



UNITED STATES GENERAL ACCOUNTING OFFICE

WASHINGTON, D.C. 20548

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July 15, 1983

HUMAN RESOURCES
DIVISION

B-212368



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The Honorable Orrin G. Hatch
United States Senate

Dear Senator Hatch:

Subject: Railroad Employment Projections (GAO/HRD-83-76)

In response to your May 20, 1983, request, we reviewed the Railroad Retirement Board's (RRB's) rail employment projections and the assumptions RRB used in making such projections from 1981 through 1983.

Inaccurate estimates of future rail employment can seriously weaken the financial condition of the \$6 billion railroad retirement program because such estimates are used to determine the amount of payroll tax revenues available to pay benefits. Therefore, we sought to determine (1) what methodology RRB followed in preparing the projections, (2) what other organizations made rail employment projections and what they forecasted, (3) what is the potential for RRB making more accurate future estimates, and (4) how RRB's current projections compare to those made by other organizations. We talked with RRB and other Federal and nongovernmental officials who make rail projections and reviewed and compared their past and current forecasts. This report does not evaluate the methodologies and assumptions used in econometric forecasts. We are currently evaluating such forecasts to determine why only one econometric model produced accurate results. We will contact your office when this additional work is completed. See enclosure I for a more detailed discussion of our work. Enclosures II through VI show past rail employment and projections by RRB and other organizations.

The results of our work are summarized below:

--RRB does not use or consider all the data it might in developing estimates and does not use econometric models such as those used by some forecasting organizations. According to RRB officials, they base their employment projections on "educated guesses" which consider past industry trends and the economy. They believe that these are as accurate as more sophisticated systematic or econometric forecasting methods. They described systematic estimating methods as a waste of money.

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--Rail employment forecasts by the Departments of Commerce and Labor, the Congressional Budget Office, and some industry groups have been considerably higher than actual rail employment. Although the Federal agencies used econometric forecasting models, their projections were not better than RRB's. Officials from these agencies described long-term rail employment forecasts (beyond 10 years) as educated guesses; however, they stated that accurate, short-term forecasts are possible.

--One forecaster, the National Planning Association, a non-profit research organization, projected rail employment more accurately than RRB and others. The Association made a detailed study of future rail employment for the Commission on Railroad Retirement in 1971. Published in 1972, the study estimates were much more accurate than an RRB projection made about the same time and more accurate for the 1980s than recent projections by RRB and others. In preparing its more accurate estimates, the Association performed a very detailed analysis of variables affecting the rail industry and developed an econometric forecasting model.

At our request, the Association updated its rail employment estimates based on the 1972 model. The cost of this updated study was under \$10,000. A comparison of RRB and Association forecasts for the next 5 years shows that RRB generally projects lower rail employment than the Association does. RRB predicts that rail employment will level off in 1989, while the Association expects a continuing decline through the year 2000.

--When contrasted with other rail employment projections, RRB's current projections appear conservative--until 1989. This current estimate provides a reasonable basis for estimating short-term payroll tax revenues available for benefit payments. Over the longer term, the reasonableness of these estimates is uncertain.

--RRB's past performance in estimating future rail employment has been poor. The Congress could explore with RRB how better information might be obtained. The relative accuracy of the National Planning Association's 1972 forecast suggests that using a well-constructed econometric model could assist RRB in making accurate rail employment projections.

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Because of time constraints, we did not obtain RRB's written comments on the matters covered in this report. However, we discussed these matters with agency officials and included their comments where appropriate.

Copies of this report are being sent to cognizant congressional committees; the Chairman, Railroad Retirement Board; the Director, Office of Management and Budget; and other interested parties.

Sincerely yours,

A handwritten signature in cursive script, appearing to read "Richard L. Fogel".

