IV. RAILROAD PERFORMANCE INDICATORS

On January 5, 1985 the Alaska Railroad (ARR) was sold by the U. S. Government to the State of Alaska. As owner, the State established the Alaska Railroad Corporation (ARRC) to operate the ARR. To manage the ARR, the State established a seven member Board of Directors which, by legislative intent, is responsible for the management of the financial and legal obligations of the ARR, the operation of the ARR, and other matters (see Report Section III.A.5 "Alaska Railroad Corporation Act" for a detailed listing of the Board of Directors' responsibilities).

To enable the Board of Directors to properly carry out its duties, it is requisite that the ARR provide the Board with timely and proper information upon which the Board can make its decisions and otherwise perform its responsibilities.

During the initial year of ARRC existence and operation, the ARR has provided the Board with timely financial and other information. Given the short time period within which the ARRC has had to do so many things to take over ARR operation, the ARR-provided information has been excellent. However, now that the Board has had some experience with its duties, it is appropriate to ask whether the Board needs other types of information, whether the information that is provided is provided in the best possible format, and whether the Board is able to understand the information that is provided by the ARR.

To assist, this Rail Plan has set forth a series of "Railroad Performance Indicators", whose intent is to display the types of information that railroad management typically would expect to have at its disposal. In this sense, "performance indicators" mean data that can be used to measure the efficiency

and financial performance of the ARR. Such statistical units or performance indicators should be developed regularly. By having these statistical units available on a current basis, operations can be monitored and trends can be recognized very early. Decisions regarding needed adjustments in operations and cost can then be made to reflect current circumstances.

Comparisons of performance indicators of an individual company with industry averages can be a useful tool in establishing norms and determining the reasonableness of the operation. However, in the case of the Alaska Railroad, the industry norms may not always be appropriate since the ARR operates with unique climate and market conditions, is a State owned railroad, and has other features that make it very different than most U.S. railroads. Nevertheless, even though not appropriate in every case, a comparison of performance indicator statistics with industry averages and with railroads of comparable size can assist in the timely evaluation and assessment of some operating and financial results.

A. Suggested Railroad Performance Indicators

Performance indicators can be placed in two general categories: (1) financial ratios and statistics used for broad overview by senior management and the Board of Directors, and (2) the detailed cost and production indicators used by department heads and middle management for monitoring the various activities.

1. Financial Data

Much of the statistical data needed for calculating financial ratios are normally found in the railroad's annual report.

Monthly or quarterly reports contain current data, both by month and year-to-date. Tables 3-9 and 4-1 illustrate the considerable data found in recent ARR annual reports. From this data many of the ratios and other performance indicators can be determined for measuring efficiency and profitability, without requiring the ARRC to generate significant amounts of additional data. Table 4-2 provides revenue and expenses for the ARR through October 31, 1985.

a. Net Income

The net income from railway operations forms the basis for calculating several of the other recommended performance indicators. Even though the ARR has shown a net profit in the recent past, this generally has been due to non-operating income, principally miscellaneous rental income.

b. Rate of Return

This represents the rate of return on net investment (ROI) and is the relationship of net railway operating income to net investment in transportation property. The U.S. railroad industry historically has had a low rate of return. For the period between 1975 and 1983, the ROI has varied from 1.20% to 4.13%. Under the new Depreciation Accounting System (DA) which allows for including the track structure in the depreciation base, beginning in 1983 the annual expenses for Class I railroads decreased and the profits increased. The actual cash flow does not change. Therefore as reported in the future, the ROI will increase for the U.S. railroad industry. The ARR converted to the Depreciation Accounting System in 1985. Since it is not a Class I carrier, it provides passenger service, is State owned and is not required to pay taxes, direct comparisons cannot be made in every instance.

