

MEMORANDUM
OF
MUTUAL UNDERSTANDINGS AND AGREEMENTS
South Coast Locomotive Fleet Average Emissions Program

July 2, 1998

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MEMORANDUM
OF
MUTUAL UNDERSTANDINGS AND AGREEMENTS

This MEMORANDUM OF MUTUAL UNDERSTANDINGS AND AGREEMENTS dated as of July 2, 1998 ("Memorandum"), is entered into between and among the following (collectively, the "parties"):

- California Air Resources Board ("ARB"), and
- The Burlington Northern and Santa Fe Railway Company and Union Pacific Railroad Company, which are the Class I freight Railroads operating within the boundaries of the South Coast Nonattainment Area (individually, a "Participating Railroad", and together, the "Participating Railroads").

In order to achieve the emissions reductions contemplated herein, the parties have voluntarily arrived at the following mutual understandings and agreements:

I. MUTUAL UNDERSTANDINGS AND AGREEMENTS

A. Locomotive Emissions Program Statement of Principles

The parties have entered into this Memorandum in recognition of the Statement of Principles - South Coast Locomotives Program ("Statement of Principles") agreed to by the U.S. Environmental Protection Agency ("EPA"), ARB, and the Participating Railroads, and dated as of May 14, 1997.

B. National Emissions Standards for Locomotives

Section 213 of the Federal Clean Air Act directs EPA to adopt emissions standards

applicable to new locomotives and new engines used in locomotives. EPA proposed regulations establishing such emission standards on February 11, 1997 (62 Fed.Reg. 6366) and promulgated the final regulation on April 16, 1998 (63 Fed. Reg. 18978) (the "Final EPA National Locomotive Rule"). EPA adopted national emission standards consisting of several tiers, applicable to remanufactured and new locomotives as specified in the Final EPA National Locomotive Rule. EPA promulgated each of these emission standards to "achieve the greatest degree of emission reduction achievable through the application of technology which the Administrator determines will be available for the locomotives or engines to which such standards apply, giving appropriate consideration to the cost of applying such technology within the period of time available to manufacturers and to noise, energy, and safety factors associated with the application of such technology." (Clean Air Act § 213(a)(5)).

C. Participating Railroads' Affirmative Proposal for the South Coast Nonattainment Area

In 1993, the Participating Railroads proposed to EPA, ARB and others the establishment of a locomotive fleet average emissions program in the South Coast Nonattainment Area tied to promulgation of the Final EPA National Locomotive Rule and intended to accelerate introduction into the South Coast Nonattainment Area of newer, lower emitting locomotives. The Participating Railroads, EPA and ARB have since discussed improvements and refinements of the fleet average program, resulting in the mutual understandings, agreements and covenants herein. Measure M14 of the 1994 California State Implementation Plan recognizes the uniqueness of the Participating Railroads' fleet average proposal: "In essence, this fleet average requirement represents the most aggressive scrappage and replacement program of any transportation source . . ."

D. Projected Emission Reductions from 1994 California State Implementation Plan Measure M14

1. California developed and adopted the 1994 California State Implementation Plan ("1994 SIP") to attain the federal ozone air quality standard in the South Coast Nonattainment Area and certain other areas of California. EPA approved the 1994 SIP on September 26, 1996.

2. Measure M14 of the 1994 SIP anticipates that locomotive fleets operating in the South Coast Nonattainment Area in 2010 and later will emit on average no more than the 5.5 grams per brake horsepower-hour ("g/bhp-hr") Tier 2 (2005 and later) new locomotive oxides of nitrogen ("NO_x") emission standard included in the Final EPA National Locomotive Rule. Measure M14 further states that this fleet average emission level will achieve about a two-thirds reduction in locomotive NO_x emissions from the 1994 SIP's projection of the 2010 emissions level for locomotives operating in the South Coast Nonattainment Area. As indicated in the Statement of Principles, the Parties fully expect that the locomotive fleet average emissions program specified herein, when fully implemented, will achieve the emissions reductions contemplated by M14 in 2010, beyond the reductions expected to result through implementation of EPA's national emissions standards for new locomotives and new engines used in locomotives.

E. SIP Credit for Emissions Reductions

Measure M14 was included in EPA's September 26, 1996 approval of the 1994 SIP (62 Fed.Reg. 1149 (January 8, 1997)). As stated in the Statement of Principles, EPA intends to commit to adopt regulations as necessary that would assure that the emissions reductions called for in this Memorandum are achieved from the railroads and/or, if necessary, from other national transportation sources. EPA intends to promulgate such a commitment and establish appropriate SIP credits through notice and comment rulemaking at the conclusion of the Public Consultative Process established in conjunction with approval of the South Coast attainment demonstration (see 40 C.F.R. § 52.238). In that rulemaking, EPA intends to propose adoption of the backstop commitment provision attached to the Statement of Principles.

F. Implementation Impacts on Participating Railroads

The parties understand and acknowledge that implementation of the Locomotive Fleet Average Emissions Program in the South Coast Nonattainment Area will have substantial capital cost and operational impacts on the Participating Railroads. These costs and impacts result from the Participating Railroads' accelerated introduction into the South Coast

Nonattainment Area of lower emitting locomotives, and are in addition to the impacts that will result from implementation of the Final EPA National Locomotive Rule. These impacts include: costs of purchasing additional reserve power, purchasing and installing necessary metering and monitoring equipment, and constructing, maintaining, and operating power changeout facilities; train delay due to power changeouts; and reductions in operating flexibility due to the need to concentrate lower-emitting locomotives in the South Coast Nonattainment Area.

G. Relationship with EPA's National Locomotive Emissions Standards

Under sections 209 and 213 of the Federal Clean Air Act, EPA has the exclusive authority to "promulgate regulations containing standards applicable to emissions from new locomotives and new engines used in locomotives." States and political subdivisions are prohibited from adopting or attempting to enforce "any standard or other requirement relating to the control of emissions from . . . new locomotives or new engines used in locomotives." In the Final EPA National Locomotive Rule promulgated under sections 209 and 213, EPA addressed the issue of the scope of preemption under section 209, and specified that a prohibited "other requirement" includes mandatory fleet average standards. In this Memorandum, the parties voluntarily consent to their mutual participation herein solely for the South Coast Nonattainment Area and solely for the purposes set forth herein, and further agree that the state has the authority to enter into this Memorandum. Under California law, ARB is the state agency with the appropriate jurisdiction to participate in this Memorandum.

H. Unique Features of Railroads

1. Railroads operate national locomotive fleets that travel between states daily, moving more than forty percent of the total intercity revenue ton-miles of freight in the United States. The interconnected nature of the rail network and the ability of locomotives to travel freely throughout the country allow for efficient deployment of locomotives to meet customer needs. Segmentation of the national locomotive fleets into multiple geographic areas would be very burdensome for the railroads because of the very high capital costs of the additional locomotives needed to establish area-specific locomotive fleets, creation of inefficient

operations, and delay of time-sensitive customer shipments. A patchwork of different state and local programs would be an inefficient, costly and time-consuming disruption of interstate commerce. See EPA, Proposed National Locomotive Emission Standards, 62 Fed. Reg. 6366, 6368 (February 11, 1997).

2. Because of the expense of purchasing new locomotives and the resulting economic necessity to keep them operating for as long as possible, railroads spend considerable time and money to maintain their locomotives in equivalent to new condition for at least 30 years.

3. Railroads are an environmentally efficient way to move goods. See, for example, the discussion at 62 Fed. Reg. 6368. Railroads continue to improve their efficiency and reduce emissions per ton-mile of freight moved.

4. Price is usually the significant determinant in a shipper's choice of modes or routes, with the result that railroad traffic levels and patterns are very sensitive to increases in costs. Overly stringent regulation can severely impact railroad traffic and divert international trade away from California ports.

I. Unique Features of Locomotives

1. Only two companies manufacture most of the locomotives used in the United States. Only about 500 new locomotives are manufactured for use in the United States per year. This means that railroads have a limited ability to purchase new locomotives in any particular year. In addition, the price of locomotives is high (upwards of \$2.5 million each in 1997) because the manufacturers' costs must be spread over such a small production level.

2. Locomotives continue in active service for 30 to 40 years. Given proper maintenance, their NO_x emissions rates do not significantly deteriorate over time. Most locomotives are remanufactured periodically, allowing them to remain in equivalent to new condition for their entire lives. In contrast to the usual 30-40 year fleet turnover rate as noted in Measure M14, the locomotive fleet average program for the South Coast Nonattainment Area

would, in effect, result in 100 percent scrappage/replacement with the lower-emitting locomotives over 5 years from 2005-2009.

3. Technologies from other mobile sources that have been successfully applied to reduce NO_x emissions from locomotives include retarded injection timing, increased charge air cooling and increased injection pressure. However, locomotive engines cannot readily use several key cooling mechanisms (e.g., ram air and air-to-air aftercooling) that can be used on other engines to reduce NO_x emissions. Other potential NO_x emission reduction techniques also cannot be used on locomotives due to very high vibration levels, the need for all locomotive components to withstand shock loading of up to five times the force of gravity, locomotive size and weight restrictions, and air flow characteristics affecting locomotive operations in tunnels.

J. Unique Features of the South Coast Nonattainment Area

1. The South Coast Nonattainment Area has, and under any conceivable future circumstances will continue to have, unique air quality problems which require unique, exceptional solutions. Despite the great strides made in California and the South Coast to clean up the air by controlling emissions from virtually all sources of air pollution over the past several decades, the South Coast area continues to have the worst ozone problem in the country and is the only region classified as an extreme nonattainment area. From 1990 to 1992, the average number of exceedance days in each year was 134.3. The South Coast's unique air quality problems are the result of massive emissions generated within the region, exacerbated by especially adverse meteorology and topography. "Southern California . . . violates the [federal ozone] standard on almost one out of every three days--25 times more frequently than the next most polluted urban areas." EPA, Proposed Approval of the California SIP, 61 Fed.Reg. 10920, 10922 (March 18, 1996).

