



BUILDING AMERICA®

March 31, 2023

CALIFORNIA AIR RESOURCES BOARD
ATTN EXECUTIVE OFFICER – Liane Randolph
1001 I STREET P O BOX 2815
SACRAMENTO CA 95812

Dear Ms. Randolph:

Pursuant to Paragraph IV.B.1 of the "Memorandum of Mutual Understandings and Agreements" dated July 2, 1998, please find enclosed Union Pacific Railroad Company's Fleet Average submittal and ULEL Credit Report for calendar year 2022.

The following documents, containing the information specified in Appendix F of the Memorandum, are enclosed for your review:

- UPRR Calculation of Fleet Average Using Megawatt-Hours/Gallons of Fuel (Forms F-A-1 through F-A-6)
- UPRR Fleet Average Certification for calendar year 2021(per Paragraph IV.B.6)
- UPRR Fleet Average Form F-S for 2021

Union Pacific has received foreign locomotive data from other carriers and has entered this data as it was provided. Some engine family and/or NOx values may differ from similar UPRR Locomotives.

As with the previous submissions, these reports contain confidential business information concerning our operations, fleet deployments, locomotive technologies and other topics. We have labeled them accordingly and request that ARB treat them as "confidential business information" pursuant to the California Public Records Act.

Please contact us with questions.

Best Regards,

Trish Clary
Senior Director – Environmental Programs

CERTIFICATE

STATE OF NEBRASKA)

) ss:

COUNTY OF DOUGLAS)

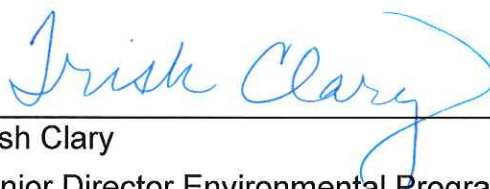
The undersigned, Trish Clary, does hereby certify as follows:

(1) I am Senior Director Environmental Programs for Union Pacific Railroad Company, located at 1400 Douglas Street, Omaha, Nebraska;

(2) The enclosed report for calendar year 2022 is submitted on behalf of Union Pacific Railroad Company, a Participating Railroad in the Memorandum of Mutual Understandings and Agreements for the South Coast Locomotive Fleet Average Emissions Program, dated July 2, 1998 (Memorandum); and

(3) The information submitted is, to the best of Union Pacific's knowledge and belief, true, accurate and complete, and is consistent with Appendix F of the Memorandum.

IN WITNESS WHEREOF, I have hereunto set my hand on the 21st day of March, 2022.




Trish Clary

Senior Director Environmental Programs
Union Pacific Railroad

_____) ss:
COUNTY OF DOUGLAS)

IN WITNESS WHEREOF, I have hereunto set my hand and official seal this day and year last above written.

My Commission expires: May 7, 2024

 **GENERAL NOTARY - State of Nebraska**
BRENDA L. FREDERICK
My Comm. Exp. May 7, 2024

South Coast Locomotive Fleet Average Emissions Program

ANNUAL COMPLIANCE REPORT

FOR

CALENDAR YEAR

_____2022_____

Submitted by a Participating Railroad

to the

California Air Resources Board

in Accordance with the

Memorandum of Mutual Understandings and Agreements

Dated

July 2, 1998

Participating Railroad: _____Union Pacific Railroad_____

Date Submitted: _____March 31, 2023_____

Form F-S

Summary Information

I.	If the Participating Railroad is filing this report only to document FAC from ULELs created in a year prior to 2010, please check here and go directly to Section D.	_____
II.	If the Participating Railroad is filing this report to document its fleet average for a year prior to 2010 in order to create FAC, please check here. Go directly to Section A and, if applicable, Section D.	_____
III.	If the Participating Railroad is filing this report for the year 2010 or later in order to demonstrate whether it is in compliance with its annual obligation under paragraph III.A.1 of the Memorandum of Mutual Understandings and Agreements (Memorandum), check A, B, or C below to indicate which method is being used to demonstrate compliance.	
A.	Calculation of Final FA, beginning with the formula for calculating FA in paragraph III.B.1 of the Memorandum	__ X __
B.	Exclusive Use of locomotives with CLs at or below the Fleet Average Target, as defined in Section II of the Memorandum	_____
C.	Calculation of Final FA, beginning with the formula for calculating FA in paragraph III.B.3 of the Memorandum	_____

	If III.A is checked above, complete Section A below and, if applicable, Section D.
	If III.B is checked above, complete Section B below and, if applicable, Section D.
	If III.C is checked above, complete Section C below and, if applicable, Section D.