Table 4-1

ALASKA RAILROAD TRAFFIC, REVENUES, AND EXPENSES

SUMMARY STATISTICS	FY 79	FY 80	FY 81	FY 82	FY 83	FY 84
Total Revenues ($ million)	25.20	28.90	43.90	58.80	56.10	62.15
Total Expenses ($ million)	31.50	34.70	40.60	49.23	53.27	60.32
Surplus (loss)						
Net Profit (after depreciation)	(3.20)	(2.30)	6.60	9.56	2.82	1.83
Cash Flow (before depreciation)	(6.30)	(5.80)	3.30	13.27	7.23	6.66
Capital & Major Maintenance Program	9.40	5.50	13.40	12.70	16.60	7.43
Freight Revenues ($ million)	18.20	21.70	34.00	47.88	43.79	49.75
Freight Tons (millions)	1.81	1.74	3.36	4.50	6.02	8.27
Freight Ton-Miles (millions)	257.00	271.00	407.00	479.14	546.52	700.88
Freight Revenue per Ton-Mile (cents)	7.10	8.00	8.40	10.01	8.01	7.10
Average Length of Haul (miles)	142.00	156.00	121.00	106.48	90.78	84.75
Freight Carloads Handled (thousand)	36.50	33.00	51.30	69.51	83.88	106.01
Revenue Train-Miles (thousand)	370.00	368.00	443.00	503.95	480.96	591.41
Passenger Revenue ($ million)	1.56	1.55	2.00	2.63	3.30	3.88
Passenger Miles (million)	13.80	11.80	13.63	15.07	15.27	15.59
Gross Ton-Miles (million)	878.00	925.00	1,182.00	1,446.53	1,417.81	1,781.71
Average Freight Load Per Car	49.6	52.7	65.5	64.7	71.8	78.0

SOURCE: Alaska Railroad Annual Reports, 1979-1984

Table 4-2

ARR STATEMENT OF INCOME
October 31, 1985
(000's)

	YEAR-TO-DATE 1985	YEAR-TO-DATE Budget
REVENUES		
Railroad	$49,965	$55,893
Other	9,222	7,500
Total	$59,187	$63,393
COST AND EXPENSES		
Railroad		
Transportation	$17,731	$22,280
Ways and Structures	11,188	11,022
Equipment	9,830	10,092
General and Administrative	11,343	7,169
Total Railroad	$50,092	$50,563
Other	$ 195	$ 3,718
Total Costs	$50,287	$54,282
Operating Surplus	8,900	9,112
Interest Expense	301	0
Corporate Expense	2,061	518
Net Surplus	$ 6,538	$ 7,594
Depreciation	1,064	4,000
Net Income	$ 5,474	$ 3,594

SOURCE: Alaska Railroad Corporation Financial Statements, October, 1985

When non-operating income is excluded, the ARR 1984 operating earnings reveal a ROI of 0.0, while the 1985 railway operations reflects a profit with a potential rate of return of 15%.

c. Current Ratio

The current ratio, or the ratio of current assets to current liabilities, is a measure of the ability of a company to meet its obligations in the short term. The current ratio of the ARR for the first 6 months of 1985 is 2.7. This is extremely good, since levels of 1.5 to 2.5 are considered good. Several large and profitable U.S. carriers have had current ratios varying between 0.64 and 2.23 during the period 1977 to 1981.

2. Operating Ratios

The operating ratio is used to measure overall efficiency. The operating ratio is determined by dividing railway operating expenses by railway operating revenues. The U.S. industry average in 1983 (the latest year available and not a banner year due to just emerging from the 1982 recession) was approximately 90%. By comparison, the ARR operating ratio for 1983-84 was 103.5%. The October, 1985 operating ratio, year-to-date, for ARR is approximately 100.3% without depreciation and 102.4% when depreciation is included.

The operating ratio is further broken down into the components that make up the total operating expense. These are the maintenance-of-way ratio, the maintenance-of-equipment ratio, the transportation ratio and the general and administration ratio.

Each ratio is obtained by dividing the individual department expense by the total operating revenue. Railroad officials strive to keep these ratios as low as possible and traditionally the ratios were compared month by month to the same month for the previous year. When revenues declined, expenses were cut to stay within the established ratio. However, in recent years the total operating ratio has been emphasized. It has been recognized by many railroad managements that an acceptable transportation department ratio can best be accomplished by providing the maintenance-of-way and maintenance-of-equipment (mechanical) departments with budgets sufficient to adequately maintain the plant and equipment needed to provide the transportation service. Of course, maintenance-of-way and maintenance-of-equipment expenditures for any given period are somewhat discretionary and during periods of declining revenues can be delayed (deferred). Significant or continued delays can adversely affect the quality of transportation service and present long-term profitability problems.

a. Maintenance-of-Way Indicators

The maintenance-of-way (MOW) ratio described earlier averaged about 18% for U.S. Class I railroads in 1981, but was approximately 15% in 1983. The ARR October 1985 year-to-date MOW ratio is 22.4%.