Richard L. Fogel
Director

Enclosures - 6

RAILROAD EMPLOYMENT PROJECTIONS

To review the Railroad Retirement Board's (RRB's) employment projections and the potential for increased accuracy in future projections, we interviewed RRB and other Federal and nongovernmental officials who make rail employment projections and analyzed their past and current forecasts. We reviewed rail employment projections made by RRB, the Departments of Commerce and Labor, the Congressional Budget Office, and private organizations, such as the Association of American Railroads and the National Railway Labor Conference, and compared rates of accuracy. We did not evaluate the methodologies and assumptions used in making their forecasts. We interviewed economic forecasters in the above Federal agencies, the Department of Transportation, and private industry to learn their views on the feasibility and cost of making accurate rail employment projections using a systematic forecasting model. We contracted with one organization, the National Planning Association, to develop rail employment projections using an econometric forecasting model.

RECENT RRB EMPLOYMENT PROJECTIONS--
THEIR ACCURACY AND HOW THEY WERE MADE

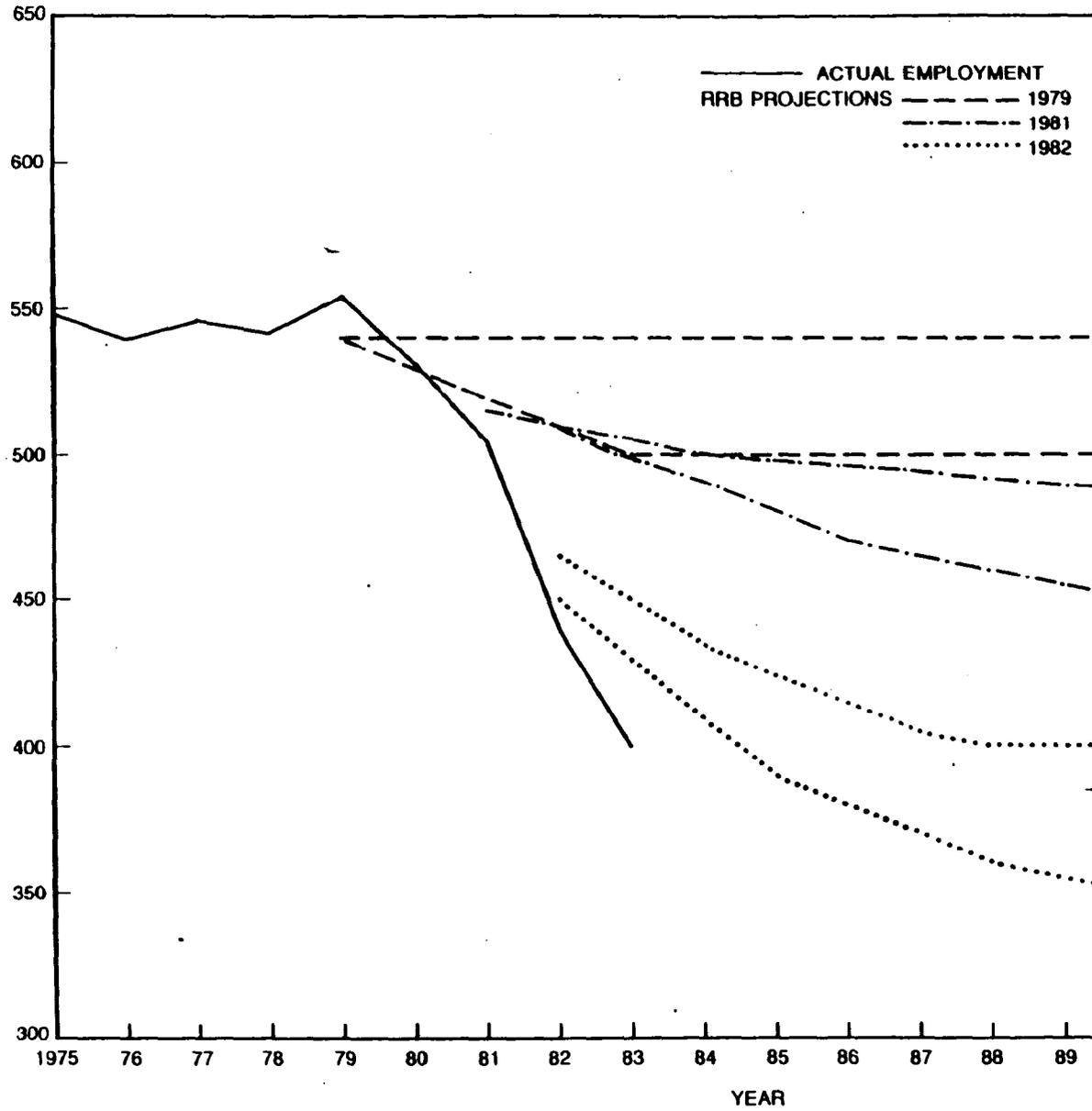
RRB is required to evaluate actuarially the railroad retirement program every 3 years. The last evaluation was in October 1982. These evaluations estimate rail industry employment and analyze the financial condition of the railroad retirement program. Because recent, short-term projections have been considerably higher than actual employment (see graph on the following page and enc. II), RRB has made additional interim projections since the latest evaluation. RRB's recent projection figures are in enclosure III. These estimates, which were developed without the use of systematic or econometric techniques,¹ assume rail employment will cease declining and level off--an unfulfilled expectation RRB has been projecting for many years.

