ASSOCIATION
OF AMERICAN
RAILROADS

**John T. Gray**
Senior Vice President - Policy & Economics

September 5, 2018

The Honorable Cynthia T. Brown
Chief, Section of Administration
Office of Proceedings
Surface Transportation Board
395 E Street, SW
Washington, DC 20423-0001

Dear Ms. Brown:

This submission is the AAR forecast of the fourth quarter 2018 All-Inclusive Index and Rail Cost Adjustment Factor, filed in Ex Parte No. 290 (Sub-No. 5) (2018-4) *Quarterly Rail Cost Adjustment Factor.* The versions of RCAF-related indices covered in this filing are: the All-Inclusive Index (initiated in the second quarter of 1985), the Unadjusted RCAF (produced since October 1982), the Adjusted RCAF (first published in the second quarter of 1989), and the RCAF-5 (created by the STB in its Ex Parte No. 290 (Sub-No. 7) decision served October 3, 1996). The table below summarizes the fourth quarter 2018 results and compares to the previous quarter. Both quarters are shown on a 4Q\2017=100 base.

| | 2018Q3 | 2018Q4 | % Change |
|---|---|---|---|
| All-Inclusive Index | 107.2 | 108.1 | 0.8 |
| Preliminary RCAF | 1.072 | 1.081 | 0.8 |
| Forecast Error Adjustment | -0.011 | -0.002 | |
| RCAF (Unadjusted) | 1.061 | 1.079 | 1.7 |
| Productivity Adjustment Factor | 2.3641 | 2.3617 | |
| RCAF (Adjusted) | 0.449 | 0.457 | 1.8 |
| PAF-5 | 2.5298 | 2.5260 | |
| RCAF-5 | 0.419 | 0.427 | 1.9 |

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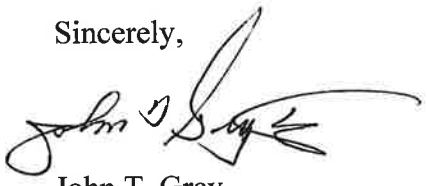
In its October 3, 1996 decision in Ex Parte No. 290 (Sub-No. 7), *Productivity Adjustment - Implementation,* the STB noted its intent to publish, in addition to the RCAF (Unadjusted) and RCAF (Adjusted), an RCAF-5 (i.e., a calculation of the productivity adjusted RCAF values as if the agency had always used a 5-year rolling average to calculate the productivity adjustment). In response to a request by STB staff, the AAR is including a calculation of the RCAF-5 in its quarterly RCAF filing. The AAR and its members, however, do not believe the publication of a third RCAF index is required or permitted by the applicable statute (49 U.S.C. § 10708) and do not endorse its publication.

Our quarterly non-proprietary work papers underlying this submission are e-filed herewith, in accordance with the ICC's order in Ex Parte No. 290 (Sub-No. 2), *Railroad Cost Recovery Procedures,* served February 8, 1990. We have notified Pedro Ramirez, in the STB office handling this proceeding, of our plan to e-file the submission and non-proprietary work papers. A second copy of the submission and non-proprietary work papers, plus selected highly confidential work papers, will be hand-delivered to Mr. Ramirez's Data Collection and Auditing Team. All work papers are available for STB inspection. Questions should be directed to me or Clyde Crimmel (202 639-2309) of this office.

Sincerely,



John T. Gray

Attachments

# Fourth Quarter 2018
# All-Inclusive Index

# Ex Parte No. 290 (Sub-No. 5) (2018-4)

# Quarterly Rail Cost Adjustment Factor
# Surface Transportation Board

**Policy and Economics Department**
**Association of American Railroads**

**September 5, 2018**

# Table of Contents

# Introduction

On January 2, 1985, the Interstate Commerce Commission (ICC) adopted the All-Inclusive Index as the basis for the Rail Cost Adjustment Factor (RCAF). The quarterly projection of railroad costs, as documented herein, employs the All-Inclusive Index as required by the regulations. Also presented in this submission is the RCAF, both Adjusted and Unadjusted, as required by the ICC in its decision in Ex Parte No. 290 (Sub-No. 4), Rail Cost Recovery Procedures - Productivity Adjustment, served March 24, 1989. In addition, the AAR has included the RCAF-5, which was instituted by a Surface Transportation Board decision served October 3, 1996 in Ex Parte No. 290 (Sub-No. 7), *Productivity Adjustment - Implementation* . The AAR and its members do not believe the additional productivity-adjusted index is required or permitted by the applicable statute, and do not endorse its publication.

This quarter's projection of railroad costs is for the fourth quarter 2018. The All-Inclusive Index utilizes new weights (see page 2), which are based on 2017 Annual Report Form R-1 data. New annual report and wage statistics data have also been utilized to rebenchmark labor (see Appendix A), and the annual report data have also been used to update the Interest Index (see Appendix F).

# Index Weights

In the Ex Parte No. 290 (Sub-No. 2) final rules, issued in April 1981, the Interstate Commerce Commission mandated that the weights of each major cost component be updated annually. These "external" weights are calculated using expense data from Schedules 410 and 210 of the R-1 annual report filed with the Surface Transportation Board by the Class I railroads. The weights are typically updated with the fourth quarter projection.

The 2017 (current) and 2016 (previous) weights are shown below. Weights calculated from 2016 data were used for the fourth quarter of 2017 through the third quarter of 2018. Beginning with the fourth quarter of 2018, weights calculated using 2017 data are used.

The weight for Fuel increased 2.3 percentage points, and Depreciation's was up 0.2 percentage points. The remaining component weights all decreased by 0.1 to 1.0 percentage points. Although expenses were higher in every category except Equipment Rents, Fuel and Depreciation had the highest percentage increases in expenses. Traffic and fuel prices were up in 2017, causing fuel expenses to be 27 percent higher. Depreciation expenses increased 6.2 percent, possibly caused by higher capital expenditures in recent years and spending on positive train control. Labor expenses were up 3.4 percent, but Labor's weight decreased.