2. The movement of goods through the South Coast Nonattainment Area is essential to the economic vitality of the area and of the nation, and the rail transportation network in the South Coast Nonattainment Area is an essential part of the regional, national and global transportation systems. This network already provides substantial environmental and

economic benefits to the region. These benefits can increase over the long term. The parties agree that the use of rail transportation for goods movement in the South Coast Nonattainment Area is consistent with the goal of maintaining economic vitality in an environmentally beneficial manner.

II. GLOSSARY OF TERMS USED

"Adjustment" means a downward adjustment to either a locomotive's EL_i or a Participating Railroad's FA due to quantifiable and verifiable emissions reduction measures undertaken by a railroad that are not accounted for in the CL or FA. Adjustments shall be made pursuant to paragraph III.C.3 or paragraph III.D.1, as applicable.

"CL" is a locomotive's certified NO_x emission rate in g/bhp-hr, as determined pursuant to 40 C.F.R. Part 92 for the line haul duty cycle.

"Correction" means a downward mathematical change to a Participating Railroad's FA for 2010 and later years, to reflect differences between the atmospheric conditions specified in EPA's test procedure for establishing certified emission levels for locomotives pursuant to the Final EPA National Locomotive Rule and the atmospheric conditions in the South Coast Nonattainment Area, as specified in paragraph III.D.2.

" EL_i " is the NO_x emission rate in g/bhp-hr for an individual locomotive, as calculated and adjusted pursuant to subsection III.C.

"Exclusive Use" or the phrase "exclusive use of locomotives with CLs at or below the Fleet Average Target" means the use of locomotives with CLs at or below the Fleet Average Target in the South Coast Nonattainment Area by a Participating Railroad during a year such that either of the following is true: (1) 100% of the locomotives used have CLs at or below the Fleet Average Target; or (2) no less than 99.9% of the Locomotive Days of Operation are generated by locomotives with CLs at or below the Fleet Average Target.

"FA" means a Participating Railroad's fleet average NO_x emission rate, in g/bhp-hr, for locomotives operated in the South Coast Nonattainment Area, as calculated pursuant to subsection III.B.

"FAC" means fleet average emission credits, expressed in g/bhp-hr, calculated pursuant to subsection III.F.

"Final EPA National Locomotive Rule" means the final regulation promulgated by EPA on April 16, 1998 (63 Fed. Reg. 18978) establishing emission standards for new locomotives and new engines used in locomotives and appearing at Title 40, Code of Federal Regulations, Part 92, commencing at § 92.1, and addressing preemption of state and local locomotive emission standards at Title 40, Code of Federal Regulations, § 85.1603(c).

"Final FA" means a Participating Railroad's final fleet average NO_x emission rate, in g/bhp-hr, for a calendar year, after application of any adjustments and any correction to FA, and subtraction from the adjusted/corrected FA of any FAC or other emission reductions available to the Participating Railroad in accordance with this Memorandum and needed to reduce that Participating Railroad's adjusted/corrected FA. The Final FA is calculated as specified in subsection III.D.

"Fleet Average Target" means EPA's NO_x emission standard for freight locomotives manufactured in 2005 and later, for the line-haul duty cycle, or 5.5 g/bhp-hr, whichever is greater.

"Locomotive Day of Operation" means a calendar day, from midnight to midnight, during any portion of which a locomotive is operated in the South Coast Nonattainment Area.

"Locomotive Fleet Average Emissions Program" means the program established in the South Coast Nonattainment Area by the Participating Railroads pursuant to this Memorandum of Mutual Understandings and Agreements.

"Measure M14" means the control measure pertaining to locomotive emissions and adopted by the ARB on November 15, 1994, as part of the 1994 California State Implementation Plan required under the Federal Clean Air Act, and approved by EPA on September 26, 1996 (62 Fed.Reg. 1149 (January 8, 1997)), and any amendments to the control measure made to incorporate revised locomotive NO_x emission reductions expected to occur in the South Coast Nonattainment Area for the years 2005 through 2009.

"Proposed EPA National Locomotive Rule" means the proposed regulation published in the Federal Register on February 11, 1997 (62 Fed.Reg. 6366), identifying expected emission standards for new locomotives and new engines used in locomotives, and further proposing provisions to preempt state and local locomotive emission standards.

"South Coast Nonattainment Area" means the area of Los Angeles, Orange, Riverside, and San Bernardino Counties designated in 40 C.F.R. § 81.305 as of July 1, 1996 as a federal "Extreme" ozone nonattainment area and described more specifically in Appendix A.

"ULEL" means ultra-low emitting locomotive. For the purposes of this Memorandum, through 2011 a ULEL is a locomotive with an EL_i equal to or less than 4.0 g/bhp-hr, and for 2012 through 2014 a ULEL is a locomotive with an EL_i less than 3.0 g/bhp-hr.

"Year" means a calendar year beginning on January 1 and continuing until the following December 31, except as otherwise specified herein.

III. PARTICIPATING RAILROADS' FLEET AVERAGE OBLIGATIONS IN THE SOUTH COAST NONATTAINMENT AREA

A. Annual Obligation

1. In each calendar year beginning in 2010, each Participating Railroad's Final FA shall not exceed the Fleet Average Target.

2. Beginning April 1, 2011, each Participating Railroad shall annually demonstrate that it has satisfied paragraph III.A.1 for the preceding year, by calculating its FA pursuant to paragraph III.B.1 or paragraph III.B.3, and determining its Final FA pursuant to subsection III.D. As an alternative, a Participating Railroad may show that it has satisfied the definition of Exclusive Use.

B. Calculation of FA

1. The formula for calculating a Participating Railroad's FA in a particular year shall be:

$$FA = \frac{\sum_{i=1}^n (EL_i) (MWhr_i)}{\sum_{i=1}^n (MWhr_i)} 1$$

where $MWhr_i$ = the total number of megawatt-hours an individual locomotive operated in the South Coast Nonattainment Area in the applicable year, measured at the generator, or, at the Participating Railroad's option, the number of gallons of fuel consumed by the locomotive while it operated in the South Coast Nonattainment Area.

n = the total number of locomotives the Participating Railroad operated in the South Coast Nonattainment Area in the applicable year.

For the purposes of this calculation, n may include nominal locomotive(s) to represent one or more alternative operating scenarios for a particular physical locomotive. Alternative operating scenarios may include, but are not limited to, operation of a locomotive on more than

one fuel where a different CL has been determined for the locomotive's operation on each fuel, and circumstances where a physical locomotive operates for less than an entire calendar year under a particular combination of quantifiable and verifiable emission reductions for which adjustments may be made to the EL_i or FA.

2. A Participating Railroad may use either megawatt-hours or gallons of fuel for determining any individual locomotive's MWhr_i, but the use of one or the other measurement for all of a Participating Railroad's locomotives is encouraged. A Participating Railroad shall be permitted to convert gallons of fuel to megawatt-hours, or vice-versa, pursuant to the procedure in Appendix B or any other formula agreed to by the parties.

3. If, for a particular year, a Participating Railroad attempts to satisfy its fleet average obligation through the exclusive use of locomotives with CLs at or below the Fleet Average Target, but is unable to satisfy the definition of Exclusive Use, the Participating Railroad may calculate its FA for that year by using the formula in paragraph III.B.1 or by using the following formula:

$$FA = \frac{\sum_{i=1}^n (EL_i) (Days_i) (Factor_i)}{\sum_{i=1}^n (Days_i) (Factor_i)}$$

where Days_i = the total number of Locomotive Days of Operation for an individual locomotive in the South Coast Nonattainment Area in the applicable year.

n = the total number of locomotives the Participating Railroad operated in the South Coast Nonattainment Area in the applicable year.

Factor_i = the locomotive horsepower weighting factor applicable to an individual locomotive, as specified in the following table:

Locomotive Horsepower	Factor
1999 or less	1

2000 to 2999	2
3000 or more	5

C. Calculation of EL

1. EL_i for a locomotive shall be the CL for that locomotive, unless the EL_i is adjusted pursuant to this subsection III.C.
2. Prior to 2005, the parties shall mutually agree upon default CL's for locomotive models with no CL for NO_x .
3. A locomotive's EL_i may be adjusted downward to account for quantifiable and verifiable emissions reductions not included in the CL. Adjustments to the EL_i may be made pursuant to paragraphs 2 through 5 of Appendix D.
4. When quantifiable and verifiable emissions reductions for a particular locomotive apply to only a portion of that locomotive's operations in the South Coast Nonattainment Area in a given year, the locomotive shall be treated in the fleet average calculation as two or more nominal locomotives, pursuant to paragraph III.B.1. For each nominal locomotive, a separate EL_i shall be calculated, based upon the quantifiable and verifiable emissions reductions that apply to that nominal locomotive. In calculating the FA, the megawatt-hours operated or fuel usage for each nominal locomotive shall be the number of megawatt-hours operated or gallons of fuel used under the operating conditions that apply to that nominal locomotive.

D. Calculation of Final FA

1. In lieu of adjusting each locomotive's EL_i downward under paragraph III.C.3 due to applicable quantifiable and verifiable emissions reductions not accounted for in the CL, a Participating Railroad may adjust FA for such reductions after FA has been calculated pursuant to subsection III.B, but only if the adjustment is mathematically equivalent to or less than the cumulative adjustment that would have occurred by adjusting each locomotive's EL_i .

2. If necessary to achieve the Fleet Average Target for 2010 and later, after adjusting a Participating Railroad's FA pursuant to paragraph III.D.1, if applicable, the Participating Railroad's FA or adjusted FA may be corrected downward to account for atmospheric conditions, as specified in paragraph 1 of Appendix D.