In mid-1981, RRB made employment projections for its 15th actuarial valuation. The valuation contained high (optimistic) and low (pessimistic) employment projections. In preparing its 15th actuarial valuation, RRB, as suggested by the Office of Management and Budget, obtained employment forecasts from other Federal agencies, including the Department of Commerce's Bureau

¹An econometric technique is designed to measure the effect that certain variables have on the variable being studied (rail employment), based on the historical relationship among variables.

COMPARISON OF RECENT RRB RAIL EMPLOYMENT PROJ WITH ACTUAL RAIL EMPLOYMENT

EMPLOYMENT
(THOUSANDS)



of Industrial Economics, the Department of Labor's Bureau of Labor Statistics, and the Congressional Budget Office. RRB officials considered these forecasts in making their 1981 employment projections. Because RRB's 1981 projections overstated actual rail employment, new projections were added in April 1982 before the valuation report was published. Less than 1 year later, employment had dropped below the level predicted in the April 1982 estimates, and in February 1983 RRB revised those estimates. The February 1983 low (pessimistic) projection was revised again in May 1983; the high (optimistic) projection, which RRB officials stress is their "most likely" assumption, remains unchanged.

While it is too early to judge the accuracy of RRB's latest projections, we analyzed RRB's estimating methodology and the effect the revised projections will have on the railroad retirement program. A five-member panel consisting of three RRB actuaries, one RRB statistician, and one RRB economist makes the RRB projections. Starting with current employment levels, the panel assumed that rail employment would continue to decline--as has been the trend since World War II. They said they guessed the amount of annual decline based on their general knowledge of the industry. They did not consider the mathematical relationship between rail employment and variables which affect rail employment, such as gross national product (GNP), rail output, and productivity. There was no documentation on the panel's procedures, discussions, or basis for assumptions.

RRB officials believe it is impossible to predict accurately the economic variables on which rail employment depends. They stated that because an exact relationship does not exist between rail employment and these variables, it is preferable to predict rail employment without considering variables. They added that contracting for mathematical projections would be a waste of money.

RRB calculations show that, over the 10-year period between fiscal years 1983 and 1992, the railroad retirement program will receive about \$6.4 billion less in tax revenue for the industry pension component (tier II) based on its 1983 projections than it would have received under the 1981 projections.²

²Although the 1981 high projection ranged from 505,000 in 1983 to 484,000 in 1992 (see enc. III), RRB used a level of 500,000 for its calculations.

MORE ACCURATE RRB RAIL EMPLOYMENT
PROJECTIONS MAY BE FEASIBLE

Recent rail employment forecasts by RRB, other Federal agencies, and some industry groups have been considerably higher than actual rail employment. None, for instance, predicted the severity of the 1982-83 recession on rail employment. Projections made in 1972 by the Commission on Railroad Retirement were more accurate than the 1981 RRB forecasts--for the years during which actual employment data are available (1981-83). The accuracy of these 1972 projections indicates that using a well-constructed econometric model could assist RRB in making accurate rail employment projections.