**Weights for RCAF's All-Inclusive Index**

| | 2017 | 2016 |
|---|---|---|
| Labor | 35.0 % | 35.6 % |
| Fuel | 13.0 | 10.7 |
| Materials & Supplies | 4.9 | 5.0 |
| Equipment Rents | 5.2 | 5.9 |
| Depreciation | 15.8 | 15.6 |
| Interest | 2.1 | 2.2 |
| Other | 24.0 | 25.0 |
| Total | 100.0 | 100.0 |

Reweighting of the index is accomplished by calculating both the current quarter (normally the fourth) and prior (normally the third) quarter indexes with the new weights. The relative change between the two quarters is then multiplied times the prior quarter (usually the third) *linked* index. Use of this method ensures that the weight change, by itself, does not cause a change in the level of the All-Inclusive Index.

Internal weights in the labor and equipment rents components are updated at the same time as the external weights. When these weights are changed, they are also linked using the procedure described above in order to eliminate the effect of the change in weighting.

# All-Inclusive Index
## Fourth Quarter 2018

The components and values of the current and previous All-Inclusive Indexes are shown below. Details of the construction of each component of the index are contained in the Appendices.

| | 2017 Weights | Forecast Previous 2018Q3 | Forecast Current 2018Q4 | Percent Change |
|---|---|---|---|---|
| 1. Labor | 35.0% | 434.3 | 439.2 | 1.1 % |
| 2. Fuel | 13.0% | 291.0 | 283.9 | -2.4 |
| 3. M&S | 4.9% | 263.7 | 269.8 | 2.3 |
| 4. Equipment Rents | 5.2% | 230.5 | 236.4 | 2.6 |
| 5. Depreciation | 15.8% | 223.5 | 223.8 | 0.1 |
| 6. Interest | 2.1% | 60.5 | 62.4 | 3.1 |
| 7. Other | 24.0% | 231.5 | 235.5 | 1.7 |
| 8. Weighted Average | | | | |
| a. 1980 = 100 | | 306.9 | 309.3 | |
| b. 1980 = 100 (linked) | | 283.6 | 285.8 [1] | |
| c. 4Q17 = 100 | | 107.2 | 108.1 [2] | 0.8 |

**Note:**

New weights are utilized. The linked index is always unchanged in this linking procedure. However, the 306.9 weighted average for 2018Q3 has been recalculated with 2017 weights to eliminate any changes in the fourth quarter index that would be caused by changing weights. The original Q3 weighted average with 2016 weights is 306.6.

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[1] Index80 = (Current Index / Previous Index) * the Previous Quarter Linked Index

= (309.3 / 306.9) x 283.6

= 285.8

[2] To calculate the 4Q17 = 100 index:

Index4Q17 = (Current Linked Index / 4Q17 Basing Factor) * 100

= 285.8 divided by 264.5 times 100

= 108.1

Indexes based on other periods:
4Q12 based index = 285.8 / 297.6 x 100 = 96.0
4Q07 based index = 285.8 / 245.9 x 100 = 116.2
4Q02 based index = 285.8 / 192.1 x 100 = 148.8
4Q97 based index = 285.8 / 173.2 x 100 = 165.0
4Q92 based index = 285.8 / 156.9 x 100 = 182.2

# Forecast vs. Actual All-Inclusive Index
## Second Quarter 2018

Because of data availability, the forecast error adjustment has a two-quarter lag from each filing. As shown below, the second quarter actual index of 103.7 is 0.2 index points below the forecast value of 103.9. Therefore, the forecast error adjustment for fourth quarter 2018 is -0.2 index points.

| | 2016 Weights | Second Quarter 2018 Forecast | Second Quarter 2018 Actual | Amt Difference |
|---|---|---|---|---|
| 1. Labor | 35.6% | 422.5 | 422.5 | |
| 2. Fuel | 10.7% | 248.9 | 261.4 | |
| 3. M&S | 5.0% | 258.0 | 258.0 | |
| 4. Equipment Rents[1] | 5.9% | 228.9 | 230.4 | |
| 5. Depreciation | 15.6% | 224.6 | 223.5 | |
| 6. Interest | 2.2% | 60.5 | 60.5 | |
| 7. Other | 25.0% | 229.5 | 231.1 | |
| 8. Weighted Average | | | | |
| a. 1980 = 100 | | 297.2 | 298.8 | |
| b. 1980 = 100 (linked) | | 274.9 | 274.2 [2] | |
| c. 4Q17 = 100[3] | | 103.9 | 103.7 | -0.2 |

**Forecast error ⟶ -0.2 index points**

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[1]

| | 2016 Weights | Second Quarter 2018 Forecast | Second Quarter 2018 Actual |
|---|---|---|---|
| Car-Hire | 58.3% | 209.2 | 210.0 |
| Lease Rentals | 41.7% | 229.5 | 231.1 |
| Weighted Average | | 217.7 | 218.8 |
| Weighted Average (linked) | | 228.9 | 230.4 |

[2] Linked actual index = (actual index / previous actual index) x previous linked actual index.

274.2 = 298.8 / 296.0 x 271.6

[3] The 4Q17 based indexes are 1980 based indexes divided by the 4Q17 basing factor (264.5/100). Other basing factors are: 4Q12 = 297.6; 4Q07 = 245.9; 4Q02 = 192.1; 4Q97 = 173.2; and 4Q92 = 156.9.

# Productivity

On February 8, 2018, the Surface Transportation Board (STB) served a decision in Ex Parte 290 (Sub-No. 4) which proposed to adopt -0.4 percent as the geometric average productivity change for the five most recent years available. Their five year rolling geometric average calculation added the year 2016 and removed the year 2011. The components of this average annual value are shown on the following table in ratio format – therefore, 0.996 is the same as a decrease of 0.4 percent. Productivity changes are calculated by multiplying each of the five productivity changes together and taking the result to the one-fifth power. The productivity adjustment factors (PAF) for each quarter are calculated by increasing the previous quarter's PAF by quarterly versions of the annual rate, which are the fourth root of the geometric average annual growth rate. The difference between the PAF and the PAF-5 is the timing of the five-year productivity trend.