Other possibly more significant indicators than the MOW ratio are the average MOW cost per mile of railroad and average MOW cost per mile of track. The current year-to-date average MOW expenditure for the ARR is approximately $24,400 per mile of railroad and $19,700 per mile of track. The miles of railroad represents all main line tracks and miles of track represents all tracks, including passing tracks and yard tracks and sidings. An equality factor can be applied to branch lines,

passing tracks and yard tracks and sidings to arrive at an equated mileage. The cost of snow removal can also be deleted to make a more realistic evaluation of expenditures since this may constitute a higher percentage of the ARR cost. Because of the added cost of obtaining track materials and the higher wage rates in Alaska, dollar comparisons with Class I carriers alone may be misleading. All other things being equal, the ARR cost per mile would be higher by about 25% to 50%.

The number of MOW employees per mile of track also provides a measure of performance. The 1973 U.S. Class I railroad average was 0.4 MOW employees per track mile. The 1981 U.S. Class I average was 0.24 MOW employees per track mile. The average number of MOW employees per mile of track for the ARR in 1980, including temporary or part time, was 0.31. In 1985 the average is 0.27. The reduction and apparent improvement in efficiency is at least partly accounted for by the increased mechanization of many track work functions and the improvement in the mechanized track work equipment over the 10 year period both for the Class I railroads and the ARR.

b. Maintenance-of-Equipment Indicators

The maintenance-of-equipment (MOE) ratio is determined by dividing MOE expenses by the total operating revenues. For all U.S. Class I railroads in 1981, the MOE ratio was approximately 21% and about 23% in 1983. In 1981 the ARR MOE ratio was 22.7%. The ARR October 1985, year-to-date MOE ratio is 19.7%. A footnote in the June, 1985 Alaska Railroad Corporation Financial Statements indicates that this is due primarily to newer rail cars and locomotive fleet, requiring less maintenance.

Two MOE indicators that are reviewed annually are the average age of cars and the average age of locomotives. These should

be compared with the "rebuild or replace age" of 18 to 20 years for locomotives and the average freight car life of approximately 30 years. A younger fleet would imply larger, more efficient equipment types. An older fleet indicates less efficient fleet and potential high maintenance cost.

In addition to a review of the MOE ratio, the Board should consider a regular review of the bad-order ratio. The bad-order ratio is the unserviceable equipment as a percent of the total equipment on line and is the railroad industry measure of equipment condition. Equipment out of service due to needed repairs for more than 24 hours is reported on this list. This could be subdivided and reported as locomotives, revenue freight cars, non-revenue freight cars and passenger equipment. The bad order ratio is reviewed along with the MOE ratio. The comparison is made to determine if there may be potential problems in too little being spent on equipment repairs. As reported in a recent federal report, the U.S. average bad-order ratio for freight cars and locomotives varied from about 5.5% to 8.2% between 1972 and 1977. Ratios of 9% or above were considered high by that report. However, the U.S. Class I railroad locomotive bad-order ratio reported in the Harvard Business School Alaska Railroad Study, Spring 1982 was 10%. The ARR bad-order ratio for locomotives was 16% at that time. New equipment has been acquired by the ARR since that time, and some older equipment has been retired.

c. Transportation Ratios

The transportation ratio is determined by dividing the transportation expense by total operating revenues. In 1983 the U.S. Class I railroads transportation ratio was approximately 43%. In 1983 the ARR transportation ratio was about 42%. The June, 1985 year-to-date ARR transportation ratio is 35%.

The average freight carload in tons, the average freight train load, and the average number of cars per train are statistics that also provide measures of transportation efficiency.