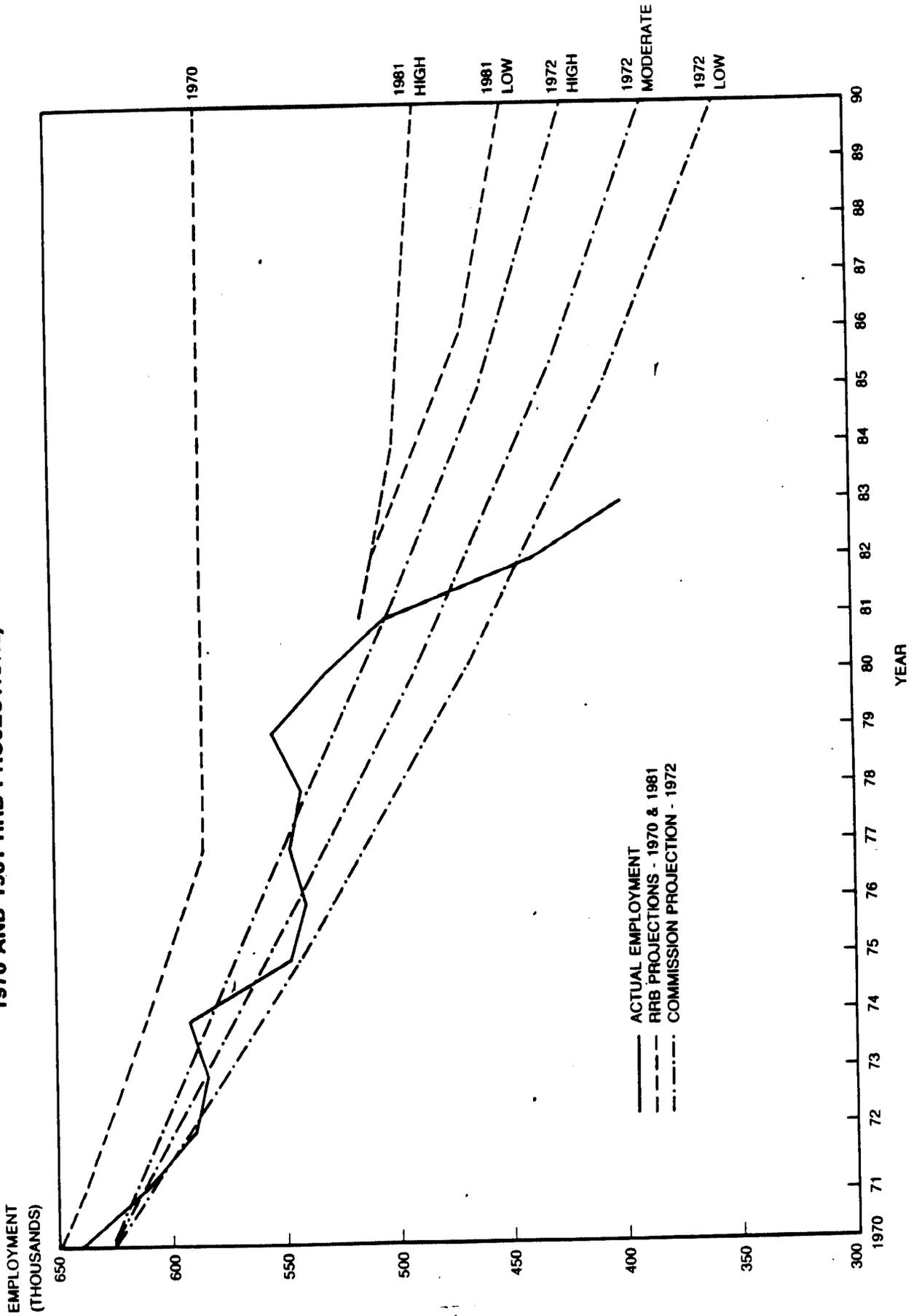
In 1976, the Association of American Railroads and the National Railway Labor Conference projected rail employment for 1976-80. These short-term projections, not based on econometric models, were higher than actual rail employment (see enc. V).