3. After making applicable adjustments and/or a correction pursuant to paragraphs III.D.1 and III.D.2, a Participating Railroad's resultant FA shall be rounded to the nearest 0.1 g/bhp-hr in accordance with Appendix C. If this adjusted/corrected FA still exceeds the Fleet Average Target, the Participating Railroad may subtract from the adjusted/corrected FA emission reductions to reduce the adjusted/corrected FA using either or both of the following:

a. A Participating Railroad may in any year subtract from its adjusted/corrected FA not more than 1.3 g/bhp-hr of FAC created prior to 2010. A Participating Railroad also may in any year subtract from its adjusted/corrected FA not more than 0.3 g/bhp-hr of emission reductions other than FAC generated under this Memorandum (with those emission reductions converted to g/bhp-hr using Table E-1 in Appendix E), provided that the 1.3 g/bhp-hr limit on the use of FAC created prior to 2010 shall be reduced by the amount of any non-FAC emission reductions subtracted pursuant to this sentence.

b. A Participating Railroad may in any year subtract from its adjusted/corrected FA any quantity of FAC created in 2010 or later.

4. The Participating Railroad's Final FA shall be the FA calculated pursuant to subsection III.B, as adjusted and, if necessary, corrected, and after subtraction pursuant to paragraph III.D.3 of any FAC or other emission reduction.

E. Data Collection and Calculations

1. No later than January 1, 2010, and for any year prior to 2010 for which a Participating Railroad wishes to generate FAC (other than FAC created through the use of

ULELs), each Participating Railroad shall track megawatt-hour usage or fuel consumption through the use of track-side transponders that read megawatt-hour or fuel data for all locomotives as they enter and leave the South Coast Nonattainment Area. The transponders shall be located at the South Coast Nonattainment Area borders or at a close distance past the borders. A Participating Railroad and ARB may agree to alternative means of tracking megawatt-hour usage or fuel consumption. If the Participating Railroad elects to achieve the Fleet Average Target through the exclusive use of locomotives with CLs at or below the Fleet Average Target, instead of tracking megawatt-hours or fuel consumption, that Participating Railroad shall collect data to identify all locomotives used in the South Coast Nonattainment Area for the applicable year for the purpose of demonstrating that the definition of "Exclusive Use" is satisfied or, if necessary to calculate the Participating Railroad's FA using the formula provided in paragraph III.B.3 or to document the quantity of FAC created by the use of ULELs, records specifying the number of Locomotive Days of Operation for each locomotive used in the South Coast Nonattainment Area for the applicable year.

2. Calculation of FA shall be based on all data in a Participating Railroad's possession. For FA calculations made using the formula specified in paragraph III.B.1., if such data represent less than 90 percent of a Participating Railroad's locomotives operating within the South Coast Nonattainment Area, the Participating Railroad shall use estimated data for enough missing locomotives so that the calculated FA for the year represents at least 90 percent of the Participating Railroad's locomotives operated within the South Coast Nonattainment Area. Estimation of the missing data shall be based on data for locomotives operated on similar trains within the South Coast Nonattainment Area, as provided in Appendix F.

3. The rules in Appendix C shall apply to any rounding of calculations performed in connection with this Memorandum.

F. Fleet Average Emission Credits

1. For the year 2010 and thereafter, a Participating Railroad may generate FAC in any year in which its Final FA (if based on FA calculated using the formula specified in paragraph III.B.1) is below the Fleet Average Target. FAC created in 2010 and later, other than

FAC created by the use of ULELs, shall be calculated as follows:

$$\text{FAC} = \text{Fleet Average Target} - \text{Final FA}$$

2. A Participating Railroad may generate FAC for emissions reductions in the 2005 - 2009 time period, as specified in this paragraph. To generate such credits, a Participating Railroad must calculate its Final FA for the year for which emissions reductions are to be credited, using the formula for FA specified in paragraph III.B.1. FAC for the 2005 - 2009 time period shall be calculated as follows:

$$\text{FAC} = ((1-y) \times 15.4 \text{ g/bhp-hr}) - \text{Final FA},$$

where y = a specified percentage reduction from 1990 baseline NO_x emission levels (15.4 g/bhp-hr). For the purpose of calculating FAC pursuant to this paragraph, the percentage reductions from baseline emission levels which constitute " y " shall be as follows: 27.8% (2005), 32.9% (2006), 37.8% (2007), 41.8% (2008), and 47.8% (2009).

3. FAC shall be denominated in g/bhp-hr. FAC calculated pursuant to this subsection III.F shall be rounded to the nearest 0.1 g/bhp-hr. For purposes of generating FAC pursuant to this subsection III.F, the Final FA shall not include any correction for absolute humidity and ambient temperature levels in the South Coast Nonattainment Area.

4. FAC shall not be discounted or expire.

5. Except as otherwise provided herein, a Participating Railroad may retain FAC for its own future use and may engage in the purchase, sale, trade or other transfer of FAC with the other Participating Railroad. A Participating Railroad may acquire and use FAC from another Participating Railroad for any purpose for which FAC may be used under this Memorandum, including the use of FAC to calculate a Participating Railroad's Final FA under paragraph III.D.3 or to provide mitigation as required under paragraph IV.C.4 and Appendix E.

6. A Participating Railroad may generate FAC from the use of ULELs in any

calendar year beginning on or after the effective date of this Memorandum, through December 31, 2014. The opportunity to create FAC through the use of ULELs is provided as an incentive for the introduction of ultra-low emitting locomotives into the South Coast Nonattainment Area. Calculation of FAC created by a Participating Railroad's use of ULELs in a particular calendar year is independent of the calculation of FAC pursuant to paragraphs III.F.1 and III.F.2 and shall be performed as follows:

- a. The Participating Railroad's weighted average ULEL emission rate ("w") for the year shall be calculated by using the following formula:

$$w = \frac{\sum_{i=1}^k (EL_i) (Days_i) (Factor_i)}{\sum_{i=1}^k (Days_i) (Factor_i)}$$

where Days_i = the total number of Locomotive Days of Operation for an individual ULEL in the South Coast Nonattainment Area in the applicable year;

k = the total number of ULELs the Participating Railroad operated in the South Coast Nonattainment Area in the applicable year;

Factor_i = the locomotive horsepower weighting factor applicable to an individual ULEL, as specified in the following table:

Locomotive Horsepower	Factor
1999 or less	1
2000 to 2999	2
3000 or more	5

- b. The Participating Railroad's maximum possible FAC from the use of ULELs ("m") for the particular year shall be determined according to the following formula:

m = Fleet Average Target - w

- c. The Participating Railroad's usage of ULELs in the South Coast Nonattainment Area ("u") for the particular year shall be determined according to the following formula:

$$u = \sum_{i=1}^k (Days_i) 4$$

where Days_i = the total number of Locomotive Days of Operation for an individual ULEL in the South Coast Nonattainment Area in the applicable year;

k = the total number of ULELs the Participating Railroad operated in the South Coast Nonattainment Area in the applicable year.

- d. The usage level ("s") (in Locomotive Days of Operation) at which the Participating Railroad would earn the maximum amount of FAC from the use of ULELs shall be calculated according to one of the following formulas, as applicable:

- i. When the weighted average ULEL emission rate ("w") for the year is more than 3.0 g/bhp-hr and less than or equal to 4.0 g/bhp-hr,

$$s = 30000 w - 70500$$

- ii. When the weighted average ULEL emission rate ("w") for the year is equal to or less than 3.0 g/bhp-hr,

$$s = 2500 w + 12000$$

- e. The Participating Railroad's FAC from the use of ULELs for the particular year shall be determined according to the following formula, but shall not exceed m:

$$FAC = m \left(\frac{u}{s} \right) 5$$

G. No Locomotive or Railroad Operating Limit

The purpose of this Memorandum is to reduce emissions from railroad operations in the South Coast Nonattainment Area consistent with Measure M14 through implementation of a locomotive fleet average emission standard; however, nothing herein constitutes, or shall be interpreted to constitute, any restriction or limit on the operation or activity of locomotives or railroads in the South Coast Nonattainment Area pursuant to their common carrier obligations under the Interstate Commerce Act, or on total railroad emissions in that area.

H. Participation in South Coast Nonattainment Area Emission Credit Trading Programs

Except as specified in this subsection, nothing herein shall impair the ability of a Participating Railroad to participate in any emission banking or trading programs effective in the South Coast Nonattainment Area, provided that "double crediting" (use of the same credits twice) shall not be permitted. Subject to the requirements of such emission banking and trading programs, a Participating Railroad may use emission credits from such programs to calculate its Final FA under subparagraph III.D.3.a, or to mitigate excess emissions pursuant to Appendix E, or may transfer FAC to other persons for use in such programs.

I. Contribution of Emission Reductions

The Participating Railroads have voluntarily undertaken the obligation to implement the fleet average program established herein. During the term hereof, each Participating Railroad hereby irrevocably contributes the resulting emission reductions (other than FAC created in accordance herewith) to the State of California for the benefit of the citizens of the South Coast Nonattainment Area.

IV. ADMINISTRATION OF THE FLEET AVERAGE PROGRAM FOR THE SOUTH COAST NONATTAINMENT AREA

A. Recordkeeping

1. Beginning in 2010, and for any year prior to 2010 for which a Participating Railroad wishes to generate FAC (other than FAC from the use of ULELs), each Participating Railroad shall keep supporting documentation showing megawatt-hour usage or fuel consumption, as appropriate, by locomotive. If the Participating Railroad elects to achieve the Fleet Average Target through the exclusive use of locomotives with CLs at or below the Fleet Average Target, the Participating Railroad shall instead keep records identifying all locomotives used in the South Coast Nonattainment Area for the applicable year, and, if necessary to demonstrate that the definition of "Exclusive Use" is satisfied or to calculate the Participating Railroad's FA using the formula provided in paragraph III.B.3, records specifying the Locomotive Days of Operation for each locomotive used in the South Coast Nonattainment Area for the applicable year. If a Participating Railroad elects to create FAC from the use of ULELs in any year, the Participating Railroad shall keep records identifying all ULELs used in the South Coast Nonattainment Area for the applicable year and the Locomotive Days of Operation for each such ULEL.

2. Each Participating Railroad shall keep supporting documentation for all FAC generated, used, retained, purchased or transferred, and for adjustments and any correction made to the fleet average calculation.