**Comparison of Output, Input, & Productivity**
**2012 - 2016**

| Year | Output Index (1) | Input Index (2) | Productivity Changes (3) |
|---|---|---|---|
| 2012 | 1.007 | 0.999 | 1.008 |
| 2013 | 1.022 | 1.018 | 1.003 |
| 2014 | 1.055 | 1.036 | 1.018 |
| 2015 | 0.913 | 0.972 | 0.939 |
| 2016 | 0.955 | 0.941 | 1.015 |
| Average | | | **0.996** |
| Previous Average (2011-2015) | | | 0.994 |

**Calculation of PAF and PAF-5**

For 2012-2016, use fourth root of avg. productivity change = 0.9990
For 2011-2015, use fourth root of avg. productivity change = 0.9985

| Quarter | Year | PAF | PAF-5 |
|---|---|---|---|
| Q1 | 2018 | 2.3689 | 2.5374 |
| Q2 | 2018 | 2.3665 | 2.5336 |
| Q3 | 2018 | 2.3641 | 2.5298 |
| Q4 | 2018 | 2.3617 | 2.5260 |
| Q1 | 2019 | 2.3593 | 2.5235 |

2011-2015

2012-2016

# Rail Cost Adjustment Factor
## Fourth Quarter 2018

Four RCAF values are presented in this filing. Two are not modified for productivity (Preliminary RCAF and RCAF Unadjusted), and two incorporate a productivity calculation (RCAF Adjusted and RCAF-5). The All-Inclusive Index and all four RCAF values, plus the percent change for each, are shown below. Note that beginning with the 2018Q1 index, the All-Inclusive Index was rebased to a 2017Q4=100 basis as required in the applicable statute.

| | Previous 2018Q3 | Current 2018Q4 | Percent Change |
|---|---|---|---|
| All-Inclusive Index[1] | 107.2 | 108.1 | 0.8 |
| Preliminary RCAF[2] | 1.072 | 1.081 | 0.8 |
| Forecast Error Adjustment[3] | -0.011 | -0.002 | |
| RCAF (Unadjusted)[4] | 1.061 | 1.079 | 1.7 |
| Productivity Adjustment Factor[5] | 2.3641 | 2.3617 | |
| RCAF (Adjusted)[6] | 0.449 | 0.457 | 1.8 |
| PAF-5[7] | 2.5298 | 2.5260 | |
| RCAF-5[8] | 0.419 | 0.427 | 1.9 |

[1] See All-Inclusive Index on page 3.
[2] All-Inclusive Index divided by the All-Inclusive Index in the base period (100.0).
[3] The current figure is from Forecast vs. Actual All-Inclusive Index in this filing (page 4). The previous quarter figure is shown in a similar section of the previous quarter's filing.
[4] Preliminary RCAF plus the forecast error adjustment.
[5] See Productivity on page 5.
[6] RCAF (Unadjusted) divided by the Productivity Adjustment Factor (PAF).
[7] See Productivity on page 5.
[8] RCAF (Unadjusted) divided by the PAF-5.

# Appendixes

# Labor
## Fourth Quarter 2018

The fourth quarter 2018 Labor Index increased 1.1 percent from the previous quarter. Although 11 new independent labor agreements were added to the index, most of the increase was caused by rebenchmarking.[1]

***Rebenchmarking and Reweighting***: Rebenchmarking, as well as updating the internal weights (i.e., the proportion of labor costs represented by wages and supplements, respectively), is reflected each year in the fourth quarter filing. The Labor rate is basically a group of benchmarks from annual data that are updated each quarter using additional information such as labor agreements, payroll tax rates, health & welfare rates, and other data. By rebenchmarking to newer annual data, the number of quarterly updates (the "distance") from the benchmark year to the current quarter becomes smaller – increasing the probability that the updated values match reality. Therefore, the impact of rebenchmarking is captured in the Labor Index, and by itself can cause a change in the index.

The new benchmark year is 2017, and data for that year replaces data for 2016. In this rebenchmarking, some railroad unions that were previously independent have now joined the national agreements. One of the major data sources underlying the fourth quarter rebenchmarking is the Annual Report Form R-1 submitted to the Surface Transportation Board (STB) by each Class I railroad. The other major data source is the 112-Class Wage Statistics report received by the Association of American Railroads (AAR) from each Class I railroad. The totals in each of the 112-Class Wage Statistics reports matches the corresponding total in the less-detailed Wage Form A&B submitted to the STB. The extra detail allows the AAR to divide the wage statistics by labor union, which enables wage rate updates to be more accurate. Data from the two major sources are used for labor benchmarks, and the annual report data are also used to calculate index weights.

The source for the wage and supplements internal weights, like the external weights, is the Annual Report Form R-1 Summary. Unlike rebenchmarking, reweighting by itself is prevented from causing a change in the index. A linking procedure, where the previous quarter unlinked index is recalculated using the new weights, eliminates changes that would be caused solely by changing weights.

### Wage Rate Index

The Wage Rate Index portion of the Labor Index is up 1.2 percent. Almost all of the change was caused by rebenchmarking to 2017 wage statistics. Non-union bonuses in 2017 were better than 2016 (but not as good as 2015), and this was a significant contributor to the higher wage rate benchmark. Other possible contributors to the higher benchmark are changes in employee mix and age distribution.

***New National Agreements:*** All of the new national labor agreements, with one exception, were incorporated in the Labor Index in the previous (2018Q3) filing. The one exception is the IAM, and that contract has not been ratified.[2]

[1] Rebenchmarking does not always cause increases. One year ago, rebenchmarking caused the Labor Index to decrease.

[2] See Appendix H for union abbreviations.

# Labor
## Fourth Quarter 2018

***Wage Increases:*** No wage increases are currently scheduled for the fourth quarter. In the case of 11 new independent labor agreements added to the index, retroactive wage increases caused the wage rate to be updated.

***Lump Sums:*** The fourth quarter lump sum rate increased by one cent. Although one amount was fully amortized and removed, it was replaced by a bonus of similar size for the new quarter.[3] The entire increase was caused by rebenchmarking to wage statistics for 2017.

***Back Pay:*** The back pay rate increased 5.1 cents. Over half of this increase was caused by rebenchmarking. An additional increase was caused by adding 11 new independent labor agreements with retroactive wage increases to the index. Some of the additional back pay was offset by a negative back pay amount for the national IBEW contract, as an arbitration board awarded the railroads a portion of the back pay owed to IBEW employees because their delay in ratifying a new labor agreement denied the carriers some health care benefit savings. As always, back pay amounts will be removed from the index after they have been amortized over four quarters.[3]

***Other:*** In wages, "Other" contains the amortization of incentive compensation payments (similar to lump sums) that one railroad makes each year to its dispatchers, yardmasters, and locomotive engineers. The payment total is for performance in 2017 that was paid in early 2018. The rate increased half of a cent ($0.005), and rebenchmarking caused the entire change.