The Bureau of Labor Statistics, Department of Labor; the Bureau of Industrial Economics, Department of Commerce; and the Congressional Budget Office used econometric models in 1980 to project rail employment. These projections have also been high compared with actual employment and have not been more accurate than RRB forecasts. These forecasts, along with actual rail employment, are in enclosure VI.

Although the difficulty of accurately forecasting rail employment is well established, there is some evidence that a detailed econometric forecasting model might provide better projections. In 1970, Public Law 91-377 established the Commission on Railroad Retirement to study the railroad retirement system and recommend changes that would provide adequate and actuarially sound levels of benefits. A primary Commission task was to study and forecast likely trends in rail employment. Using an econometric model, the National Planning Association developed these forecasts for the Commission. Among the model's variables considered in projecting employment were: GNP, rail industry productivity, rail employment trends, railroad versus total transportation employment, average rail worker weekly hours and total hours, and wage rates. While our analysis of how this model differed from the Federal agencies' models is not complete, we have noted that there are major differences in the equations used to predict rail employment.

Based on the Association's study, the Commission made three projections of rail employment from 1975 to the year 2000 (see enc. IV). The 1972 Commission's projections proved more accurate than an RRB projection made about the same time. The graph on the following page shows how the Commission and RRB projections compared to actual rail employment. Also, the 1972

1972 COMMISSION ON RAILROAD RETIREMENT EMPLOYMENT PROJECTIONS,
1970 AND 1981 RRB PROJECTIONS, AND ACTUAL EMPLOYMENT



projections are considerably closer to actual rail employment than RRB projections made as recently as 1981. Average rail employment was about 532,000 in 1980, and about 402,000 at the end of 1982. The Commission projected an employment level of 470,000 in 1980 under a slow growth economy, and 407,000 in 1985. In 1981, 10 years after the Commission projections, RRB was projecting a low rail employment path of 510,000 in 1982 and 480,000 in 1985.

Views of Federal agencies
and private organizations
on rail employment forecasting

Officials from the Department of Transportation's Federal Railroad Administration, the Department of Commerce's Bureau of Industrial Economics, and the National Railway Labor Conference said accurate, long-range employment projections are very difficult. These officials described forecasts of more than 10 years as educated guesses. They indicated, however, that accurate, short-term forecasts are possible.

Officials from these three organizations said the economic variables affecting rail employment are difficult to forecast. Moreover, they noted that factors, such as rail mergers or political decisions, may have a greater impact on rail employment than economic variables and are even more difficult to predict. They said no one projected the large drop in rail employment during the 1982-83 recession, because no one anticipated the severe downturns in the automobile and steel industries and the huge cutbacks by CONRAIL and AMTRAK. One official observed that the future development of the coal slurry pipeline could reduce rail employment by about 70,000.

In the 1972 Commission on Railroad Retirement Report, the National Planning Association noted that many uncertainties can severely affect the demand for rail services and rail employment. These uncertainties included: more rapid or slower growth in the GNP, the changes in railroad productivity or profitability, nationalization of railroads, Federal support of railroads and mass transit programs, freight costs, interest rates, expansion of interstate highways, limitation of air and auto travel for ecological reasons, and expansion of the pipeline concept. Finally, the study acknowledged that no projection can ensure certainty and that other forecasters might assert widely different but equally valid estimates.

Besides the National Planning Association, Wharton Econometric Forecasting Associates and Chase Econometrics provide forecasting services for corporations, labor unions, and governmental agencies. These firms use various economic trend assumptions in projecting total employment for the entire country and

for specific industries. Officials of these firms said they could use existing economic models to project rail employment. The cost of updating the detailed rail industry model developed by the Association was under \$10,000.