3. Records required to be retained pursuant hereto shall be kept for two years following the submittal of the report required by paragraph IV.B.1 or IV.B.3 and, for records pertaining to the generation of FAC, for two years after the FAC have been used. In any situation in which records required to be retained pursuant hereto are pertinent to a noncompliance determination or dispute resolution process proceeding in accordance with subsection IV.C, such records shall be retained for one year following (i) issuance of the final compliance determination or (ii) final resolution of the dispute, whichever is later.

4. Notwithstanding the recordkeeping and reporting requirements herein, each Participating Railroad retains all rights under law to protect confidential business information and other information protected by law from disclosure.

B. Reporting

1. By April 1, 2011, and each April 1 thereafter, each Participating Railroad shall report to ARB its Final FA for the previous calendar year. Should a Participating Railroad elect to calculate its Final FA for any year in the 2005 -- 2009 period for the purpose of generating FAC, it shall report the results of its calculation to ARB by December 31 of the following year. Should a Participating Railroad elect to generate FAC by the use of ULELs, it shall report the results of its FAC calculation to ARB by December 31 of the following year (for years 2002 through 2009) and by April 1 of the following year (for years 2010 through 2014). Reports made pursuant to this subsection IV.B shall include the information specified in Appendix F. Upon request by a Participating Railroad, ARB may, for good cause, extend the deadline for any report made pursuant to this subsection IV.B.

2. Upon reasonable request by ARB, a Participating Railroad shall provide the requesting agency with additional data or information related to the calculation of its Final FA.

3. If for any year a Participating Railroad achieves the Fleet Average Target through the exclusive use of locomotives with CLs at or below the Fleet Average Target, in lieu of calculating and submitting its Final FA for that year pursuant to subsection III.D and paragraph IV.B.1, respectively, the Participating Railroad shall submit to ARB by April 1 of the following year the list of locomotives used in the South Coast Nonattainment Area for the applicable year, their identification number, year of manufacture or remanufacture, CL, and if necessary to demonstrate that the definition of "Exclusive Use" is satisfied, the number of Locomotive Days of Operation.

4. Each Participating Railroad must include in the report submitted pursuant to paragraph IV.B.1 information regarding the source and quantity of any FAC or other emission reduction used by the Participating Railroad to achieve the Fleet Average Target or otherwise

comply with this Memorandum during the year for which the report is filed.

5. By September 30, 2002, the Participating Railroads and ARB will meet and confer to determine what constitutes sufficient information to be submitted by the Participating Railroads for the years 2002-2004 to explain the railroads' implementation plans and their progress toward meeting the Fleet Average Target in 2010 and beyond. The Participating Railroads will submit the agreed-upon information on April 1, 2003, 2004 and 2005 for each of the preceding calendar years. For calendar years 2005-2009, the Participating Railroads will submit to ARB the information submitted to EPA pursuant to a backstop commitment regulation adopted as described in subsection I.E and the Statement of Principles. In complying with this paragraph IV.B.5, the Participating Railroads shall not be subject to the mitigation and liquidated damages provisions of paragraph IV.C.4 or Appendix E.

6. All reports submitted by the Participating Railroads pursuant to paragraphs IV.B.1, 3, and 4 shall include a certification by a management-level employee with sufficient authority to act for the Participating Railroad pursuant to the terms hereof, that the report is submitted on behalf of the Participating Railroad and that the information submitted is, to the best of the railroad's knowledge and belief, true, accurate and complete, and is consistent with Appendix F.

7. The purpose of Appendix F is to provide all information necessary for a Participating Railroad to demonstrate compliance with the annual obligation set forth in paragraph III.A.1 by providing the information necessary to perform the calculations under subsections III.B, C, D, E and F, as applicable, and to provide the information required under paragraphs IV.B.1, 3 and 4, as applicable.

C. Enforcement Procedure and Agreed Remedies

1. The ARB is designated as the agency responsible for enforcement of the obligations undertaken by the Participating Railroads. The enforcement authorities specified herein may only be exercised by ARB. Nothing herein shall be interpreted as granting any

rights to the public or to any person not a party hereto.

2. Consultations.

a. A Participating Railroad may at any time initiate informal consultations with ARB to identify and resolve concerns or other issues regarding compliance herewith.

b. ARB may at any time initiate informal consultations with either or both of the Participating Railroads to identify and resolve concerns or other issues regarding Participating Railroad compliance herewith.

3. Completeness and Noncompliance Determinations

a.i. ARB shall review the report submitted each year by each Participating Railroad pursuant to paragraph IV.B.1, 3 and 4, as applicable. If ARB has not received such report from a Participating Railroad by April 1, ARB shall promptly notify that Participating Railroad.

ii. Within thirty days of receipt of a report submitted pursuant to paragraph IV.B.1, 3 and 4, as applicable, ARB shall notify the Participating Railroad if it determines that the report is incomplete when compared to the report elements specified in Appendix F, and shall provide the Participating Railroad a written notice of incompleteness identifying any deficiencies. Upon receipt of a notice of incompleteness issued by ARB pursuant to this clause IV.C.3.a.ii, a Participating Railroad shall have an opportunity to meet and confer with ARB regarding the completeness of the report with respect to the report elements specified in Appendix F, within 30 days of the Participating Railroad's receipt of ARB's notification. The Participating Railroad shall provide any information needed to correct any incompleteness within 30 days after its receipt of the notice of incompleteness and agreement between the Participating Railroad and ARB specifying the information needed to correct any incompleteness. If the Participating Railroad requires more than 30 days to respond, it may request, and

ARB will not unreasonably deny, a further extension. If the Participating Railroad and ARB, after consultation, do not reach agreement regarding the completeness of the report or the need for additional information, each party shall submit its position to the administrative appeals panel within 30 days of the last day of consultation for resolution pursuant to the limited dispute resolution process set forth in paragraph IV.C.5.

iii. ARB shall review the complete report and, if necessary, make a preliminary determination that the Participating Railroad did not satisfy its fleet average emissions obligation under subsection III.A for the previous year or was otherwise not in compliance with its obligations hereunder. ARB shall provide the Participating Railroad with its written preliminary determination as expeditiously as practicable but not later than 120 days after initial receipt of the Participating Railroad's report submitted pursuant to paragraph IV.B.1, 3 and 4, as applicable, or 30 days after receipt of a complete report, whichever is later. The time periods provided for ARB to make a preliminary compliance determination may be extended by written agreement between ARB and the Participating Railroad.

b. A Participating Railroad shall have 45 days to respond to ARB's preliminary determination that the Participating Railroad is or was not in compliance herewith. The Participating Railroad's response may contain such information and analysis as the Participating Railroad believes appropriate to demonstrate its compliance with this Memorandum of Mutual Understandings and Agreements.

c. If, after review and consideration of the Participating Railroad's response to a preliminary determination, ARB confirms its preliminary determination that the Participating Railroad is or was not in compliance herewith, within 30 days of its receipt of the Participating Railroad's response ARB shall provide an opportunity for the Participating Railroad to meet and confer with ARB in an effort to resolve the parties' differences.

d. If, after meeting with a Participating Railroad pursuant to subparagraph IV.C.3.c,

ARB confirms its preliminary determination that the Participating Railroad is or was not in compliance herewith, within 45 days after that meeting ARB shall provide to the Participating Railroad a final written determination of noncompliance.

e. A preliminary or final determination of noncompliance shall specifically identify the portion or portions hereof with which ARB contends the Participating Railroad is or was not in compliance, and the reasons for the determination. Where ARB has determined that the Participating Railroad did not achieve the Fleet Average Target for the year in question, any preliminary or final determination of noncompliance shall state, with the greatest precision possible based on data submitted by the Participating Railroad, ARB's calculation of the difference between the Participating Railroad's Final FA and the Fleet Average Target.

f. The ARB and Participating Railroads shall use their respective best efforts to expedite submission and review of the report under this paragraph IV.C.3.

4. Mitigation and Liquidated Damages

a. The parties agree that any determination of damages resulting from a Participating Railroad's failure to achieve the Fleet Average Target, or from any other breach of this Memorandum would be speculative and uncertain. The parties therefore agree to mitigation of excess emissions as measured in g/bhp-hr and the payment of reasonable liquidated damages for any such noncompliance, as follows:

- i. Where a Participating Railroad did not achieve the Fleet Average Target for a calendar year and received ARB's preliminary determination of noncompliance within the time period specified in subparagraph IV.C.3.a, the Participating Railroad shall mitigate excess emissions as measured in g/bhp-hr and pay liquidated damages as specified in Appendix E.
- ii. Where a Participating Railroad failed to collect data as provided in paragraph III.E, to keep records as provided in paragraph IV.A.1, or to submit a timely annual compliance report as provided in paragraph IV.B.1, the Participating

Railroad shall pay liquidated damages as specified in Appendix E.

iii. ARB may for good cause waive or reduce the amounts otherwise payable pursuant to this paragraph IV.C.4.

b. If ARB determines that a Participating Railroad is in noncompliance with this Memorandum because of disapproval of an adjustment, correction, or calculation methodology used in an annual compliance report, the railroad shall not be subject to mitigation or liquidated damages as a result of such noncompliance if the Participating Railroad relied in good faith upon such adjustment, correction or calculation methodology. For purposes of this paragraph, good faith includes reliance on an adjustment, correction or calculation methodology when the adjustment, correction or methodology has been approved or accepted by ARB in accordance with Appendix D.

c. As provided in Appendix D, a Participating Railroad may at any time submit to ARB an adjustment, correction or calculation methodology to be used in determining compliance with the annual fleet average obligation, or may present such an adjustment, correction or calculation methodology in an annual compliance report.

