfer between rail and truck, can be finalized and brought online as quickly as possible after rail operations begin. This will also be important for industrial development so that businesses seeking a location in the Four Corners area will be aware of facilities near the railroad's northern terminus. This will enable them to cut down on local trucking in the Farmington/Bloomfield area.

ECONOMIC DATA UPDATE

Railroad economics consist of two major factors. The first factor is the fixed investment, primarily in the right-of-way and improvements to allow rail operations. Unlike most common carrier freight operators, railroads do not share government built and maintained right-of-ways with other users. There are some cases where one railroad will use the facilities of another carrier and then pay the carrier owning those facilities a trackage rights fee. This arrangement is contemplated for the Star Lake extension at least between the BNSF mainline junction near Prewitt and the current end of track near South Hospah.

Agreements to use another railroad's trackage bring with it both economic costs and increased liability. However, the economic costs are usually less than the costs of building parallel facilities, and therefore offer an incremental advantage. The additional liability comes from the indemnification that is quite standard that the trackage rights user will hold the owner of the track harmless from virtually all liability. This indemnification may even include negligence on the part of the track owner.

The other economic factor for railroads are the operating costs relating to the expenses for track and equipment maintenance, the transportation of the freight, and the overhead to manage the company. Appendix D contains the *pro forma* cash flow statement based on the projected operations of the Star Lake Railroad extension. The key assumptions that generated these costs are as follows:

- Service levels: One train will be run six days per week each week of the year from the northern terminus to the BNSF junction and return. As business builds on the railroad, the size of this train will increase and the number of locomotives required to pull it will increase accordingly. In addition to the line haul movement from one end of the railroad to the other, there is also a six day per week switching assignment at the northern terminus that will provide the movement of cars locally to appropriate tracks for loading and unloading. This switcher will also be responsible for assembling the train each day.
- Maintenance of Way: The responsibility for track and fixed facility maintenance will fall on the operator of the Star Lake extension. With the new railroad and relatively light tonnage forecast, the effort to maintain the railroad will allow a normalized maintenance program to be instituted immediately to minimize track deterioration. Most of the maintenance in the first five to 10 years will be related to inspections and fine-tuning weak areas in sections where there are unique topographical issues that negatively impact railroad maintenance.

The track will be maintained at the Federal Railroad Administration's (FRA) Class III safety standard. This allows trains to travel at a top speed of 40 miles per hour. However, due to the absence of a need for

this speed and to control wear and tear as well as derailment risk, the top authorized speed will be 30 miles per hour.

- Maintenance of Equipment: It is not contemplated that the railroad will own rolling stock beyond the locomotives necessary to pull trains. Therefore, repairs made to cars owned by others that will be transporting the freight are considered an offset due to the fact that railroads making safety oriented repairs can bill the owner for expenses incurred.
- Revenue: The freight revenues for the railroad are a blend of factors for the portion of the total movement handled by the Star Lake extension. Given the fact that all carloads are anticipated to move exactly the same distance between the BNSF junction and the northern terminal, the amount of revenue will be dependent upon other factors, including the value of the shipment and total distance. In this regard, hazardous commodities and higher-value shipments generally have higher revenue factors, while low-value commodities moving shorter distances will have lower factors. To simplify the matter, several averages were considered, and the revenue factor for inbound business was set at \$400 per car, while the revenue factor for outbound shipments was set at \$325 per car.
- Land Usage Fees: The research presented in Chapter III reveals a wide range of potential costs to acquire right-of-ways. These range from a low of just under \$7 per acre for BLM land up to hundreds of thousands of dollars for certain Navajo lands. The right-of-way alignment chosen generally minimizes the exposure to nonpublic lands. However, further due diligence would be necessary to specifically pinpoint exact costs for

any particular alignment. Based on estimates developed from this research, it is estimated that the annual lease rates for the 55 miles from Pueblo Pintado to the northern terminus would be \$300,000 annually.

OPERATING CASH FLOW

Exhibits G, H, and I summarize the 10-year operating cash flow under the three traffic forecasts. In each case, the first year is considered to be a startup year with negative cash flow from operations of \$500,000. However, from year two under all three traffic forecasts, the railroad generates a positive cash flow that builds each year at various rates, depending upon the forecast scenario. While even under a low forecast, the railroad produces a considerable operating cash flow, it is insufficient to cover the new investment.