Form F-A-1

Calculation of FA in Accordance with Paragraph III.B.1 of Memorandum

- I. Using all available data, complete this Part I and include each locomotive operated by the Participating Railroad in the South Coast Nonattainment Area during the year. Use additional pages as needed. See the notes to this Form F-A-1 for additional instructions. If the data on this schedule represent less than 90% of the Participating Railroad's locomotives operated in the South Coast Nonattainment Area during the year, also complete Part II below. Otherwise, go to Part III.

(1) Line No.	(2) Locomotive ID No. [Note 1]	(3) CL (g/bhphr)	(4) Adj. to CL (g/bhphr) [Note 2]	(5)=(3)-(4) EL (g/bhphr)	(6) MWhr (or Gal. of Fuel) [Note 3]	(7)=(5)x(6) EL x MWhr
1						
2						
3						
etc.						
		See Attached Sheets for details				

Total of Columns 6 and 7 - Part I	<u>117297.51</u>	<u>674763.7</u>
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Form F-A-1
(continued)

Calculation of FA in Accordance with Paragraph III.B.1 of Memorandum

- II. Complete this Part II only if the data in Part I represent less than 90% of the Participating Railroad's locomotives operated in the South Coast Nonattainment Area during the year (see paragraph III.E.2 of the Memorandum). Information provided in this Part II should be estimated data for enough missing locomotives so that the combination of data in Parts I and II represents at least 90% of the Participating Railroad's locomotives operated in the South Coast Nonattainment Area during the year. Estimations should be based on data for locomotives operated on similar trains within the South Coast Nonattainment Area, and should be explained on Form F-A-5.

(1) Line No.	(2) Estimated Locomotive [Note 1]	(3) CL (g/bhphr)	(4) Adj. to CL (g/bhphr) [Note 2]	(5)=(3)-(4) EL (g/bhphr)	(6) Est. MWhr (or Gal. of Fuel) [Note 3]	(7)=(5)x(6) EL x MWhr
1	1					
2	2					
3	3					
etc.	etc.					
		<p align="center">See Attached Sheets for details</p>				

Total of Columns 6 and 7 - Part II	<u>71418.08</u>	<u>421967.92</u>
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Form F-A-1
(continued)

Calculation of FA in Accordance with Paragraph III.B.1 of Memorandum

III. Complete this Part III to calculate FA.

		(1) MWhr (or Gal. <u>of Fuel</u>)	(2) <u>EL x MWhr</u>	
A.				
B.	Totals from Columns 6 and 7 - Part I	117297.51	674763.7	
C.	Totals from Columns 6 and 7 - Part II	<u>71418.08</u>	<u>421967.92</u>	
	Sum of Lines A and B	188715.59	1096731.60	
D.	FA in g/bhphr (Line C, Column 2 divided by Line C, Column 1)			<u>5.81</u>

Form F-A-2

Calculation of Final FA in Accordance with Subsection III.D of Memorandum

Complete this form to calculate Final FA. All entries should be expressed in g/bhphr.

A.	Enter the value shown on Line D of Part III of Form F-A-1.	5.8
B.	Enter the total of all adjustments made to FA in accordance with paragraph III.D.1 of the Memorandum. If any adjustment is made to FA, complete Part II of Form F-A-3.	<u> 0 </u>
C.	Calculate Adjusted FA (Line A - Line B)	5.8
D.	If Line C is less than or equal to Fleet Average Target, or if this report is for a year prior to 2010, enter zero. Otherwise, enter any correction made to account for atmospheric conditions in accordance with paragraph III.D.2 of the Memorandum. Do not enter more than the difference between Line C and Fleet Average Target. If a correction is made to account for atmospheric conditions, complete Part III of Form F-A-3.	<u> 0 </u>
E.	Calculate Adjusted/Corrected FA (Line C - Line D); round to nearest 0.1 g/bhphr (see Appendix C of Memorandum)	5.8
F.	If Line E is less than or equal to Fleet Average Target, or if this report is for a year prior to 2010, enter zero. Otherwise, enter any available emission reductions from Line E of Part I of Form F-A-6 and/or Part II of Form F-A-6 which the Participating Railroad wishes to deduct from Line E in accordance with paragraph III.D.3 of the Memorandum. Do not enter more than the difference between Line E and Fleet Average Target.	<u> 0.3 </u>
G.	Calculate Final FA in g/bhphr (Line E - Line F)	<u>5.5</u>

Note: Line G must be less than or equal to Fleet Average Target for the Participating Railroad to be in compliance.