5. Limited Dispute Resolution.

a. In the event of any disagreement regarding a determination of noncompliance, the magnitude of noncompliance, the increment by which the Final FA exceeded the Fleet Average Target for any year, or any other issue arising hereunder (except for an ARB determination made pursuant to clause IV.C.4.a.iii), a Participating Railroad may appeal the issue to an administrative appeals panel. The panel shall be comprised of one member selected by ARB, one member selected by the Participating Railroad, and a third member selected by the initial two members. The panel shall evaluate evidence provided by the parties, shall make decisions by majority vote, and shall render its decision as expeditiously as practicable under the circumstances. Decisions of the panel shall be binding on the parties unless judicial review is sought pursuant to subparagraph IV.C.5.b.

b. Any party dissatisfied with the outcome of the administrative appeals process established pursuant to subparagraph IV.C.5.a may seek de novo review of the disagreement in any court of competent jurisdiction located in California.

6. Any liquidated damages payable pursuant to this paragraph IV.C.6 and Appendix E shall be deposited in an escrow account established for this purpose. All fees for the escrow account may be paid out of interest earned. All liquidated damages funds shall be used for air quality-related projects, including clean technology projects, mutually agreeable to ARB and the Participating Railroad that paid the liquidated damages. Any liquidated damages not expended or allocated to a specific project within 36 months of payment shall revert to the state Air Pollution Control Fund. The provisions of this Memorandum are for the benefit only of the parties, and no third party may seek to enforce or benefit from this paragraph or any other provisions of this Memorandum.

7. The measures expressly identified in this subsection IV.C are the exclusive remedy for any noncompliance herewith, except as otherwise agreed to in writing between ARB and a Participating Railroad. The parties expressly agree that the Participating Railroads' obligation to achieve the Fleet Average Target pursuant to this Memorandum cannot be enforced by an order for specific performance or similar injunction intended to compel establishment of a fleet average program consistent with this Memorandum. The parties specifically disavow any desire or intention to create any third party beneficiary under this Memorandum, and specifically declare that no person or entity, except the parties hereto, shall have any remedy or right of enforcement hereof.

8. In the event that a Participating Railroad fails in whole or in part to fulfill its obligations to mitigate pursuant to paragraph IV.C.4, ARB may file suit and seek any and all remedies available under state law for damages for failure to provide the unmitigated quantity of regional emissions reductions (plus 10 percent of such unmitigated quantity).

D. Effective Date and Term

1. Effective Date.

a. This Memorandum shall take effect on January 1, 2002, unless:

- i. ARB or EPA has not approved an amendment to Measure M14 to incorporate revised projections of the locomotive NO_x emission reductions expected to occur in the South Coast Nonattainment Area from 2005 through 2009 no greater than those set out in paragraph III.F.2; or
- ii. A court has entered a final, unappealable order invalidating or remanding the Tier II NO_x emissions standard or the preemption provisions in the Final EPA National Locomotive Rule; or
- iii. Any litigation challenging the Tier II NO_x emissions standard or the preemption provisions of the Final EPA National Locomotive Rule has not yet been resolved and a final, unappealable order entered.

2. The term of this Memorandum commences on the Effective Date and expires on January 1, 2030, unless earlier terminated pursuant to subsection IV.F or by mutual written agreement of the parties, or unless extended by mutual written agreement of the parties.

E. Modifications

1. The terms hereof may be modified at any time, and from time to time, by mutual written agreement between the parties.

2. All parties hereto agree to meet to discuss and negotiate any revisions hereof which, in the judgment of any party, are needed to address significant changes in circumstances

or to assure that this Memorandum continues to accomplish the objectives of the parties.

3. No amendment hereto shall be binding on the parties unless in writing and signed by authorized representatives of all parties, except as otherwise expressly provided herein.

F. Termination

1. ARB may terminate this Memorandum by providing written notice to the Participating Railroads in the event that:

a. ARB determines, after conclusion of the dispute resolution process provided in subsection IV.C, that the Participating Railroads have materially breached their obligation to achieve the Fleet Average Target by 1.0 g/bhp-hr or more in three or more consecutive years; provided, however, that ARB may make such determination regarding the third year of noncompliance upon issuance of a final written determination of noncompliance under subparagraph IV.C.3.d. Notwithstanding ARB's exercise of its termination right under the preceding sentence, the Participating Railroad may elect to exercise its rights to use the limited dispute resolution process under paragraph IV.C.5 for the purpose of resolving any matter identified in subparagraph IV.C.5.a.

b. The Participating Railroads do not comply with the annual obligation set out in paragraph III.A.1 as the result in part or in whole of one or more events of force majeure continuing 36 months or more.

2. The Participating Railroads may terminate this Memorandum by providing written notice to ARB in the event that:

a. The State of California or any political subdivision thereof takes any action to establish (i) locomotive emission standards; (ii) any mandatory locomotive fleet average emissions standard; or (iii) any requirement applicable to locomotives or locomotive engines and within the scope of the preemption established in the Final EPA National Locomotive Rule;

or

b. EPA or any agency of the United States government takes any action to establish or approve any mandatory locomotive fleet average emissions standard or revises the preemption provisions of the Final EPA National Locomotive Rule; or

c. The California Legislature or U.S. Congress take or require any action which if taken administratively by EPA or ARB would allow the Participating Railroads to terminate this Memorandum pursuant to this paragraph IV.F.2; or

d. The effective date for the Tier II NO_x emission standard is later than January 1, 2005; or

e. Their noncompliance is the result in part or in whole of one or more events of force majeure continuing 36 months or more.

3. Prior to giving notice of termination pursuant to this subsection IV.F, a party shall provide the other parties with at least 30 days notice of intent to terminate, and, upon request of the other parties, shall meet to discuss the issues giving rise to the proposed termination.

4. Except as noted below, in the event any party gives notice of termination of this Memorandum, the obligation of the Participating Railroads to achieve the Fleet Average Target shall terminate on December 31 of the year prior to the year in which the notice of termination was given. If the ARB gives notice of termination under subparagraph IV.F.1.a, the obligation of the Participating Railroads to achieve the Fleet Average Target shall terminate on April 1 of the year in which the notice of termination was given and any railroad obligations (including any obligations to mitigate and pay liquidated damages) hereunder shall be prorated as of such date.

5. As an alternative to termination, the parties may agree to suspend the Participating Railroads' continuing obligation under this Memorandum for a time certain, which

may be extended from time-to-time by agreement of the parties.

6. In the event this Memorandum is terminated by any party, any outstanding noncompliance issues, whether asserted or unasserted at the time of termination, shall continue to be resolved pursuant to the procedures specified in subsection IV.C and Appendix E. A Participating Railroad's obligation, if any, to mitigate excess g/bhp-hr and pay liquidated damages arising from any noncompliance for any year ending before termination of the Memorandum, asserted by the ARB prior to termination, shall survive termination, as shall any defenses the Participating Railroad may have. The ARB shall allege any previously unasserted claims of noncompliance within one year from the date of termination.

G. Force Majeure

Parties shall not be responsible for failure to perform the terms hereof where nonperformance is based upon events or circumstances that are beyond the reasonable control of the nonperforming party, and the events or circumstances affect a Participating Railroad's ability to comply with the terms hereof. Events of force majeure are not limited to Acts of God, may occur on any part of the system of a Participating Railroad, and include, but are not limited to, flood, earthquake, storm, fire and other natural catastrophes, epidemic, war (whether declared or undeclared), riot, civic disturbance or disobedience, strikes, labor disputes, sabotage of facilities, any order or injunction made by a court or public agency, accommodations to the government made in connection with a state of emergency, whether or not formally declared, or the inability of a Participating Railroad to obtain or operate sufficient locomotives to make any of the compliance demonstrations specified in paragraph III.A.2 (including but not limited to the availability in each of the years 2005 to 2009 of sufficient quantities of locomotives with CLs at or below the Fleet Average Target to enable the Participating Railroads to meet their obligations under this Memorandum), and include the secondary effects of any such event. This paragraph is to be construed in recognition of the understanding that the Participating Railroads are end users, not manufacturers, of locomotives. Upon becoming aware that an occurrence constitutes an event of force majeure, the Participating Railroad must promptly notify ARB and must use its best efforts to resume performance as quickly as possible, and may suspend performance only for such period of time and to the extent necessary as a result of the

event or circumstances that constitutes a force majeure.

H. Notices

All notices and other communications to be given hereunder shall be in writing and shall be deemed to have been duly given if delivered personally, delivered by U.S. Mail or a recognized overnight commercial carrier, or telecopied with receipt acknowledged, to the party at the address set forth below or such other address as such party shall have designated by 10 days prior written notice to the other parties. Each party's designated contact person shall be a management-level employee, with sufficient authority to act for the party pursuant to the terms hereof.

If to ARB:

California Air Resources Board
2020 L Street
Sacramento, California 95814
Attention: Executive Officer
Telephone: (916) 445-4383

If to The Burlington Northern and Santa Fe Railway Company:

The Burlington Northern and Santa Fe Railway Company
2650 Lou Menk Drive
Ft. Worth, TX 76131
Attention: Matthew K. Rose
Sr. Vice President and Chief Operating Officer
Telephone: (817) 352-6100

If to Union Pacific Railroad Company:

Union Pacific Railroad Company
1416 Dodge Street
Omaha, NE 68179
Attention: Chief Mechanical Officer - Locomotive
Telephone: (402) 271-4739

I. Entire Understanding/References.

This Memorandum, the Appendices hereto, and the Statement of Principles constitute

all understandings and agreements among the parties with respect to the Locomotive Fleet Average Emissions Program, and supersede all prior oral or written agreements, commitments or understandings with respect thereto. The appendices hereto are made part of this Memorandum. "Herein," "hereto," and like terms refer to this Memorandum and all Appendices attached to it. Headings are for convenience only and shall not be deemed a part hereof.

J. Choice of Law

This Memorandum shall be interpreted according to the laws of the United States and internal laws of the State of California.

K. Counterparts

This Memorandum may be executed in any number of counterparts, each of which shall be considered an original, but all of which together constitute one and the same instrument.