As noted earlier, most of the railroads' competitors use government owned and maintained right-of-ways and facilities. Therefore, the heavy construction burden is not the sole responsibility for any one user. In short, freight transporters using government owned and maintained facilities pay as they go, while a railroad required to build and finance the right-of-way and facilities must essentially pay before it proceeds.

CAPITAL REQUIREMENTS

Based on the construction cost estimated in Chapter IV and adding the additional capital for startup and purchasing the locomotives, machines,

EXHIBIT G				
Ten-Year Operating Cash Flow Projection				
Low Traffic Forecast				
YEAR	ANNUAL OPERATING CASH FLOW	ANNUAL DEBT SERVICE¹⁴	DEFICIT¹⁵	COVERAGE RATIO
1	(\$500,000)	\$5,034,000	\$5,534,000	
2	254,600	5,034,000	4,779,400	5%
3	824,100	5,034,000	4,209,900	16%
4	1,057,110	5,034,000	3,976,890	21%
5	1,268,532	5,034,000	3,765,468	25%
6	1,439,390	5,034,000	3,594,610	29%
7	1,663,566	5,034,000	3,370,434	33%
8	1,829,922	5,034,000	3,204,078	36%
9	2,207,059	5,034,000	2,826,941	44%
10	2,310,684	5,034,000	2,723,316	46%
TOTAL	\$12,354,963	\$50,340,000	\$37,985,037	25%

¹⁴ \$67.5 million total capital @ 7 percent annual interest and 40-year level payback.

¹⁵ Presumes cash flow deficit does not carry over each year.

EXHIBIT H				
Ten-Year Operating Cash Flow Projection Mid Traffic Forecast				
YEAR	ANNUAL OPERATING CASH FLOW	ANNUAL DEBT SERVICE¹⁶	DEFICIT¹⁷	COVERAGE RATIO
1	(\$500,000)	\$5,034,000	\$5,534,000	
2	824,100	5,034,000	4,209,900	16%
3	1,057,110	5,034,000	3,976,890	21%
4	1,439,390	5,034,000	3,594,610	29%
5	1,727,268	5,034,000	3,306,732	34%
6	2,207,059	5,034,000	2,826,941	44%
7	2,326,117	5,034,000	2,707,883	46%
8	2,825,908	5,034,000	2,208,092	54%
9	3,201,976	5,034,000	1,832,024	64%
10	3,464,353	5,034,000	1,569,647	69%
TOTAL	\$18,573,281	\$50,340,000	\$31,766,719	37%

¹⁶ \$67.5 million total capital @ 7 percent annual interest and 40-year level payback.

¹⁷ Presumes cash flow deficit does not carry over each year.

EXHIBIT I				
Ten-Year Operating Cash Flow Projection High Traffic Forecast				
YEAR	ANNUAL OPERATING CASH FLOW	ANNUAL DEBT SERVICE¹⁸	DEFICIT¹⁹	COVERAGE RATIO
1	(\$500,000)	\$5,034,000	\$5,534,000	
2	824,100	5,034,000	4,209,900	16%
3	1,439,390	5,034,000	3,594,610	29%
4	2,207,059	5,034,000	2,826,941	44%
5	2,825,908	5,034,000	2,208,092	54%
6	3,464,353	5,034,000	1,569,647	69%
7	3,575,878	5,034,000	1,458,122	71%
8	3,677,658	5,034,000	1,356,342	73%
9	3,782,493	5,034,000	1,251,507	75%
10	3,890,472	5,034,000	1,143,528	77%
TOTAL	\$25,187,311	\$50,340,000	\$25,152,689	50%

¹⁸ \$67.5 million total capital @ 7 percent annual interest and 40-year level payback.

¹⁹ Presumes cash flow deficit does not carry over each year.

vehicles, and buildings, it is projected that the capital requirements for the 55-mile line from the northern terminus to the area of Pueblo Pintado is \$67.5 million. Based on a level payback at 7 percent interest, the annual cash for debt service for this capital component would be \$5,034,000. The following three exhibits summarize the difference between the annual operating cash flow and the annual debt service based on the specific traffic forecast. The exhibits also summarize the coverage percentage that increases as the business on the railroad develops. Utilizing the mid forecast, for example, the coverage ratio reaches 81 percent at the end of 40 years, with an average of 63 percent over the 40-year period.