Proceed to Forms F-A-3 through F-A-5, if applicable. Otherwise, complete Form F-A-6.

Form F-A-3

Adjustments to CL, Adjustments to FA, and Correction to FA

I. Adjustments to CL

For each locomotive whose CL was adjusted in column 4 of either Part I or Part II of Form F-A-1, complete the following information. Use additional pages as needed.

Locomotive ID No. or Estimated Locomotive No.:	(summary)
A. Adjustment to CL shown on Form F-A-1 (g/bhphr)	3 or 6%
B. Has Adjustment to CL been accepted previously by California Air Resources Board (ARB) in accordance with the terms of Appendix D of the Memorandum?	_Yes_
C. If Line B is Yes, enter date. If Line B is No, go to Line F.	11/18/04
D. Has locomotive been remanufactured, as defined in the Final EPA National Locomotive Rule, since the date shown on Line C?	(some – yes)
E. If Line D is Yes, complete Line F. Otherwise, proceed to next locomotive.	
F. Explain below, in detail, the reasons for the Adjustment to CL and show how it was calculated. Attach all supporting data and evidence. This information will be used by ARB to determine whether to accept the Adjustment to CL. See paragraphs III.C.3, III.C.4, IV.C.4, IV.C.5 and Appendix D of the Memorandum.	Adjustment for CARB fuel (CL certified to EPA diesel)

Notes: Adjustment percentage to CL based on locomotive service type (line-haul vs. captive). Captive units are always fueled with CARB-spec diesel (and therefore, the full 6% adjustment applies), while line-haul locomotives average fueling in California between interstate trips, and therefore, the “half” level of 3% adjustment applies.

This is a generalized summary applicable for all locomotives (individual Form F-A-3 for each locomotive would result in printing several thousand additional pages of nearly identical information). Individual CL adjustments for each locomotive are listed for the entries in Form F-A-1, column 4.

Form F-A-3**(continued)**

Adjustments to CL,
Adjustments to FA,
and
Correction to FA

II. Adjustments to FA

For each Adjustment to FA made in accordance with paragraph III.D.1 of the Memorandum, and included on Line B of Form F-A-2, complete the following information. Use additional pages as needed.

<u>Adjustment to FA No.:</u> (Number each Adjustment, beginning with "1")	<u>N/A</u>
A. How much of the total Adjustment to FA included on Line B of Form F-A-2 is attributable to this Adjustment to FA (in g/bhphr)?	_____
B. Has this Adjustment to FA been accepted previously by California Air Resources Board (ARB) in accordance with the terms of paragraph III.D.1 and Appendix D of the Memorandum?	_____
C. If Line B is Yes, enter date and proceed to next Adjustment.	_____
D. Explain below, in detail, the reasons for this Adjustment to FA and show how it was calculated. Attach all supporting data and evidence. This information will be used by ARB to determine whether to accept this Adjustment to FA. See paragraphs III.C.3, III.C.4, III.D.1, IV.C.4, IV.C.5 and Appendix D of the Memorandum.	

**Form F-A-3
(continued)**

**Adjustments to CL,
Adjustments to FA,
and
Correction to FA**

III. Correction to FA

If a Correction to FA for atmospheric conditions was made in accordance with paragraph III.D.2 of the Memorandum, and was included on Line D of Form F-A-2, complete the following information. Use additional pages as needed.

A.	Show the Correction to FA included on Form F-A-2 (in g/bhphr)	<u> N/A </u>
B.	Has the methodology used for the Correction to FA been accepted previously by California Air Resources Board (ARB) in accordance with the terms of Appendix D of the Memorandum?	<u> </u>
C.	If Line B is Yes, enter date.	<u> </u>
D.	Show below, in detail, how the Correction to FA was calculated. Attach all supporting data and evidence. This information will be used by ARB to determine whether to accept the Correction to FA. If Line B is No, it will also be used to determine whether to accept the methodology. See paragraphs III.D.2 and Appendix D of the Memorandum.	

Form F-A-4

Factors to Convert between Gallons of Fuel and MWhr

For each locomotive whose Gallons of Fuel were converted to MWhr (or vice versa) in order to make an entry in column 6 of Part I or II of Form F-A-1, complete the following information. Use additional pages as needed.

<u>Locomotive ID No. or Estimated Locomotive ID No.:</u>		<u>N/A</u>
A.	Indicate whether original data for the locomotive were collected in gallons of fuel or MWhr.	_____
B.	What conversion factor was used?	_____
C.	Has the methodology used to develop the conversion factor been accepted previously by California Air Resources Board (ARB) in accordance with the terms of Appendix D of the Memorandum?	_____
D.	If Line C is Yes, enter date.	_____
E.	Show below, in detail, how the conversion factor was calculated. Attach all supporting data and evidence. This information will be used by ARB to determine whether to accept the conversion factor. If Line C is No, it will also be used to determine whether to accept the methodology. See paragraphs IV.C.4, IV.C.5 and Appendix B of the Memorandum.	