L. Assignment

This Memorandum and the rights, duties and obligations under it may not be assigned by any party without the prior written consent of the other parties, except that a Participating Railroad shall not need the consent of any other Participating Railroad to make any assignment. Any assignment or delegation of rights, duties or obligations hereunder made without the prior written consent contemplated by this subsection shall be void and of no effect. This Memorandum shall be binding upon, and inure to the benefit of, the successors and approved assigns of the parties.

M. Severability

Wherever possible, each provision of this Memorandum shall be interpreted in such manner as to be effective and valid under applicable law. If any provision hereof shall be prohibited by or invalid under applicable law, such provision shall be ineffective to the extent

to such prohibition or invalidity, without invalidating the remainder of such provision or the remaining provisions hereof. Notwithstanding the previous sentence, if any party determines, in its sole discretion, that in the absence of the invalidated provision or provisions this Memorandum no longer properly serves the purposes for which it was prepared, within 75 days of the entry of a final non-appealable order invalidating one or more provisions hereof such party may terminate this Memorandum upon 12 months advance notice.

N. Time

In interpreting this Memorandum, time is of the essence, "days" means calendar days and "months" means calendar months.

* * * * *

IN WITNESS WHEREOF, the parties have executed this Memorandum as of July 2, 1998.

CALIFORNIA AIR RESOURCES BOARD,
an agency of the State of
California

UNION PACIFIC RAILROAD
COMPANY,
a Utah Corporation

Signature

Signature

Name (printed)

Name (printed)

Position

Position

Date

Date

THE BURLINGTON NORTHERN AND SANTA
FE RAILWAY COMPANY,
a Delaware Corporation

Signature

Name (printed)

Position

Date

Appendix A
South Coast Nonattainment Area

Appendix B
Gallons of Fuel/MW hr Conversion Factor

$$\text{MW hr} = (\text{gallons}) (\text{density/BSFC}) (\text{conversion factor for bhp-hr to mw-hrs.})$$

In order to convert gallons of fuel to MW hr or vice versa, a conversion factor must be developed that is specific to the particular engine model under consideration and its configuration. The starting point for developing the factor should be the Brake Specific Fuel Consumption published by the manufacturer. In the case of certified locomotives, the BSFC will be from the certification tests. In the case of pre-1973 locomotives, the data will be obtained from the manufacturers' or railroads' BSFC tests.

Appendix C
Calculations

When rounding, numbers shall be rounded to the nearest tenth. Numbers that are exactly halfway between tenths shall be rounded to the highest tenth. In a multi-part calculation, only the last calculation shall be rounded.

Appendix D
Adjustments and Corrections

1. Downward corrections of a Participating Railroad's calculated FA shall be permitted for absolute humidity/ambient temperature levels in the South Coast Nonattainment Area, as indicated by average hourly measurements taken daily at two 24-hour locations (unless only one 24-hour location exists), which levels, when compared to the absolute humidity/temperature specifications in the Federal Test Procedure for calculating CL, would result in lower, calculated, in-use NO_x emissions. The outcome of the calculations for the two locations shall be averaged. Downward corrections for absolute humidity/ambient temperature shall be made to the FA after it is calculated. A correction for absolute humidity/ambient temperature shall be made only to demonstrate compliance in a given year, not to generate credits for banking or trading.

2. Participating Railroads will be permitted adjustments that fully credit emissions reductions achieved, relying on test data, agreed-upon formulas, or other evidence. A railroad may at any time submit to ARB test data, proposed formulas, or other evidence that it believes justify the use of an adjustment or correction, including calculation methodology, in determining compliance with the fleet average obligation, or may present such an adjustment or correction, including calculation methodology, and any supporting test data, formulas, or evidence in an annual compliance report. Within sixty days of such a submission, or if presented for the first time in an annual compliance report within 120 days (or within the time period for issuance of a preliminary finding of noncompliance), ARB shall inform the railroad of its specific objections, if any, to the proposed adjustment or correction, including calculation methodology. If ARB does not object in writing specifying the basis for the objection within the specific time period, the proposed adjustment shall be deemed accepted. Any ARB objection made pursuant to this paragraph and disputed by a Participating Railroad shall be subject to the dispute resolution process specified in paragraph IV.C.5.

3. Once ARB accepts test data used for an adjustment, an adjustment formula, or an adjustment calculation in accordance with paragraph 2 above, the adjustment may be used until the next remanufacturing event, as defined in the Final EPA National Locomotive Rule, unless the Participating Railroad discontinues applying the adjustment.

4. Where a Participating Railroad seeks to make an adjustment attributable to the purchase and use of cleaner fuels, the certification fuel for the locomotive or locomotives for which the adjustment is to be made shall be used in determining the baseline emissions level for the adjustment.

5. In-use testing might demonstrate that a locomotive family's NO_x emissions are not at the certified emission level. Alternatively, a manufacturer/remanufacturer might recertify an engine family at a higher NO_x emission level. A Participating Railroad shall not be obliged to use in the fleet average calculation an emission level different from the certified emission level at the time of purchase since the Participating Railroads have no choice but to purchase locomotives based on the certified emission level and failures to meet those levels are the responsibility of the manufacturer/remanufacturer.

Accordingly, for the purpose of this Memorandum, in calculating EL_i a Participating Railroad shall be permitted to use the CL in effect at the time the locomotive was purchased or remanufactured, as appropriate, regardless of the locomotive's actual emission level or any recertification of the locomotive's engine family. If the failure of an engine family to meet the CL used in the fleet average calculation would result in a Participating Railroad's exceeding the fleet average target were a revised level or limit used in the fleet average calculation, the Participating Railroad shall make every reasonable effort to substitute lower-emitting locomotives. Such efforts shall be voluntary and not subject to any other provisions of this Memorandum.

Locomotives for which a determination of nonconformity has been made by EPA may not subsequently be used to generate FAC. Subsequent to repair pursuant to the notice of nonconformity, the locomotive may be used in the FAC calculation at an emission level reflecting the repair.

Appendix E
Mitigation and Liquidated Damages

A. Mitigation

1. For any year in which a Participating Railroad's Final FA exceeds the Fleet Average Target, the Participating Railroad shall fully mitigate the excess g/bhp-hr for that year of noncompliance by no later than the end of the next reporting year by any method or combination of methods. Acceptable mitigation methods include:

a) In the year following the noncompliance year, achieving a Final FA that makes up all or part of the g/bhp-hr shortfall by which the noncompliance year's Final FA exceeds the Fleet Average Target.

b) Provide credits to make up all or part of the g/bhp-hr shortfall utilizing the conversion schedule stipulated in Table E-1:

Table E-1

Increment by Which Final FA Exceeded the Fleet Average Target for an Individual Year (g/bhp-hr)	Corresponding Tons of NOx for that Year
0.1	40
0.2	80
0.3	120
0.4	160
0.5	200
0.6	240
0.7	280
0.8	320
0.9	360
1.0	400

1.1	440
1.2	480
each additional 0.1 g/bhp-hr	40 additional tons

c) Implementing any other method that addresses all or part of the g/bhp-hr shortfall, subject to the approval of ARB, which approval shall not unreasonably be withheld, in accordance with the conversion schedule stipulated in Table E-1.

B. Liquidated Damages.

1. When a Participating Railroad submits a report pursuant to paragraph IV.B.1, and ARB and the Participating Railroad have agreed upon the information needed to satisfy the report elements specified in Appendix F, and the Participating Railroad fails to submit such information by the deadline established pursuant to clause IV.C.3.a.ii, the Participating Railroad shall be subject to liquidated damages in the amount of \$5,000 per day until the information is submitted.

2. For any year in which a Participating Railroad fails to file a report as provided by the deadline established in paragraph IV.B.1, the Participating Railroad shall be assessed liquidated damages in the amount of \$5,000 per day up to a maximum of 15 days. If the Participating Railroad has received from ARB within that 15 day period a notice that ARB has not received the report, the 15 day maximum shall not apply. If the Participating Railroad fails to submit a report within 180 days from receipt of notice from ARB that ARB has not received such report, the Participating Railroad will be deemed to have willfully and intentionally breached the data collection, recordkeeping and reporting requirements of paragraph B.2. of Appendix E.

3.a. A Participating Railroad shall be subject to liquidated damages in the amount of \$10 million for any willful and intentional material breach of the data collection, recordkeeping, and reporting requirements of subsections III.E., IV.A., and IV.B. of the Memorandum. For purposes of this paragraph B.3, any breach of the data collection, recordkeeping, and reporting requirements that precludes calculation of the increment by which a Participating Railroad's Final FA exceeded the Fleet Average Target for a year constitutes a material breach of that requirement. Any liquidated damages imposed pursuant to this paragraph B.3.a shall be in lieu of any other liquidated damages or mitigation that could otherwise be imposed pursuant to this Memorandum for the same year.

b. ARB shall notify the Participating Railroad of any preliminary determination that any breach under this paragraph has occurred. ARB and that Participating Railroad shall meet and consult regarding the determination within 30 days of receipt of ARB's notification. If ARB and the Participating Railroad do not reach agreement after such consultation, within 30 days ARB and that Participating Railroad shall submit their respective positions to the administrative appeals panel for resolution pursuant to the limited dispute resolution procedure set forth in paragraph IV.C.5.

c. If ARB and a Participating Railroad either reach agreement under subparagraph 3.b on the information that is necessary to calculate the Final FA, or a final determination is reached under the limited dispute resolution procedure identifying the information that is necessary for such a calculation, the Participating Railroad shall provide such information to ARB within 30 days of such agreement or final determination. If the Participating Railroad fails to provide such information within such time period, the Participating Railroad shall be subject to liquidated damages in the amount of \$5,000 per day until the information is submitted.