There is still a 30-mile gap that currently exists between the end of track near South Hospah and the junction with the proposed Star Lake Railroad extension near Pueblo Pintado. Although due diligence efforts are proceeding, there are currently no plans to actually build additional track, and most of the coal reserve lease holders are looking to transfer their positions due to the fact that there is no foreseeable market for the coal. Given this situation, the construction cost of this 30-mile segment would probably be the responsibility of the party building the extension into the Farmington/Bloomfield area. With an average cost the same as that for the portion north of Pueblo Pintado, the capital requirement for the additional 30 miles of railroad would be \$33 million, or nearly 50 percent higher than the 55-mile extension by itself.

This additional capital burden would cause the debt servicing coverage ratio to decline accordingly. This happens because there is no additional business available for the railroad except for that in the Farmington/Bloomfield area. The annual cash required to also service the debt for the additional 30 miles climbs to \$7.5 million, reducing the coverage ratio as shown below.

Coverage Ratio for Debt Service 40-Year Average Per Mile Comparison		
Traffic Forecast	Pueblo Pintado- North Terminus (55 Miles)	South Hospah- North Terminus (85 miles)
Low	58%	39%
Mid	63%	42%
High	74%	50%

One of the premises behind the current study was that the Star Lake Railroad would be built into at least to the Pueblo Pintado area. While this cannot be entirely ruled out, the information from both railroad and coal lease holders leaves the possibility of any further railroad construction within the next 10 years in extreme doubt. With the higher grading costs associated with the Star Lake route, the cost of building about 85 miles of railroad between South Hospah and the northern terminus would be more expensive than the 100-mile mainline for the Navajo alignment.

ECONOMIC IMPACTS OF THE STAR LAKE RAILROAD

The economic impacts of the proposed Star Lake Railroad are illustrated in Appendix E (Tables I, II, III, and IV). The following assumptions or information were used in deriving these numbers.

- The project construction cost is \$98,683,151. This is the cost of the Star Lake Extension portion of the railroad, and the portion of the railroad from South Hospah to Pueblo Pintado. Due to the current coal market, the entire length of the railroad would have to be constructed as a part of this project.
- The project start date was calculated to be the year 2000, with five years needed to construct the railroad.
- Construction costs were provided by *Freight Services Incorporated (FSI)*, based upon their knowledge of the new alignment and current railroad industry. This data was used in the GRA Economic Impacts Model to generate data on employment, wages, outputs, and taxes.
- Impacts are based upon the railroad and its construction. The auxiliary industries created as a result of the railroad, while certain to exist, cannot be accurately projected in this model.

TABLE I: ECONOMIC IMPACT OF THE PROJECT ON WAGES

From the year 2000 to 2009, the project, in total, would generate \$30 million in wages. Of this, over \$27 million would be paid out in San Juan County. The years 2002 and 2003 would generate the greatest portion of these earnings, as construction would be in full swing.

TABLE II: ECONOMIC IMPACT OF THE PROJECT ON TAXES

The project, during the ten-year period from 2000 to 2009, is estimated to generate \$334,000 in tax revenues, most of this in San Juan County. Again, the greatest amount of tax revenue would be generated in the years 2003 and 2004, when construction would be at its peak.

TABLE III: IMPACT OF THE PROJECT ON EMPLOYMENT

Over a ten-year period, the project would create over 1,000 jobs. Most of these positions would be during the construction phase of the project, as considerable manpower would be required at this time. Once the project was completed, the railroad would initially provide about 25 positions in the region.

TABLE IV: IMPACT OF THE PROJECT ON OUTPUTS

Over a ten-year period, the outputs in the region would increase by 165 million dollars as a result of construction and operation of the Star Lake Extension Railroad. The vast majority of this additional economic growth would occur in San Juan County, New Mexico.

CONCLUSION

For several years, the feasibility of a railroad to the Farmington/Bloomfield area has been studied. Although the initial cost is high, the potential economic benefits are also substantial. The information provided above does not begin to discuss the impact of these new dollars in the economy of the region, and the impact they would have on other industries in the region, such as the service industry, the hospitality industry and the recreation industry. Additionally, the economic growth that a railroad would attract to the region has not been included in this analysis. It can be assumed that the secondary economic benefits of the Star Lake Railroad Northern Extension far exceed the benefits calculated above.