### Supplements Index

The Supplements Index increased 1.0 percent. Rebenchmarking and higher taxable earnings caused most of the increase. Some of the increase was offset by lower railroad contributions to employee stock and 401(k) plans.

***Health & Welfare:*** The 2018Q4 Health & Welfare rate increased 12.8 cents (1.6 percent) entirely because of rebenchmarking to newer wage statistics and annual report data.

***Railroad Retirement:*** The Railroad Retirement rate increased 20.2 cents (or 2.3 percent). The change was caused mostly by rebenchmarking, including higher taxable earnings caused by rebenchmarking. New independent labor agreements with retroactive wage increases had a small impact.

***Unemployment Insurance:*** The Unemployment Insurance tax rate decreased by one half of one cent ($0.005). Rebenchmarking caused the decrease.

***Other:*** The "Other" category is a reflection of all other fringe benefits, and currently contains known employer contributions to employee 401(k) accounts and employer contributions to employee stock plans that are recorded as fringe benefits. The fourth quarter rate decreased 14.2 cents as this quarter does not contain bonus matches or perfect attendance stock awards.

[3] Index procedure, decided by the Interstate Commerce Commission in 1988, is to amortize lump sums and/or back pay over four quarters using the rates for 13-week (a.k.a. 3-month) U.S. Treasury bills.

# Labor
## Fourth Quarter 2018

### Labor Index Calculation

As shown in Table A-1 on the next page, the 1.2 percent increase in the Wage Rate Index and the 1.0 percent increase in the Supplements Index combined to cause the Labor Index to rise 1.1 percent from the previous quarter. The linked fourth quarter 2018 index of 439.2 is determined by multiplying the third quarter linked index of 434.3 times the change between the fourth quarter Labor Index (464.3) and the original third quarter Labor Index recalculated using the original third quarter Wage Rate and Supplements indexes weighted with the new 2017 weights (459.1). This method eliminates changes caused by the new weights, but captures changes caused by rebenchmarking. The purpose of the center "Updated to Reflect..." column in Table A-1 is only to enable the reader to discern the impact of rebenchmarking.

The linked fourth quarter 2018 Labor Index of 439.2 is 5.8 percent higher than one year ago. The current Labor Index has three additional wage increases for most unions plus considerable back pay compared to the Labor Index from a year ago. This can be attributed to the new national labor agreements that had retroactive wage increases for 2016 and 2017 in addition to their 2018 wage increases.

# Labor

## Fourth Quarter 2018

## Table A-1 Labor Index

| | 2018Q3 | | 2018Q4 | |
|---|---|---|---|---|
| | **Used in Previous Index Filing** | **Updated to Reflect New Benchmarks** | **Based on 2017 Data** | **Pct Chg From Prev. Filing** |
| Base Wage – Straight Time & Pay For Time Not Worked | $41.993 | $42.457 | $42.473 | 1.1% |
| Adjustments: | | | | |
| Lump Sum | 0.390 | 0.401 | 0.400 | 2.6% |
| Back Pay | 1.232 | 1.268 | 1.283 | 4.1% |
| Other | 0.177 | 0.182 | 0.182 | 2.8% |
| **Total Wages** | 43.792 | $44.308 | 44.338 | 1.2% |
| Health & Welfare Benefits | 8.101 | 8.229 | 8.229 | 1.6% |
| RR Retirement & Medicare | 8.867 | 9.064 | 9.069 | 2.3% |
| Unemployment Insurance | 0.365 | 0.360 | 0.360 | -1.4% |
| Other | 0.288 | 0.297 | 0.146 | -49.3% |
| **Total Supplements** | $17.621 | $17.950 | $17.804 | 1.0% |
| Total Labor (a check sum only) | $61.413 | $62.258 | $62.142 | |
| **Wage Rate Index**[1] | 374.8 | 379.2 | 379.4 | 1.2% |
| **Supplements Index**[2] | 651.2 | 663.3 | 657.9 | 1.0% |
| Total labor Index, 2016 Weights[3] | 455.5 | | | |
| Total labor Index, 2017 Weights[4] | 459.1 | 465.9 | 464.3 | |
| **Labor Index (linked)**[5] | 434.3 | | **439.2** | 1.1% |

[1] 1980 wage rate $11.685

[2] 1980 supplements rate $2.706

[3] 2016 weights: wages, supplements 70.8% 29.2%

[4] 2017 weights: wages, supplements 69.5% 30.5%

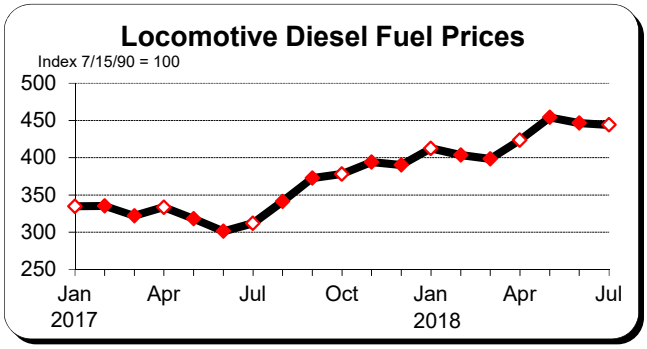
[5] 2018Q4 linked Index = $2018Q3_{linked}$ x ($2018Q4_{WT2017}$ / $2018Q3_{WT2017}$)

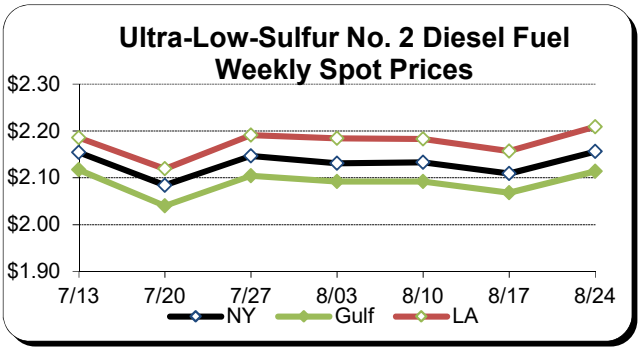
= 434.3 x 464.3 / 459.1

# Fuel
## Fourth Quarter 2018

The forecast for fuel is based on: (1) a survey of railroad fuel purchasing officers concerning current price and volume levels, (2) expectations of railroad purchasing officers based on their own forecast models and discussions with their major suppliers, and (3) a consensus of petroleum industry experts and general business publications. Fuel purchases are assumed to remain in inventory for 30 days before the fuel is consumed (and therefore expensed). Therefore, prices *paid* in the first month of each quarter are for fuel *expensed* in the second (or middle) month of the quarter, and the middle month expensed is used to represent each quarter.