4.a. A Participating Railroad shall be subject to liquidated damages in the amount of \$25,000 per report for the most recent calendar year for material misrepresentations caused by a failure to meet a standard of due care in providing the information specified in Appendix F as the report submitted pursuant to paragraphs IV.B.1, 3, and 4, as applicable, which report has been certified as true, accurate, and complete pursuant to paragraph IV.B.6. Inadvertent or harmless representations shall not be considered material misrepresentations for purposes of this paragraph B.4.

b. ARB shall notify the Participating Railroad of any preliminary determination that a material misrepresentation caused by a failure to meet a standard of due care under this paragraph has occurred. ARB and that Participating Railroad shall meet and consult within 30 days of receipt of ARB's notification, and the Participating Railroad shall have an opportunity to correct the representation within 30 days thereafter. If ARB and a Participating Railroad reach agreement on the corrected information to be provided, the Participating Railroad shall provide the agreed information to ARB within such 30 day period, the Participating Railroad shall not be considered to have made a material misrepresentation and the Participating Railroad shall not be subject to liquidated damages under this paragraph 4. If ARB and the Participating Railroad do not reach agreement after such consultation, within 30 days ARB and that Participating Railroad shall submit their respective positions to the administrative appeals panel for resolution pursuant to the limited dispute resolution procedure set forth in paragraph IV.C.5.

c. If a final determination as to material misrepresentation is reached under the limited dispute resolution procedure, the Participating Railroad shall provide information correcting such material misrepresentation to ARB within 30 days of such agreement or final determination. If the Participating Railroad fails to provide such information within such time period, the Participating Railroad shall be subject to liquidated damages in the amount of \$5,000 per day until the information is submitted.

d. If the material misrepresentation identified in subparagraph 4.c prevents the ARB from calculating the Final FA, ARB shall have 30 days from receipt of such new information provided pursuant to paragraph 4.c to review and issue a new or revised Notice of Preliminary Noncompliance.

5. For any year in which a Participating Railroad's Final FA exceeds the Fleet Average Target, the Participating Railroad shall be assessed liquidated damages in accordance with Table E-2:

Table E-2

Increment by Which Final FA Exceeded the Fleet Average Target for an Individual Year	Maximum Liquidated Damages
---	---

(g/bhp-hr)	
-------------------	--

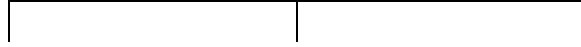
|

|

|

0.1

\$100,000



0.2	\$200,000
-----	-----------



0.3	\$300,000
-----	-----------



0.4	\$600,000
-----	-----------

--	--

0.5	\$1,000,000
-----	-------------

--	--

0.6	\$1,200,000
-----	-------------

--	--

0.7	\$1,400,000
-----	-------------



0.8	\$1,600,000
-----	-------------

--	--

0.9	\$3,000,000
-----	-------------

--	--

1.0	\$3,000,000
-----	-------------



1.1	\$3,000,000
-----	-------------

--	--

1.2 and more	\$4,000,000
--------------	-------------

6. Inflation Adjustment

a. In the year 2010, the dollar amounts in Table E-2 and all other liquidated damage amounts, except the \$10 million specified in paragraph B.3, will be increased by 25 percent unless the annual Gross Domestic Product Implicit Price Deflator published by the U.S. Department of Commerce (“GDP Price Deflator”) increases by 6.0 percent per year or more for three consecutive years during the ten-year period 2000 through 2009. If the GDP Price Deflator increases by 6.0 percent per year or more for three consecutive years during this ten-year period, the liquidated damage amounts specified in the first sentence of this subparagraph 6.a will be increased by:

$$[(1.023)^x \text{ multiplied by } (1.07)^y] - 1,$$

where $x =$ the number of years during the above 10-year period that the GDP Price Deflator increased by less than 6.0%, and

$$y = 10 - x$$

Application of the formula above will produce one of the following percentage increases:

<u>x</u>	<u>y</u>	<u>Percentage Increase</u>
7	3	44%
6	4	50%
5	5	57%
4	6	64%
3	7	72%
2	8	80%
1	9	88%
0	10	97%

b. In the year 2020, the revised liquidated damage amounts determined pursuant to subparagraph 6.a will again be increased by 25% or in accordance with the formula in subparagraph 6.a, as applicable, based on the annual changes in the GDP Price Deflator during the ten-year period 2010 through 2019.

Appendix F
Format for Submittal of Fleet Average Information

The format on the following pages contains the information required to be submitted by a Participating Railroad in its annual fleet average compliance report.

South Coast Locomotive Fleet Average Emissions Program

ANNUAL COMPLIANCE REPORT

FOR

CALENDAR YEAR

**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: _____

Date Submitted: _____

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Certification	Certification by Participating Railroad
Form F-S	Summary Information

Section A

Calculation of Fleet Average Using Megawatt-Hours/Gallons of Fuel

Form F-A-1	Calculation of FA in Accordance with Paragraph III.B.1 of Memorandum
Form F-A-2	Calculation of Final FA in Accordance with Subsection III.D of Memorandum
Form F-A-3	Adjustments to CL, Adjustments to FA, and Correction to FA
Form F-A-4	Factors to Convert between Gallons of Fuel and MWhr
Form F-A-5	Estimation of Missing Locomotives
Form F-A-6	FAC and Other Emissions Reductions

Section B

Demonstration of Exclusive Use

Form F-B-1	Demonstration of Exclusive Use in the South Coast Nonattainment Area of Locomotives with CLs at or Below the Fleet Average Target
Form F-B-2	FAC and Other Emissions Reductions

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(continued)**

Section C
Calculation of Fleet Average Using Locomotive Days of Operation

Form F-C-1	Calculation of FA in Accordance with Paragraph III.B.3 of Memorandum
Form F-C-2	Calculation of Final FA in Accordance with Subsection III.D of Memorandum
Form F-C-3	Adjustments to CL, Adjustments to FA, and Correction to FA
Form F-C-4	FAC and Other Emissions Reductions

Section D
FAC from ULELs

Form F-D-1	Calculation of Weighted Average Emission Level of ULELs
Form F-D-2	Calculation of FAC from ULELs
Form F-D-3	Adjustments to CL and Adjustments to Preliminary Weighted Average Emission Level of ULELs
Form F-D-4	FAC Balance For Years Before 2010 in Which Fleet Average is Not Determined

Certification by Participating Railroad

**Insert certification required by Paragraph IV.B.6 of
Memorandum of Mutual Understandings and Agreements**

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	_____
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.

SECTION A

Calculation of Fleet Average Using Megawatt-Hours/Gallons of Fuel

(Contains Forms F-A-1 through F-A-6)

**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.					

Total of Columns 6 and 7 - Part II		
------------------------------------	--	--

**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. of Fuel)	(2) <u>EL x MWhr</u>	
A.	Totals from Columns 6 and 7 - Part I	_____	_____	
B.	Totals from Columns 6 and 7 - Part II	_____	_____	
C.	Sum of Lines A and B			
D.	FA in g/bhphr (Line C, Column 2 divided by Line C, Column 1)			

**Form F-A-1
(continued)**

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

Notes to Form F-A-1

- [1] If two or more nominal locomotives are used for one particular physical locomotive, add letters (e.g., A, B) to the physical locomotive's ID No. to identify the nominal locomotives. See paragraphs III.B.1 and III.C.4 of the Memorandum for additional information.
- [2] Any adjustment to CL should be made in accordance with paragraphs III.C.1 and III.C.3 of the Memorandum. If an adjustment is made to any CL, complete Part I of Form F-A-3.

Note: The phrase "Adjustment to CL" is used throughout this Appendix F to mean an adjustment to EL_i in accordance with paragraphs III.C.1 and III.C.3 of the Memorandum.

- [3] Entries in this column 6 should either be entirely expressed in megawatt-hours or entirely in gallons of fuel. To convert one measure to the other, see Appendix B of the Memorandum. If any conversions are made, complete Form F-A-4.

Proceed to Form F-A-2.

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.	_____
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.	_____
C.	Calculate Adjusted FA (Line A - Line B)	_____
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.	_____
E.	Calculate Adjusted/Corrected FA (Line C - Line D); round to nearest 0.1 g/bhphr (see Appendix C of Memorandum)	_____
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.	_____
G.	Calculate Final FA in g/bhphr (Line E - Line F)	_____

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.

<u>Locomotive ID No. or Estimated Locomotive No.:</u>	_____
A. Adjustment to CL shown on Form F-A-1 (g/bhphr)	_____
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?	_____
C. If Line B is Yes, enter date. If Line B is No, go to Line F.	_____
D. Has locomotive been remanufactured, as defined in the Final EPA National Locomotive Rule, since the date shown on Line C?	_____
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.	

**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")	_____
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)	_____
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?	_____
C. If Line B is Yes, enter date.	_____
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>	_____
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.

Estimated Locomotive No. from Part II of Form F-A-1:	_____
A. What missing train would this Estimated Locomotive have powered?	_____
B. What similar train is being used as the benchmark for the missing train?	_____
C. What locomotive model powered the benchmark train, and is the basis for this Estimated Locomotive?	_____
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?	_____

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	_____	_____	_____
B. FAC acquired from Other Participating Railroad since last annual report, if any	_____	_____	_____
C. FAC created from ULELs during the year, if any (Line F of Form F-D-2)	_____	_____	_____
D. FAC transferred to Other Participating Railroad or others since last annual report, if any	_____	_____	_____
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)			
F. FAC used in this annual report, if any (included in total emission reductions shown on Line F of Form F-A-2)	_____	_____	_____
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)	_____	_____	_____
H. Ending FAC balance -- this annual report (Line E-Line F+Line G)			

**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) x 15.4 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.	_____
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)	_____

SECTION B

Demonstration of Exclusive Use

(Contains Forms F-B-1 through F-B-2)

Form F-B-1

**Demonstration of Exclusive Use in the South Coast Nonattainment Area
of Locomotives with CLs at or Below the Fleet Average Target**

- I. Using all available data, complete this Part I as instructed below. 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-B-1 for additional instructions.
 - A. If 100% of the locomotives operated in the South Coast Nonattainment Area during the year had CLs at or below the Fleet Average Target, complete columns 1-4 of the following schedule and proceed to Form F-B-2.
 - B. If less than 100% of the locomotives operated in the South Coast Nonattainment Area during the year had CLs at or below the Fleet Average Target, but at least 99.9% of the Locomotive Days of Operation were generated by locomotives with CLs at or below the Fleet Average Target (see definitions in Section II of the Memorandum), complete columns 1-5 of the following schedule and proceed to Part II of this Form F-B-1.
 - C. If neither I.A nor I.B above is true, the Participating Railroad’s operations during the year do not satisfy the definition of Exclusive Use of locomotives with CLs at or below the Fleet Average Target. To demonstrate compliance, the Participating Railroad should complete either Section A or Section C of this report.