APPENDICES

Appendix A

**PERSONS
INTERVIEWED
FOR CORRIDOR
EVALUATION**

Persons Interviewed For Corridor Evaluation

Alben, Mary Jo, Bureau of Land Management, Farmington

Barnes, Chris, Bureau of Land Management, Farmington

Bates, Lorenzo, NAPI, Farmington

Brul, Don, Star Lake Railroad, Albuquerque

Crockford, Jerrold, Bureau of Land Management, Farmington

Dennis, Merle, City Manager, Bloomfield

Dick, Steve, Wilson & Company, Albuquerque

Ford, Dabney, Chaco Culture National Historical Park, Nageezi

Freeman, Jerry, PNM Gas Services, Albuquerque

Friedman, Fred, N.M. Highway & Transportation Department

Garcia, Dennis, N.M. State Land Office, Santa Fe

Gallegos, Richard, N.M. State Land Office, Farmington

Gutierrez, Cecil, Transwestern Pipeline, Albuquerque

Harrell, Larry, Transwestern Pipeline, Bloomfield

Harrison, Dale, HDR, Albuquerque

Harrison, Virginia, Nageezi Chapter

Herrera, Vicky, Envirotech, Inc., Farmington

Lueras, Joe, Transwestern Pipeline, Albuquerque

Maestas, Roy, N.M. Highway & Transportation Department, Santa Fe

Majerson, Bruce, El Paso Natural Gas, Farmington

Murnane, Mary, Northwest New Mexico Council of Governments, Gallup

Nakai, Alfonso, NAPI, Farmington

Nakai, Henry, NAPI, Farmington

Pacheco, Luis, N.M. Highway & Transportation Department, Santa Fe

Ray, Wilson, Huerfano Chapter

Richards, T.J., San Juan County Public Works Department, Aztec

Roberts, Rob, PNM Electric and Gas Right-of-Way Department, Albuquerque

Sloan, Larre, Mid-America Pipeline System, Tulsa, Oklahoma

Starks, Robert, El Paso Natural Gas, El Paso, Texas

Trujillo, Fernando, N.M. Highway & Transportation Department, Milan

Valdez, Dennis, N.M. Highway & Transportation Department, Santa Fe

Valerio, Max, N.M. Highway & Transportation Department, Santa Fe

Willetto, Frank Chee, Pueblo Pintado Chapter

Wilson, C.T. (Butch), Chaco Culture National Historical Park, Nageezi

Data Sources for Market Analysis Update

Jack Morgan	-	Attorney at Law
Al Keller	-	Former City Manager - Bloomfield
Bill Harrell	-	Public Service Company of New Mexico
Joe Schmitz	-	City of Farmington
LoRenzo Bates	-	NAPI
John Stokes	-	Giant Refinery
David Eppich	-	San Juan Forum/Fort Lewis College
Brad Goshe	-	National King Coal
John Barrett	-	Texas Utilities
Margaret Stinson-McDaniel	-	San Juan Economic Development Service
Jack Smelser	-	Y&S Candies
Mike Reams	-	Coastal Chemical
Dan Dibble	-	City of Farmington
Bill Longacre	-	Hanover Compressors
J. Greg Merrion	-	Merrion Oil and Gas
Steve Dunn	-	Merrion Oil and Gas
Art Lopez	-	Arco Materials
Greg Miller	-	Western Mobile
Bill Webb	-	Rio Grande Cement
Earl Long	-	Four Corners Drilling
Darrell Owen	-	Chevron Lubricants
Dick Dial	-	Dial Oil
Ron Helms	-	Phoenix Cement
Dale Diulus	-	Phoenix Cement
Mark Sampson	-	Lamb Weston
Jim Britten	-	Unichem
Albert Rich	-	H & M Precision

Bill Hagler	-	Unico
Sean Leary	-	Stone Container
Jasper Welch	-	Four Corners Management Systems/Mayor ProTeam, City of Durango
Robert Vogt	-	Robert S. Vogt & Partners
Ron Baird	-	Western Enviro Fuels
Joe Arado	-	Transportation Committee
Gary Jennings	-	San Juan Resource Conservation & Development
Arnold Van Noy	-	Independent Oil and Gas Consultant
Stan Jepson	-	MI Drilling Fluids
Gene Roberts	-	Haliburton Energy Services
Bill Petersen	-	Transportation Committee
Lloyd Ayliffe	-	City of Bloomfield

Appendix C

REFERENCES

References

Bureau of Land Management, Draft Environmental Assessment for Coal Preference Right Leasing, New Mexico, undated.

Bureau of Land Management, Environmental Assessment for the Mid-America Four Corners Pipeline Loop Project, June 1995.

Bureau of Land Management, Farmington Resource Management Plan, July 1988.

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International Consulting & Associates, Highway 44: Preliminary Utility Coordination Report, September 1997.

Mid-America Pipeline System, map of Four Corners Lateral, 1973.