The average locomotive diesel fuel price has been trending upward since June 2017, although the two most recent months had slight decreases. While average prices for locomotive diesel fuel are available only through July 2018, data through four weeks of August are available for related fuel types. According to the Energy Information Administration, the daily spot price as of August 27 for Ultra-Low-Sulfur Diesel Fuel* is 3.6 to 4.4 percent higher than the average for July. The chart below (on left) shows the AAR's Monthly Locomotive Diesel Fuel Price Index from January 2017 through July 2018. The second chart (on right) shows recent spot prices for Ultra-Low-Sulfur No. 2 Diesel Fuel as reported by the Energy Information Administration.




In its *This Week in Petroleum* report released August 22, the U.S. Energy Information Administration said that despite "record refinery runs and lower exports, distillate inventories in the United States have declined because consumption has outpaced the rate at which inventories have been replanished." Demand is said to be at the highest level since 2007. With demand outpacing supply, railroads expect price increases by October (Q4) compared to prices that actually occurred for July (Q3). Because the Q3 forecast was too high, the Q4 forecast is a 2.4 percent decrease.

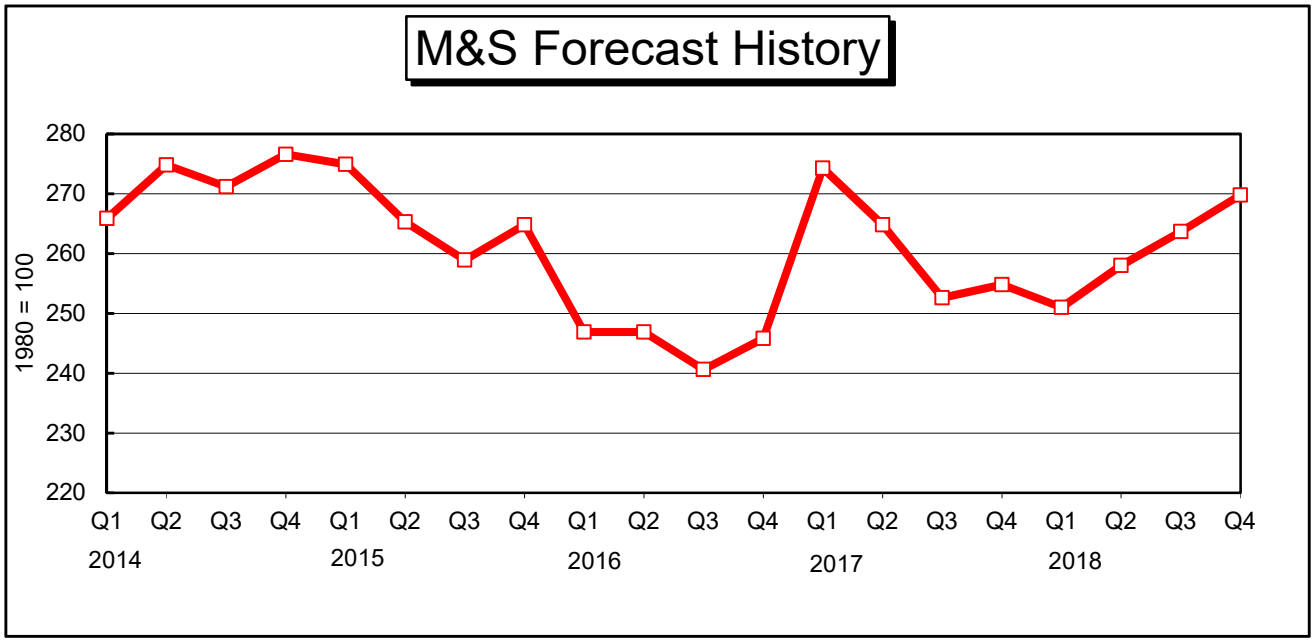
| | |
|---|---|
| Forecast Fuel Index (1980 = 100) | 283.9 |
| Change from previous quarter forecast | -2.4% |
| Change from previous quarter actual | 3.6% |

* Heating oil, Ultra-Low-Sulfur No. 2 Diesel Fuel, and locomotive diesel fuel are part of a group of closely related products, commonly labeled as distillates, that differ mostly by their sulfur content. Because of these similarities, these fuels are produced together and have similar pricing trends.

# Materials & Supplies
## Fourth Quarter 2018

The fourth quarter 2018 Materials & Supplies Index is up 2.3 percent from the previous quarter. Prices were up in all three major categories. Despite the overall increase, the Material & Supplies Index remains lower than its values for most of 2014.

| | | |
|---|---|---|
| 2018Q4 | Materials & Supplies Index = | 269.8 |
| 2018Q3 | Materials & Supplies Index = | 263.7 |
| | Difference | 6.1 basis points<br>or<br>2.3 % |



# Equipment Rents
## Fourth Quarter 2018

The Equipment Rents Index consists of two components – car hire and lease rentals. The methodologies used to create these two components, and the final Equipment Rents Index, are explained below.

### Car Hire

The car hire component is indexed using data from the Car Hire Accounting Rate Master (CHARM) file. Car hire rates for the forecast quarter are estimated based on data for active freight cars using the most recent data available. For the first quarter, December 1 of the previous year is typically used. For the second, third and fourth quarters; March 1, June 1, and September 1 are usually used, respectively. Using data retrieved from the latest CHARM file, an average rate per car is developed. Next, those average rates are grouped into four car type categories to create an overall summary of car hire rates. The summary rates are then compared from quarter to quarter, and weighted, to determine the Car Hire Index.

### Lease Rentals

The lease rentals portion of the Equipment Rents Index uses the Producer Price Index for Industrial Commodities less Fuel and Related Products and Power (PPI-LF). The Commission adopted this surrogate in its decision served March 13, 1987. The AAR uses six years of historical data to derive its forecast for the PPI-LF. The forecast is used not only for lease rentals, but also for the "Other" component of the All-Inclusive Index. Appendix G discusses the forecast in more detail.