In 1983 the average weight of a carload of freight for U.S. Class 1 railroads was 68.0 tons. By dividing the freight tons by freight carloads handled (Table 4-1), it can be determined that in 1983 the average carload weight on the ARR was 71.8 tons, and in 1984 this increased to 77.9 tons. From Table 3-6 this appears to be due to an increase in shipments of sand and gravel, unfortunately a low revenue commodity.

The average freight train load for U.S. Class 1 carriers was 2,432 tons in 1983. The division of freight ton-miles by revenue freight train-miles reveals an average freight train load for the ARR in 1984 of 1,629 tons.

The average number of cars per train is computed by dividing freight car-miles by freight train-miles. These statistics are missing from the current ARR reporting data. The average carloads per train can be determined by dividing the freight train load by the average carload weight. This produces an average of 15.8 carloads in 1983 and 15.2 carloads in 1984, approximately one- half the U.S. average of 30. The more restrictive grades, an increase in the number of larger cars, and a greater percentage of heavier commodities being handled such as sand and gravel and coal could account for the carload characteristics to date on the ARR.

d. General and Administrative (G&A) Ratio

The G&A ratio is determined by dividing G&A expenses by total operating revenues. The U.S. Class 1 railroads G&A average

was approximately 9.4% in 1983, the G&A ratio (including traffic or marketing costs) for the ARR in 1983 was about 14.5%. The year-to-date June 1985 G&A ratio for the ARR is 17%. The smaller revenue base of the ARR compared to all U.S. Class 1 railroads, combined with continuing administrative costs associated with the ARR transfer to State ownership, would cause the ARR ratio to be slightly higher.

3. Other Performance Data

Several other annual statistics can aid in evaluating overall performance.

a. Operating Revenue/Cost Per Employee

The U.S. Class 1 railroads operating revenue per employee in 1983 was about $83,000. The 1983 ARR average was $76,300, while the ARR year forecast for 1985 is about $112,000 per employee. The revenue per ton-mile for ARR in 1983 and 1984 was 8.01 and 7.10 cents while the U.S. Class 1 average in 1983 was 3.1 cents or less than half.

The average cost per employee for all U.S. Class 1 railroads in 1980 was $24,700 and the ARR average employee cost was $37,000. The 1983 estimated U.S. average was $32,125. The 1985 estimated ARR cost per employee is $64,900, which reflects the higher wage scale in Alaska.

The 1985 estimated total personnel salary and wages for the ARR of $35,700,000 is about 58% of total operating revenue. Railroads typically try to keep employee costs at 50% or less of operating revenues, so that sufficient funds can be available for materials needed for maintaining track and equipment and for capital improvements.

Total number of employees per mile of track is also a measure for comparing staffing. In 1983 the U.S. Class 1 average employees per mile of track was about 2.0. The 1985 ARR number of employees is about 1.0, which increases to approximately 1.3 when temporary employees are included.

b. Track Material

The data on the number of cross ties installed annually, and the miles of new rail layed, when considered over a period of several years, can serve as a guide to the long-term financial health of the railroad and to its policies. Under ideal conditions, a railroad's maintenance program will provide for meeting the normalized maintenance requirements. Normalized maintenance is defined as that which meets the average annual track material replacement requirement, and at a level that keeps the track at the desired standard. This is determined by dividing the total material units by the average life. Where cyclic work is performed, an allowance is made for all material items for the average annual requirement over the prescribed cycle time.

According to the 1984 Alaska Railroad Condition Assessment, there are approximately 1,950,000 cross ties on the ARR. Using a 40 year average life, which would be the upper limit of average tie life, it is found that at least 48,750 cross ties should be installed annually. As annual tonnage increases on some track segments, the longer cross tie life enjoyed in the past on the ARR can be expected to be reduced. The traffic density by segment shown previously on Table 3-8 reflects the significant increase between Matanuska and south of Anchorage where heavy gravel movements occur. This tonnage, coupled with the more numerous curves on this segment, will not permit a 40 year tie life in the future.