Navajo Indian Irrigation Project, general map and road system map, undated.

Navajo Land Department, "Eastern Navajo Agency Land Status" map, February 1997.

New Mexico Highway & Transportation Department, map of land status in vicinity of NM44, Counselor to Bloomfield, 1997.

San Juan County Public Works Department, Southern Portion San Juan County Road Map, Revised April 1996.

U.S. Geological Survey, assorted topographic maps (1:24,000), 1966-1985.

York, Frederick F. and Joseph C. Winter, Report of an Ethnographic Study and Archeological Review of Proposed Coal Lease Tracts in Northwestern New Mexico, February 1988.

Appendix D

PRO FORMA
CASH FLOW
STATEMENTS

Pro Forma Cash Flow Statements

The following *Pro Forma* Cash Flow Statements were developed using *Freight Services Incorporated's* Railroad Analysis Model. The statements have a five-year range, with specific years based on the traffic forecast. For example, under the Low Forecast, the years represented are the 3rd, 6th, 9th, 12th, and 15th after the railroad begins operations.

Star Lake Extension
 Pro Forma Operating Cash Flow
Freight Services Incorporated
Railroad Analysis Model

	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Forecast: Low	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Mid	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14
High	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14
EXPENSES													
ADMINISTRATIVE													
General Manager	\$56,000	\$56,000	\$56,000	\$56,000	\$56,000	\$56,000	\$56,000	\$56,000	\$56,000	\$56,000	\$56,000	\$56,000	\$56,000
Clerical	\$30,000	\$30,000	\$30,000	\$30,000	\$30,000	\$30,000	\$30,000	\$30,000	\$30,000	\$30,000	\$30,000	\$30,000	\$30,000
RRTA/Benefits	\$38,700	\$38,700	\$38,700	\$38,700	\$38,700	\$38,700	\$38,700	\$38,700	\$38,700	\$38,700	\$38,700	\$38,700	\$38,700
Marketing	\$62,000	\$62,000	\$62,000	\$62,000	\$62,000	\$62,000	\$62,000	\$62,000	\$62,000	\$62,000	\$62,000	\$62,000	\$62,000
Subtotal	\$186,700	\$186,700	\$186,700	\$186,700	\$186,700	\$186,700	\$186,700	\$186,700	\$186,700	\$186,700	\$186,700	\$186,700	\$186,700
Office Expense	\$28,000	\$28,500	\$29,500	\$30,500	\$32,500	\$35,000	\$37,500	\$40,000	\$42,500	\$45,000	\$47,500	\$50,000	\$52,500
Utilities	\$9,000	\$10,000	\$11,000	\$12,000	\$13,000	\$14,000	\$15,000	\$16,000	\$17,000	\$18,000	\$19,000	\$20,000	\$21,000
Subtotal	\$37,000	\$38,500	\$40,500	\$42,500	\$45,000	\$47,500	\$50,000	\$52,500	\$55,000	\$57,500	\$60,000	\$62,500	\$65,000
Travel & Entertainment	\$8,000	\$9,000	\$10,000	\$11,000	\$12,000	\$13,000	\$14,000	\$15,000	\$16,000	\$17,000	\$18,000	\$19,000	\$20,000
Subtotal	\$8,000	\$9,000	\$10,000	\$11,000	\$12,000	\$13,000	\$14,000	\$15,000	\$16,000	\$17,000	\$18,000	\$19,000	\$20,000
Accounting	\$20,000	\$22,000	\$24,000	\$26,000	\$28,000	\$30,000	\$32,000	\$34,000	\$36,000	\$38,000	\$40,000	\$42,000	\$44,000
Legal	\$30,000	\$30,000	\$35,000	\$35,000	\$40,000	\$40,000	\$45,000	\$45,000	\$50,000	\$50,000	\$55,000	\$55,000	\$60,000
Subtotal	\$50,000	\$52,000	\$59,000	\$61,000	\$68,000	\$70,000	\$77,000	\$79,000	\$87,000	\$89,000	\$97,000	\$99,000	\$107,000
Insurance	\$130,180	\$134,180	\$138,180	\$142,180	\$146,180	\$150,180	\$154,180	\$158,180	\$162,180	\$166,180	\$170,180	\$174,180	\$178,180
ROW Lease	\$300,000	\$300,000	\$300,000	\$300,000	\$300,000	\$300,000	\$300,000	\$300,000	\$300,000	\$300,000	\$300,000	\$300,000	\$300,000
TOTAL ADMINISTRATIVE	\$711,880	\$720,380	\$731,380	\$741,380	\$754,430	\$767,480	\$780,480	\$793,480	\$806,480	\$819,480	\$832,480	\$845,480	\$858,480