### Equipment Rents Index Calculation

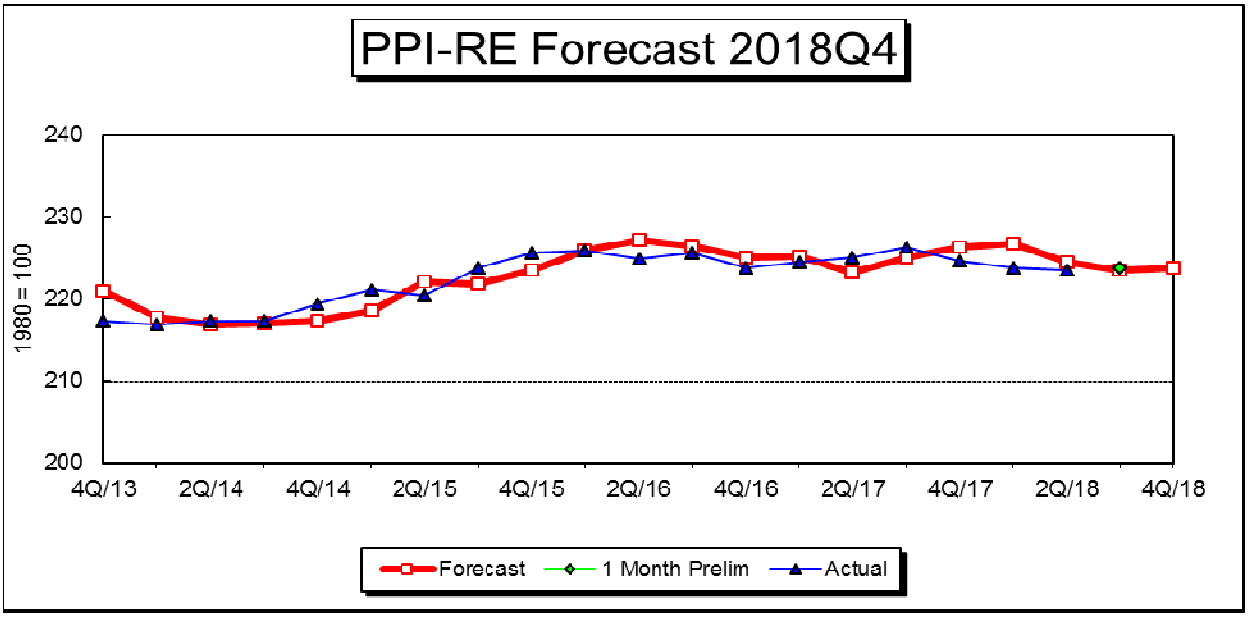
The table below shows the results of the Equipment Rents Index calculation. The fourth quarter Car Hire portion of the Index rose 3.1 percent because of higher rates for autoracks and privately-owned cars. A 1.7 percent increase for the projected PPI-LF (See Appendix G) used as a proxy for Lease Rentals, combined with the 3.1 percent increase for Car Hire, caused the Equipment Rents Index to rise 2.6 percent.

| | 2017 Weight | 2018Q3 | 2018Q4 | Percent Change |
|---|---|---|---|---|
| Car Hire | 61.5% | 210.4 | 216.9 | 3.1 % |
| Lease Rentals | 38.5% | 231.5 | 235.5 | 1.7 |
| Weighted Average | | 218.5 | 224.1 | 2.6 |
| Weighted Average (Linked) | | 230.5 | 236.4 | 2.6 |

# Depreciation
## Fourth Quarter 2018

The Producer Price Index for Railroad Equipment (PPI-RE) is used to index depreciation expense. The PPI-RE is forecast using an ARIMA (Auto-Regressive Integrated Moving Average) process where a statistical package picks the model that best fits the historical data set (see next page), and that model is then used for the forecast. The historical data set contains 6 years of monthly data (a sample size of 72), where the most recent available data point is the first month of the quarter prior to the forecast quarter. For a first quarter forecast, the most recent month of data available would be for October of the prior year. For a second quarter forecast, January would normally be the most recent period available. April and July would be the most recent months available for third and fourth quarter forecasts, respectively. The output from the forecast model is shown on page 2 of this appendix on a 1982=100 basis. The figure forecast by the model is a 0.1 percent decrease from the previous quarter's forecast, and reflects recent monthly values that did not change much in 2018 until July.

| | |
|---|---|
| Forecast of Depreciation Index (1982=100) | 202.3 |
| Forecast of Depreciation Index (1980=100) | 223.8 |
| | |
| Change from previous quarter forecast | 0.1% |
| Change from actual first month of previous quarter | 0.0% = -0.04% |
| Change from same quarter of prior year (actual) | -0.4% |



# Depreciation
## Fourth Quarter 2018

**PPI RAILROAD EQUIPMENT**

Using rule-based logic, the program narrowed down the choice to exponential smoothing or Box-Jenkins.
The program performed an out-of-sample test to select between these two approaches.
The cumulative MAD for Exponential smoothing was 1.03, and for Box-Jenkins was 0.98.
The rolling out-of-sample test used a maximum horizon of 12 and generated 78 forecasts for each method.

Based on the lower Mean Absolute Deviation, Box-Jenkins was selected.

***Model Details***

**Box-Jenkins**
**ARIMA(1, 1, 0)**

| Term | Coefficient | Std. Error | t-Statistic | Significance |
|---|---|---|---|---|
| a[1] | -0.2452 | 0.1149 | -2.134 | 0.9637 |

***Within-Sample Statistics***

| | | | | |
|---|---|---|---|---|
| Sample size | 72 | No. parameters | 1 | |
| Mean | 200.02 | Std. deviation | 3.71 | |
| R-square | 0.93 | Adj. R-square | 0.93 | |
| Durbin-Watson | 1.94 | Ljung-Box(18) | 13.40 | P=0.24 |
| Forecast error | 1.00 | BIC | 1.02 | |
| MAPE | 0.34 | SMAPE | 0.34 | |
| RMSE | 0.99 | MAD | 0.68 | |
| MAD/Mean Ratio | 0.00 | | | |

***Actual Values for the Most Recent 6 Periods:***

| Date | Actual |
|---|---|
| 2018-Feb | 202.1 |
| 2018-Mar | 202.0 |
| 2018-Apr | 202.0 |
| 2018-May | 202.0 |
| 2018-Jun | 202.1 |
| 2018-Jul | 202.4 |

***Forecasted Values***

| Date | 2.5 Lower | Forecast | 97.5 Upper |
|---|---|---|---|
| 2018-Aug | 200.373 | 202.326 | 204.279 |
| 2018-Sep | 199.898 | 202.344 | 204.791 |
| 2018-Oct | 199.421 | 202.340 | 205.259 |
| 2018-Nov | 199.030 | 202.341 | 205.652 |
| 2018-Dec | 198.677 | 202.341 | 206.005 |
| QTR AVG | 199.043 | 202.341 | 205.639 |

# Interest
## Fourth Quarter 2018

The Interstate Commerce Commission, in its decision served February 28, 1989, revised the All-Inclusive Index methodology to include a specific interest component, which is to track changes in the average interest rate from year to year. The interest rate is essentially the embedded cost of debt, i.e., total interest expense divided by average total long term debt.