A detailed inspection of track and ties would provide a projection of the average annual requirements, but this task is beyond the scope of this project. Although there has been excellent tie life in the past, several factors suggest reduced tie life in the future. These factors are the increased annual tonnage on the segments of the main line with the sharpest curves, the increase in axle loading, and poorer quality timber today compared to that of 30 to 40 years ago. In some recent studies of the ARR, cross tie life of less than 40 years (30-35 years) has been suggested.

The ARR is currently installing about 25,000 cross ties per year (25,700 in 1984). Even with an average cross tie life of 40 years, installing 25,000 ties per year is only about one-half the number required. An increase in the number of cross ties installed annually will increase the current MOW expenditures and the related ratios outlined earlier.

Future expenditures for rail must also be increased over recent levels (49,100 linear feet, or 4.65 track miles in 1984). As shown in Table 4-1 the average freight load per car has increased from 49.6 tons in 1979 to 78.0 tons in 1984, thereby increasing the average axle load at the same time. The density, expressed as million gross ton-miles per mile per year (MGTM), has increased significantly between Anchorage and Matanuska, from 3.28 MGTM in 1979 to 13.90 MGTM in 1984. This four-fold increase in density over this segment of the ARR, with a very high percentage of curves, means that if this level of traffic continues, the rail must be replaced more frequently than in the past. Rail wear formulas can be used to calculate rail life using speed, density, curvature, and axle loads as in-put. Field-wear measurements can be made to monitor wear and validate calculated life. The results over a few years will give the long term rail replacement requirements for the various

track segments. It now appears that increased rail replacement and cross tie renewals in certain track segments, especially between Matanuska and Anchorage, are critical for the future viability of the railroad. The cost of more frequent track surfacing, ditching and bank widening required on the ARR due to severe weather, rugged terrain and unique subsoil conditions has been absorbed in the past at the sacrifice of rail and cross tie renewals. This has been possible with the relatively low tonnage, light axle loads and the fact that the majority of the railroad was rebuilt with new 115 lb. rail between 1949 and 1954 and that most of the cross ties have been installed since that time. However, with the heavier cars and increased density, provisions for increased expenditures for rail and cross ties should be included in future budgets.

c. Derailment and Accident Data

Reporting on the number of derailments and the cause of each can help identify problem areas. Derailment causes are classified as track, equipment, human error or other. Others include, for example: weather, acts of God, and hitting animals (moose). Between January 1, and August 8, 1985 there were 40 derailments, 15 (38%) track related, 4 (10%) equipment, 7 (17%) human error, and 14 (35%) other. The monitoring of derailments is normally a function of operating management due to the required interpretation of data furnished and needed corrective action. The various percentages do provide a guide as to where emphasis should be placed. However, if the number of derailments due to equipment failures or to track increase, a determination as to the adequacy of expenditures would be in order.

Industry safety records measure accidents or injuries per thousand man-hours of work (which is a function of the number of employees). The ARR has performed well in this area in the past

according to the 1984 Annual Report and received national recognition.

B. Current Railroad Submittals to Board

Currently the ARRC provides data to the Board of Directors for its review. Quarterly Financial Statement prepared for the Board consist of the following:

Summary
* 1985 Performance Analysis of revenue costs and expenses
* Project to Date Capital Performance Summary

Balance Sheet
* Supporting Notes
* Lease Disclosure Schedule
* Statement of Retained Earnings

Operating
* Graph of Actual vs Budget Income
* Statement of Income
* Revenues by Commodity, Passenger, Real Estate and Other
* Expense by Department

Capital
* Graph of Capital Expenditures, Budget vs Actual
* Project to Date Capital Performance Summary
* List of Capital Projects, Budget vs Actual

Appendix
* Graph - Monthly Bank Balance

Past Annual Reports have included, among other things, those items found in Tables 3-8, 3-9, and 4-1. In other words, the ARR does have a great deal of information available which, when presented in a comparable and continuing fashion, can be very useful to the Board of Directors.

C. Suggested ARR Performance Indicators

Based on this review of possible performance indicators and based on data that is known or believed to exist, it is recommended that the ARRC prepare a set of indicators that, over time, can be used to assess the railroad's performance. A computer program could be developed that would develop these items, at very little cost to anyone since the basic data already exists. The suggested indicators are presented on Table 4-3. It should be emphasized that the suggested indicators include not only financial indicators but also operational, utilization, safety and maintenance indicators. Once these data calculations are computerized, they should be made available to the ARRC Board of Directors and other ARRC management personnel on a continuing basis.