Star Lake Extension
 Pro Forma Operating Cash Flow
Freight Services Incorporated
Railroad Analysis Model

Forecast: Low	Year 3	Year 6	Year 9	Year 12	Year 15
Mid	Year 2	Year 4	Year 6	Year 8	Year 10
High	Year 2	Year 3	Year 4	Year 5	Year 6
TOTAL REVENUE	\$3,709,500	\$4,300,000	\$5,544,625	\$6,155,000	\$7,217,750
TOTAL EXPENSES	\$2,885,400	\$2,860,610	\$3,337,566	\$3,329,092	\$3,753,397
OPERATING CASH FLOW	\$824,100	\$1,439,390	\$2,207,059	\$2,825,908	\$3,464,353

Appendix E

ECONOMIC
IMPACTS
OF THE
STAR LAKE
RAILROAD

Economic Impacts of the Star Lake Railroad

The economic impacts of the proposed Star Lake Railroad are illustrated in the following tables (Tables I, II, III, and IV). The following assumptions or information were used in deriving these numbers:

- The project construction cost is \$98,683,151. This is the cost of the Star Lake Extension portion of the railroad, and the portion of the railroad from South Hospah to Pueblo Pintado. Due to the current coal market, the entire length of the railroad would have to be constructed as a part of this project.
- The project start date was calculated to be the year 2000, with five years needed to construct the railroad.
- Construction costs were provided by *Freight Services Incorporated (FSI)*, based upon their knowledge of the new alignment and current railroad industry. This data was used in the GRA Economic Impacts Model to generate data on employment, wages, outputs and taxes.
- Impacts are based upon the railroad and its construction. The auxiliary industries created as a result of the railroad, while certain to exist, cannot be accurately projected in this model.

TABLE I
GRA Economic Impact Model
Economic Impact of the Project on Wages
Impact in Millions of Dollars

County	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	TOTAL
San Juan	0.9	1.4	8.2	7.3	4.3	1.1	1.1	1.1	1.3	1.2	27.9
McKinley	0.0	0.1	0.4	0.3	0.2	0.0	0.0	0.0	0.0	0.0	1.0
Cibola	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Apache	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
La Plata	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Montezuma	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Archuleta	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
San Juan, UT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	1.0	1.6	8.8	7.7	4.8	1.2	1.2	1.2	1.3	1.2	30.0
Navajo Nation	0.1	0.2	0.7	0.5	0.3	0.0	0.0	0.0	0.1	0.0	1.9

TABLE II
GRA Economic Impacts Model
Economic Impact of the Projects on Taxes
Impact in Thousands of Dollars

County	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	TOTAL
San Juan	9.5	15.7	90.5	79.8	49.2	12.5	12.5	12.6	13.8	12.8	308.9
McKinley	0.7	1.2	6.3	5.4	3.3	0.1	0.1	0.1	0.1	0.1	17.4
Cibola	0.1	0.2	0.8	0.5	0.3	0.0	0.0	0.0	0.0	0.0	1.9
Apache	0.0	0.1	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.6
La Plata	0.2	0.3	1.2	0.8	0.4	0.1	0.1	0.1	0.1	0.1	3.4
Montezuma	0.1	0.1	0.3	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.8
Archuleta	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2
San Juan, UT	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Navajo Nation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	10.8	17.6	99.6	87.1	53.5	12.8	12.8	12.9	14.2	13.0	334.3

TABLE III

GRA Economic Impacts Model
Economic Impact of the Projects on Employment
Number of Full-time Jobs Created

County	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	TOTAL
San Juan	33	59	319	267	158	23	23	23	29	24	958
McKinley	2	3	16	13	8	0	0	0	0	0	42
Cibola	0	0	2	1	1	0	0	0	0	0	4
Apache	0	0	2	1	1	0	0	0	0	0	4
La Plata	1	1	4	3	2	0	0	0	0	0	11
Montezuma	0	0	1	1	0	0	0	0	0	0	2
Archuleta	0	0	0	0	0	0	0	0	0	0	0
San Juan, UT	0	0	0	0	0	0	0	0	0	0	0
Total	36	64	334	287	168	24	24	24	30	25	1016
Navajo Nation	5	8	33	23	12	2	2	2	3	3	93