Form F-A-5

Estimation of Missing Locomotives

If it was not necessary to complete Part II of Form F-A-1, do not complete this form.

For each “Estimated Locomotive” shown in Part II of Form F-A-1, complete the following information. Use additional pages as needed.

<u>Estimated Locomotive No. from Part II of Form F-A-1:</u>	(all listed in Part II)
A. What missing train would this Estimated Locomotive have powered?	Type-dependent (see below)
B. What similar train is being used as the benchmark for the missing train?	Type-dependent (see below)
C. What locomotive model powered the benchmark train, and is the basis for this Estimated Locomotive?	Same locomotive model/Yes
D. Are the data shown in columns 3-6 of Part II of Form F-A-1 consistent with the answers to A, B, and C?	Yes

Notes: UPRR has equipped new locomotives and retrofitted some older locomotives with wattmeters to gather actual usage information for all model types. Most foreign-line (non-UPRR owned or leased) locomotives do not report wattmeter readings, and therefore are needed to be estimated.

As presented to CARB in 2007, UPRR has developed model-specific locomotive matrices where usage values are calculated by train type. These matrices are constantly updated with new data for the annual calculations and are available upon request.

Form F-A-6

FAC and Other Emissions Reductions

I. Summary of FAC Transactions (in g/bhphr)

	(1) Created <u>Pre-2010</u>	(2) Created <u>Post-2009</u>	(3) <u>Total</u>
A. Ending FAC balance -- last annual report	7.8	15.4	23.2
B. FAC acquired from Other Participating Railroad since last annual report, if any	__N/A__	__0__	__0__
C. FAC created from ULELs during the year, if any (Line F of Form F-D-2)	__N/A__	__0__	__N/A__
D. FAC transferred to Other Participating Railroad or others since last annual report, if any	__N/A__	__0__	__0__
E. Total FAC available for use in this annual report -- subject to restrictions on pre-2010 FAC noted in subparagraph III.D.3.a of Memorandum (Line A+Line B+Line C-Line D)	<u>7.8</u>	<u>15.4</u>	<u>23.2</u>
F. FAC used in this annual report, if any (included in total emission reductions shown on Line F of Form F-A-2)	_(0.3)_	__0__	_(0.3)_
G. FAC created during the year other than Line C, if any (Fleet Average Target [#] - Final FA shown on Line G of Form F-A-2, provided Fleet Average Target [#] exceeds Final FA)	__N/A__	__0__	__0__
H. Ending FAC balance -- this annual report (Line E-Line F+Line G)	<u>7.5</u>	<u>15.4</u>	<u>22.9</u>

Form F-A-6
(continued)

FAC and Other Emissions Reductions

Notes to Form F-A-6

For years 2005-2009, do not use Fleet Average Target. Instead, substitute $(1-y) \times 15.4 \text{ g/bhphr}$, as defined in paragraph III.F.2 of Memorandum.

Note: If an entry is shown on Line F, no entry can be shown on Line G (and vice versa). Also, if an entry is shown in column 1 of Lines C or G, no entry can be shown in column 2 of Lines C or G (and vice versa).

Form F-A-6
(continued)

FAC and Other Emissions Reductions

II. Emission Reductions Other than FAC

List the amount of emissions reductions other than FAC, if any, shown on Line F of Form F-A-2 (in g/bhphr). In accordance with subparagraph III.D.3.a of the Memorandum, this amount cannot exceed 0.3 g/bhphr. In addition, the sum of (1) the amount shown here, and (2) the pre-2010 FAC included on Line F of Form F-A-2 (and shown on Line F, column 1 of Part I of this Form F-A-6) cannot exceed 1.3 g/bhphr.	<u>N/A</u>
Attach documentation for the above emission reductions other than FAC, including a description of the reductions, how acquired, date acquired, and amount acquired. Note that subparagraph III.D.3.a and Appendix E of the Memorandum stipulate a fixed conversion rate from tons to g/bhphr.	

III. Reconciliation of Line F of Form F-A-2

A. Show amount from Line F, column 3 of Part I of this Form F-A-6	_____
B. Show amount from Part II of this Form F-A-6	_____
C. Line A + Line B (should equal Line F of Form F-A-2)	_____