*The interest rate is calculated for the most recent year and used until the next year's figures are finalized.* The source data are from a summary of the annual reports (Form R-1) submitted by each of the Class I railroads. Although the data set is received at the end of March, it is not used until the September filing. This enables data to be entered into a database and reviewed – and any revisions made, if necessary, before the data are used in the Index. The current Interest Index is based on 2017 data, and was updated in this Q4 filing submitted on September 5, 2018. The Interest Index based on 2017 increased slightly from 2016's all-time low. Interest rates for 10- and 30-year U.S. Treasury Bonds, and Corporate AAA bonds, also increased from 2016 to 2017. Changes in the mix of maturities for the debt portfolio can also cause changes in the railroad average.

The R-1 source for interest expense is Schedule 210, column b. The lines currently used are listed below. The source for average total debt is Schedule 200. The sums of data from columns b and c (ending and beginning balances) are combined and divided by 2 to compute an average balance. The line numbers listed below account for the line number changes effective beginning with the 2016 annual report.

**Interest Expense (Schedule 210)**

| Line | |
|---|---|
| 42 | Total Fixed Charges |
| 44 | Contingent Interest |
| less | |
| 22 | Release of Premium on Funded Debt |

**Average Total Debt (Schedule 200)**

| Line | |
|---|---|
| 29 | Current Liabilities, Loans and Notes Payable |
| 38 | Equipment Obligations and Other Long Term Debt Due Within One Year |
| 40 | Non-Current Liabilities: Funded Debt Unmatured |
| 41 | Non-Current Liabilities: Equipment Obligations |
| 42 | Non-Current Liabilities: Capitalized Lease Obligatons |
| 43 | Non-Current Liabilities: Debt in Default |
| 44 | Non-Current Liabilities: Accounts Payable: Affiliated Companies |
| 45 | Non-Current Liabilities:Unamortized Debt Premium |

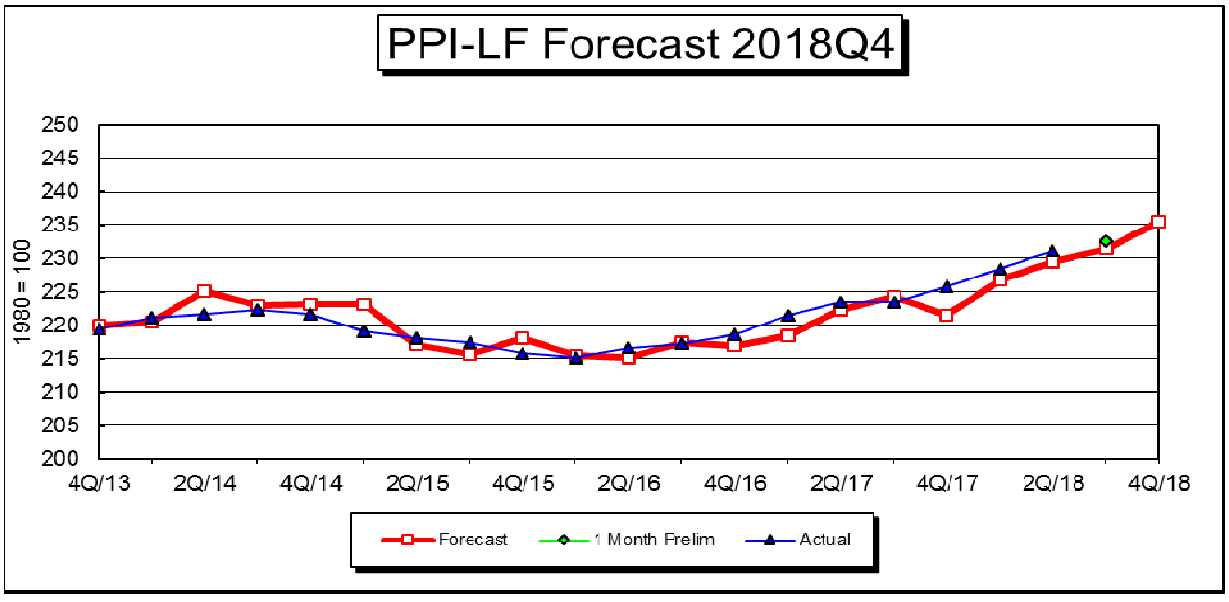
| | | |
|---|---|---|
| 2017 | Interest Rate | 4.90% |
| 1980 | Interest Rate | 7.85% |
| **2018Q4** | **Interest Index** | **62.4** |
| 2018Q3 | Interest Index | 60.5 |
| | Percent Change | 3.1% |

# Other Expenses
## Fourth Quarter 2018

The Producer Price Index for Industrial Commodities less Fuels and Related Products and Power (PPI-LF) is used to index purchased services, casualties and insurance, loss and damage, taxes (other than income and payroll), general and administrative expenses, and lease rentals. These expenses, when grouped together, are usually called "Other" expenses.

Like the PPI-RE, the PPI-LF is forecast using an ARIMA process on 6 years of monthly data (a sample size of 72) with the most recent available monthly data being the first month of the quarter prior to the forecast quarter. For a first quarter forecast, the most recent month of data available would be for October of the prior year. For a second quarter forecast, January would normally be the most recent month available. April and July would be the most recent months available for third and fourth quarter forecasts, respectively. The output from the forecast model is shown on page 2 of this appendix for 1982=100. Monthly PPI-LF figures have not decreased since July 2017.

| | |
|---|---|
| Forecast of Other Expense Index (1982=100) | 210.1 |
| Forecast of Other Expense Index (1980=100) | 235.5 |
| | |
| Change from previous quarter forecast | 1.7% |
| Change from actual first month of previous quarter | 1.2% |
| Change from same quarter of prior year (actual) | 4.3% |



# Other Expenses
## Fourth Quarter 2018

**PPI INDUSTRIAL COMMODITIES LESS FUELS AND RELATED PRODUCTS AND POWER**

Using rule-based logic, the program narrowed down the choice to exponential smoothing or Box-Jenkins.
An out-of-sample test was used to select between these two approaches.
A rolling out-of-sample test used a maximum horizon of 12 and generated 78 forecasts for each method.
The cumulative MAD for Exponential smoothing was 1.85 and for Box-Jenkins was 2.15.
Based on the lower Mean Absolute Deviation, Exponential Smoothing was selected.