CURRENT RRB EMPLOYMENT PROJECTIONS
FOR THE NEXT 5 YEARS ARE LOWER
THAN OTHERS PREDICT

To determine how a detailed econometric forecast of rail employment compared with RRB's, we contracted with the National Planning Association to estimate future rail employment. We selected the Association based on the accuracy of its 1972 rail employment forecast and the significant effort that went into preparing the 1972 model. We asked the Association to use the 1972 model as a basis with updated projections of the GNP, rail output, rail productivity, and rail employment trends. The following table shows the Association's and RRB's most recent projections.

Comparison of RRB and National Planning Association
Rail Employment Projections

Year	RRB projections (1983)		Association projections			
	High	Low	Based on Association growth assumptions (high GNP)		Based on Social Security growth assumptions (low GNP)	
			High	Low	High	Low
----- (thousands) -----						
1983	385	365	422	413	418	409
1984	370	350	417	400	403	387
1985	360	335	412	387	387	363
1986	355	320	407	374	371	341
1987	350	305	398	359	356	321
1988	345	290	387	342	342	301
1989	340	290	376	325	328	283
1990	340	290	364	309	315	266
1991	340	290	353	293	302	250
1992	340	290	342	284	289	239
1993			331	275	278	230
1994			320	266	266	220
1995			309	257	254	211
1996			298	247	243	201
1997			287	238	232	192
1998			277	230	221	183
1999			267	222	211	174
2000			257	213	201	166

The National Planning Association projections are based on a series of relationships among (1) the level of economic activity (GNP), (2) the output of the transportation sector, (3) the output of the rail industry, and (4) rail employment. The estimates were developed using data for 1955-82.

The four Association projections vary because of differences in the underlying assumptions about economic growth and an adjustment to reflect an alternative assumption about future growth of rail employment and productivity. The Association's "high" projections in columns three and five are based on the historical relationships for 1955-82. The projection in the third column is based on the current economic growth projection of the Association. The projection in the fifth column is based on the economic growth assumptions, version II-B, contained in the Social Security Trustees' 1982 Annual Report, April 1, 1982, updated to include actual GNP changes for 1981 and 1982.

The Association's "low" employment projections in columns four and six are also based on the Association's and Trustees' growth projections, but they also include an adjustment in the 1955-82 relationship between the changes in rail employment and changes in rail output. This adjustment consists of adding two percentage points to the constant annual decline in rail employment while leaving unchanged the direct effects of past and current changes in rail output. The adjustment allows for the expected acceleration in future growth of rail productivity and corresponding acceleration in the decline of rail employment which some industry analysts expect and which some believe has already begun. It may be termed a "deregulation adjustment" because these experts expect rail industry deregulation will have a major impact on future rail mergers, on the closing of rail lines, and on declines in employment. Other developments which would have similar results are also expected, notably further technological innovations leading to substantial productivity gains, especially in track maintenance and in office work, and changes in work practices.

Although RRB and the Association project similar employment levels for some years, there are notable differences. Over the next 5 years, RRB's estimates are generally lower than the Association's, reaching equilibrium around 1989. However, it is at this point that RRB assumes rail employment will stop declining. In contrast, the Association projects a continued decline in rail employment under each of its four projections. By 1992, the Association's projections, using the Social Security Trustees' current assumptions, differ from RRB's by 15 percent (high projection of 289,000 versus 340,000) and 18 percent (low projection of 239,000 versus 290,000), respectively. Based on projection trends, this difference would increase beyond 1992.

In May 1983, the National Railway Labor Conference also projected rail employment levels for the next 7 years. Its projections are much higher than RRB's, reflecting a recovery from the recent recession to 411,000 in 1986 and then a decline in rail employment to 386,000 by 1989.

The Department of Labor's Bureau of Labor Statistics is presently updating its national employment projections. Bureau officials provided preliminary rail employment estimates which, like the National Railway Labor Conference's, were much higher than RRB projections. These preliminary figures show rail employment reaching 417,000 in 1985, 396,000 in 1990, and 383,000 in 1995.