Table 4-3

SUGGESTED ARR PERFORMANCE INDICATORS

Performance Indicator	1984
*Railroad Miles	535.2
*Track Miles(1)	655.9
*Gross Revenues (Million)	$62.15
*Operating Revenues (Million)	$57.92
*Operating Expenses (Million)	$59.95
*Net Railway Operating Income (Million)	<$2.03>
*Net Other Income (Million)	$3.87
*Total Net Income (Million)	$1.84
*Depreciation (Million)	(2)
*Net Income After Depreciation (Million)	$1.84
*Net Investment Operating Property (Million)	$149.79
*Rate of Return	0.0
*Freight Revenues (Million)	$49.75
*Freight Tons (Million)	8.27
*Freight Tons-Miles (Million)	700.88
*Freight Revenue per Ton-Mile (Cents)	7.10
*Average Length of Haul (Miles)	84.75
*Freight Carloads Handled (Thousands)	106.01
*Passenger Revenues (Million)	3.88
*Passenger Expenses	N/A
*Gross Ton-Miles (Million)	1,781.71
Average Freight Load per Car	78.0
Density by Track Segment	(3)
*Operating Expenses (Thousand)	
*Maint.-of-Way & Structures	$12.75
*Maint.-of-Equipment	$13.53
*Transportation	$22.11
*General & Administrative	$11.57
*Operating Ratio	103.5%
*Maintenance-of-Way Ratio	22%
*Maintenance-Of-Equipment	23%
*Transportation Ratio	38%
*General & Administrative	20%
*Average Number of Employees	-
*Average Bad-Order Ratio	N/A
Average Freight Train Load	1185
Operating Revenue per Employee (Thousand)	N/A
Average Cost per Employee (Thousand)	N/A

Table 4-3

SUGGESTED ARR PERFORMANCE INDICATORS
(continued)

	1984
Average Number of Employees/per Mile of Track	N/A
Average Number of Maint.-of-Way Employee per Mile of Track	N/A
Cross Ties Installed	25,700
Track Miles (.5 X rail miles) of Rail Laid	4.65
Number of Derailments by Cause	
Track	N/A
Equipment	N/A
Human Error	N/A
Other	N/A

(1) Includes 3.8 miles on Suntrana Branch now out of service
(2) Depreciation shown with expenses in 1984
(3) Density by segment reported separately

Note: All of the performance indicators should be made available to department heads and middle management. Those designated by an asterisk * should be made available to the Board of Directors.

SOURCE: Wilbur Smith and Associates

GLOSSARY OF TERMS

Rate of Return - The rate of return on net investment (ROI) and is the relationship of net railway operating income to net investment in transporation property.

Current Ratio - The ratio of current assets to current liabilities, the measure of the ability of a company to meets its short term obligations.

Operating Ratio - The ratio of railway operating expenses to railway operating income.

Maintenance-of-Way Ratio - The ratio of maintenance-of-way and structures expense to railway operating income.

Maintenance-of-Equipment Ratio - The ratio of maintenance of equipment expense to railway operating income.

Transportation Ratio - The transportation expense divided by railway operating income.

General and Administrative Ratio - G&A expenses divided by railway operating income.

Bad-Order Ratio - The unserviceable equipment as a percent of the total equipment on line. Equipment is subdivided and reported as locomotive, revenue freight cars, non-revenue freight cars and passenger equipment.

Line Density - Expressed as million gross ton-miles per mile per year (MGTM).

Railroad Miles - As used here is route miles or main line miles as opposed to track miles which include all main tracks, passing tracks and yard tracks and sidings.

Normalized Maintenance - The average annual expenditure which meets the average annual track material replacement requirement and at a level that keeps the track at the desired standard or level of operation. This average annual expense includes actual expenses plus an allowance for those items worked on a longer cycle basis, such as, cross tie renewals, surfacing and lining, road crossing repairs, ditching and bridge maintenance.