**Forecast Model for PPILF**

**Multiplicative Winters: Linear trend, Multiplicative seasonality**
**LM(0.931, 0.787, 0.999)**
Confidence limits proportional to indexes

| Component | Smoothing Wgt | | Final Value |
|---|---|---|---|
| Level | 0.9306 | | 207.6 |
| Trend | 0.787 | | 0.5991 |
| Seasonal | 0.9994 | | |
| **Seasonal Indexes** | | | |
| Jan - Mar | 1.001 | 0.9999 | 0.9995 |
| Apr - Jun | 0.9996 | 0.9995 | 0.9998 |
| Jul - Sep | 0.9996 | 1 | 0.9997 |
| Oct - Dec | 1.001 | 1.001 | 0.9999 |

***Within-Sample Statistics***

| | | | | |
|---|---|---|---|---|
| Sample size | 72 | No. parameters | 3 | |
| Mean | 196.83 | Std. deviation | 3.68 | |
| R-square | 0.99 | Adj. R-square | 0.99 | |
| Durbin-Watson | 1.71 | Ljung-Box(18) | 27.4 | P=0.93 |
| Forecast error | 0.4 | BIC | 0.43 | |
| MAPE | 0.16 | SMAPE | 0.16 | |
| RMSE | 0.39 | MAD | 0.32 | |
| MAD/Mean Ratio | 0 | | | |

***Actual Values for the Most Recent 6 Periods:***

| Date | Actual |
|---|---|
| 2018-Feb | 203.8 |
| 2018-Mar | 204.8 |
| 2018-Apr | 205.2 |
| 2018-May | 206.1 |
| 2018-Jun | 207.0 |
| 2018-Jul | 207.5 |

***Forecasted Values***

| Date | 2.5 Lower | Forecast | 97.5 Upper |
|---|---|---|---|
| 2018-Oct | 207.425 | 209.571 | 211.718 |
| 2018-Nov | 207.569 | 210.131 | 212.693 |
| 2018-Dec | 207.629 | 210.547 | 213.465 |
| QTR AVG | 207.541 | 210.083 | 212.625 |

# Railroad and Union Abbreviations

## Fourth Quarter 2018

***Railroads***

| | |
|---|---|
| BLE | Bessemer & Lake Erie Railroad (Part of CN's Grand Trunk Corp.) |
| BNSF | BNSF Railway Company |
| CC | Chicago, Central & Pacific (Part of CN's Grand Trunk Corp. Sometimes noted as CC&P.) |
| CN | Canadian National Railway (Commonly known as CN, owns Grand Trunk Corporation.) |
| CNGT | AAR's abbreviation for Grand Trunk Corporation (Almost all of CN's U.S. operations.) |
| CP | Canadian Pacific (Also noted as CPR. Owns the U.S. Class I railroad Soo Line.) |
| CPSL | AAR's abbreviation for Soo Line Corporation (CP's U.S. operations including SOO, D&H, and DME.) |
| CSX | CSX Transportation |
| D&H | Delaware & Hudson (Part of Canadian Pacific's U.S. operations, included beginning 2011Q4.) |
| DME | Dakota, Minnesota & Eastern (Part of Canadian Pacific's U.S. operations, included beginning 2011Q4.) |
| GTW | Grand Trunk Western Railroad (Part of CN's Grand Trunk Corp.) |
| IC | Illinois Central Railroad (Part of CN's Grand Trunk Corp.) |
| KCS | Kansas City Southern Railway |
| NS | Norfolk Southern Combined Railroad Subsidiaries (a.k.a. Norfolk Southern Railway or NS Rail) |
| SOO | Soo Line Railroad (The largest part of Canadian Pacific's U.S. operations.) |
| UP | Union Pacific Railroad |
| WC | Wisconsin Central and subsidiaries (Part of CN's Grand Trunk Corp.) |

***Major Unions Involved with Railroads***

| | |
|---|---|
| ATDA | American Train Dispatchers Association |
| BLET | Brotherhood of Locomotive Engineers and Trainmen Div. of the International Brotherhood of Teamsters |
| BMWED | Brotherhood of Maintenance of Way Employees Division of the International Brotherhood of Teamsters |
| BRS | Brotherhood of Railroad Signalmen |
| IAM | International Association of Machinists and Aerospace Workers |
| IBBM | International Brotherhood of Boilermakers, Iron Ship Builders, Blacksmiths, Forgers & Helpers |
| IBEW | International Brotherhood of Electrical Workers |
| NCFO | National Conference of Firemen and Oilers |
| SMART-TD | International Association of Sheet Metal, Air, Rail, and Transportation Workers - Transportation Division* |
| SMART-MD | International Association of Sheet Metal, Air, Rail, and Transportation Workers - Mechanical Division** |
| TCU | Transportation Communication International Union |
| TCU-Carmen | Brotherhood of Railway Carmen Division of the Transportation Communications International Union |

***Predecessor Unions (Some AAR databases use these old abbreviations.)***

| | |
|---|---|
| BLE | Brotherhood of Locomotive Engineers (predecessor to BLET) |
| BMWE | Brotherhood of Maintenance of Way Employees (predecessor to BMWED) |
| BRC | Brotherhood of Railway Carmen (predecessor to TCU-Carmen) |
| IBFO | International Brotherhood of Firemen and Oilers (predecessor to NCFO) |
| SMW | Sheet Metal Workers' International Association (see SMART-MD) |
| UTU | United Transportation Union (merged into SMART) |
| UTU-YMD | United Transportation Union Yardmaster Department (see SMART-TD) |

* Represents employees formerly represented by the UTU (conductors and brakemen) and also has a separate yardmasters department.

** Represents employees formerly represented by the SMW (steel workers)