AVERAGE RAIL EMPLOYMENT1937 - MAY 1983

<u>Year</u>	<u>Rail Employees</u> (thousands)	<u>Year</u>	<u>Rail Employees</u> (thousands)
1937	1,279	1961	836
1938	1,093	1962	815
1939	1,151	1963	790
1940	1,195	1964	775
1941	1,322	1965	753
1942	1,470	1966	741
1943	1,591	1967	713
1944	1,670	1968	683
1945	1,680	1969	659
1946	1,622	1970	640
1947	1,598	1971	611
1948	1,558	1972	589
1949	1,403	1973	584
1950	1,421	1974	592
1951	1,476	1975	548
1952	1,429	1976	540
1953	1,405	1977	546
1954	1,250	1978	542
1955	1,239	1979	554
1956	1,220	1980	532
1957	1,150	1981	503
1958	984	1982	438
1959	949	1983 (May)	400
1960	909		

Source: Railroad Retirement Board.

RRB RAIL EMPLOYMENT PROJECTIONS1979 - 1983

<u>Year</u>	<u>1979 projection</u>		<u>1981 projection</u>		<u>1982 projection</u>		<u>1983 projection^a</u>		
	<u>High</u>	<u>Low</u>	<u>High</u>	<u>Low</u>	<u>High</u>	<u>Low</u>	<u>High</u>	<u>Low</u> <u>2/83</u>	<u>Low</u> <u>5/83</u>
(thousands)									
1981	540	520	515	515	-	-	-	-	-
1982	540	510	510	510	465	450	-	-	-
1983	540	500	505	500	450	430	385	370	365
1984	540	500	500	490	435	410	370	350	350
1985	540	500	498	480	425	390	360	335	335
1986	540	500	496	470	415	380	355	325	320
1987	540	500	494	465	405	370	350	320	305
1988	540	500	492	460	400	360	345	315	290
1989	540	500	490	455	400	355	340	310	290
1990	540	500	488	450	400	350	340	310	290
1991			486	445	400	350	340	310	290
1992			484	440	400	350	340	310	290
1993			482	435	400	350			
1994			480	430	400	350			
1995			478	425	400	350			
1996			476	420	400	350			
1997			474	415	400	350			
1998			472	410	400	350			
1999			470	405	400	350			
2000			470	400	400	350			

^aRRB officials stressed that their high projection is "most likely." They considered the low projection a pessimistic, low probability scenario. Three lower employment assumptions were also made by RRB; however, RRB officials said these were not realistic projections, but rather were used to demonstrate at what employment level a financial crisis would reoccur.

1972 COMMISSION ON RAILROAD RETIREMENTRAIL EMPLOYMENT PROJECTIONS

<u>Year</u>	<u>High</u>	<u>Moderate</u>	<u>Low</u>	<u>Actual</u>
	----- (thousands) -----			
1975	572	558	544	548
1980	514	492	470	532
1985	462	435	407	
1990	424	389	356	
1995	391	351	313	
2000	367	320	279	

RAIL INDUSTRY PROJECTIONS^a
OF RAIL EMPLOYMENT 1976-1980

<u>Year</u>	<u>Association of American Railroads</u>	<u>National Railway Labor Conference</u>		<u>Actual</u>
		<u>High</u>	<u>Low</u>	
----- (thousands) -----				
1976	585	558	552	540
1977	582	572	558	546
1978	580	589	561	542
1979	578	610	564	554
1980	576	634	567	532

^aThese projections were made in 1976.

FEDERAL AGENCY PROJECTIONS^a
OF RAIL EMPLOYMENT 1980-1985

<u>Year</u>	<u>Bureau of Industrial Economics</u>		<u>Bureau of Labor Statistics</u>	<u>Congressional Budget Office</u>	<u>Actual</u>
	<u>High</u>	<u>Low</u>			
----- (thousands) -----					
1980	542	542	557	535	532
1981	530	525	-	518	503
1982	533	522	-	510	438
1983	524	514	-	509	(May) 400
1984	523	502	-	511	
1985	521	494	514	513	

^aThese projections were made in 1980.