(1) Line No.	(2) Locomotive ID No. [Note 1]	(3) Year of Manufacture or Remanufacture	(4) CL (g/bhphr)	(5) Locomotive Days of Operation [Note 2]
1				
2				
3				
etc.				

**Form F-B-1
(continued)**

**Demonstration of Exclusive Use in the South Coast Nonattainment Area
of Locomotives with CLs at or Below the Fleet Average Target**

II. Complete this Part II to calculate the percent of Locomotive Days of Operation represented by locomotives with CLs at or below the Fleet Average Target.

	<u>Sum of Locomotive Days of Operation for:</u>	
	<u>(1) Locomotives with CLs at or Below Fleet Average Target</u>	<u>(2) All Locomotives</u>
A. Appropriate Entries from Column 5 - Part I		
B. Line A, Column 1 divided by Line A, Column 2		

Line B must be greater than or equal to 0.999. If not, complete Section A or Section C of this report.

**Form F-B-1
(continued)**

**Demonstration of Exclusive Use in the South Coast Nonattainment Area
of Locomotives with CLs at or Below the Fleet Average Target**

Notes to Form F-B-1

- [1] If two or more nominal locomotives are used for one particular physical locomotive, add letters (e.g., A, B) to the physical locomotive's ID No. to identify the nominal locomotives. See paragraphs III.B.1 and III.C.4 of the Memorandum for additional information.
- [2] Locomotive Days of Operation should be calculated in accordance with the definition contained in Section II of the Memorandum.

Proceed to Form F-B-2.

Form F-B-2

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	_____	_____	_____
B. FAC acquired from Other Participating Railroad since last annual report, if any	_____	_____	_____
C. FAC created from ULELs during the year, if any (Line F of Form F-D-2)	_____	_____	_____
D. FAC transferred to Other Participating Railroad or others since last annual report, if any	_____	_____	_____
E. Ending FAC balance -- this annual report (Line A+Line B+Line C-Line D)			

Note: FAC (other than FAC from ULELs) cannot be created if compliance is demonstrated using Section B of this report. FAC (other than FAC from ULELs) can be created only if Section A is used.

II. Emission Reductions Other than FAC

Not Applicable when method of compliance is exclusive use of locomotives with CLs at or below the Fleet Average Target.

SECTION C

Calculation of Fleet Average Using Locomotive Days of Operation

(Contains Forms F-C-1 through F-C-4)

Form F-C-1

Calculation of FA in Accordance with Paragraph III.B.3 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-C-1 for additional instructions. When completed, go to Part II.

(1) Line No.	(2) Locomotive I.D.N.O. [Note 1]	(3) Locomotive Horsepower	(4) CL (g/bhphr)	(5) Adj. to CL (g/bhphr) [Note 2]	(6)=(4)-(5) EL (g/bhphr)	(7) Locomotive Days of Operation [Note 3]	(8) Weighting Factor [Note 4]	(9)=(7)x(8) Weighted Locomotive Days of Operation	(10)=(6)x(9) EL x Weighted Days of Operation
1									
2									
3									
etc.									

Total of Columns 9 and 10 - Part I		
------------------------------------	--	--

**Form F-C-1
(continued)**

Calculation of FA in Accordance with Paragraph III.B.3 of Memorandum

II. Complete this Part II to calculate FA.

	(1) Weighted Locomotive Days of <u>Operation</u>	(2) EL x Weighted Locomotive <u>Days of Operation</u>	
A. Totals from Columns 9 and 10 - Part I			
B. FA in g/bhphr (Line A, Column 2 divided by Line A, Column 1)			

**Form F-C-1
(continued)**

Calculation of FA in Accordance with Paragraph III.B.3 of Memorandum

Notes to Form F-C-1

[1] If two or more nominal locomotives are used for one particular physical locomotive, add letters (e.g., A, B) to the physical locomotive's ID No. to identify the nominal locomotives. See paragraphs III.B.1 and III.C.4 of the Memorandum for additional information.

[2] Any adjustment to CL should be made in accordance with paragraphs III.C.1 and III.C.3 of the Memorandum. If an adjustment is made to any CL, complete Part I of Form F-C-3.

Note: The phrase "Adjustment to CL" is used throughout this Appendix F to mean an adjustment to EL_i in accordance with paragraphs III.C.1 and III.C.3 of the Memorandum.

[3] Locomotive Days of Operation should be calculated in accordance with the definition contained in Section II of the Memorandum.

[4] Weighting Factor is determined as follows:

If Locomotive Horsepower is less than 2,000: Factor = 1

If Locomotive Horsepower is 2,000 through 2,999: Factor = 2

If Locomotive Horsepower is 3,000 or more: Factor = 5

Proceed to Form F-C-2.

Form F-C-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 B of Part II of Form F-C-1.	_____
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-C-3.	_____
C. Calculate Adjusted FA (Line A - Line B)	_____
D. If Line C is less than or equal to Fleet Average Target, 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-C-3.	_____
E. Calculate Adjusted/Corrected FA (Line C - Line D); round to nearest 0.1 g/bhphr (see Appendix C of Memorandum)	_____
F. If Line E is less than or equal to Fleet Average Target, enter zero. Otherwise, enter any available emission reductions from Line E of Part I of Form F-C-4 and/or Part II of Form F-C-4 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.	_____
G. Calculate Final FA in g/bhphr (Line E - Line F)	_____

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

Proceed to Form F-C-3, if applicable. Otherwise, complete Form F-C-4.

Form F-C-3

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

I. Adjustments to CL

For each locomotive whose CL was adjusted in column 5 of Part I of Form F-C-1, complete the following information. Use additional pages as needed.

<u>Locomotive ID No. or Estimated Locomotive No.:</u>	_____
A. Adjustment to CL shown on Form F-C-1 (g/bhphr)	_____
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?	_____
C. If Line B is Yes, enter date. If Line B is No, go to Line F.	_____
D. Has locomotive been remanufactured, as defined in the Final EPA National Locomotive Rule, since the date shown on Line C?	_____
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.	

**Form F-C-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-C-2, complete the following information. Use additional pages as needed.

<u>Adjustment to FA No.:</u> (Number each Adjustment, beginning with "1")	_____
A. How much of the total Adjustment to FA included on Line B of Form F-C-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-C-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-C-2, complete the following information. Use additional pages as needed.

A. Show the Correction to FA included on Form F-C-2 (in g/bhphr)	_____
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?	_____
C. If Line B is Yes, enter date	_____
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-C-4

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	_____	_____	_____
B. FAC acquired from Other Participating Railroad since last annual report, if any	_____	_____	_____
C. FAC created from ULELs during the year, if any (Line F of Form F-D-2)	_____	_____	_____
D. FAC transferred to Other Participating Railroad or others since last annual report, if any	_____	_____	_____
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)			
F. FAC used in this annual report, if any (included in total emission reductions shown on Line F of Form F-C-2)	_____	_____	_____
G. Ending FAC balance -- this annual report (Line E-Line F)			

Note: FAC (other than FAC from ULELs) cannot be created if compliance is demonstrated using Section C of this report. FAC (other than FAC from ULELs) can be created only if Section A is used.

If an entry is shown in column 1 of Line C, no entry can be shown in column 2 of Line C (and vice versa).

**Form F-C-4
(continued)**

FAC and Other Emissions Reductions

II. Emission Reductions Other than FAC

<p>List the amount of emissions reductions other than FAC, if any, shown on Line F of Form F-C-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-C-2 (and shown on Line F, column 1 of Part I of this Form F-C-4) cannot exceed 1.3 g/bhphr.</p>	_____
<p>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.</p>	_____

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

<p>A. Show amount from Line F, column 3 of Part I of this Form F-C-4</p>	_____
<p>B. Show amount from Part II of this Form F-C-4</p>	_____
<p>C. Line A + Line B (should equal Line F of Form F-C-2)</p>	_____

SECTION D

FAC from ULELs

(Contains Forms F-D-1 through F-D-4)

Form F-D-1

Calculation of Weighted Average Emission Level of ULELs

If this report is being submitted for a calendar year after 2014, do not complete Section D. The Participating Railroad is not eligible for FAC from ULELs.

I. Using all available data, complete this Part I and include each ULEL 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-D-1 for additional instructions and the definition of ULEL. When completed, go to Part II.

(1) Line No.	(2) ULEL ID No. [Note 1]	(3) ULEL Horse- power	(4) CL (g/bhphr)	(5) Adj. to CL (g/bhphr) [Note 2]	(6)=(4)-(5) EL (g/bhphr) [Note 3]	(7) Loco- motive Days of Opera- tion [Note 4]	(8) Weight- ing Factor [Note 5]	(9)=(7)x(8) Weighted Loco- motive Days of Operation	(10)=(6)x(9) EL x Weighted Locomotive Days of Operation
1									
2									
3									
etc.									
Total of Columns 7, 9, and 10 - Part I									

**Form F-D-1
(continued)**

Calculation of Weighted Average Emission Level of ULELs

II. Complete this Part II to calculate the weighted average emission level of ULELs.

	(1) Weighted Locomotive Days of <u>Operation</u>	(2) EL x Weighted Locomotive <u>Days of Operation</u>	
A. Totals from Columns 9 and 10 - Part I			
B. Preliminary Weighted Average Emission Level of ULELs in g/bhphr (Line A, Column 2 divided by Line A, Column 1)			_____
C. Adjustments [Note 6]			_____
D. Weighted Average Emission Level of ULELs (Line B-Line C)			

**Form F-D-1
(continued)**

Calculation of Weighted Average Emission Level of ULELs

Notes to Form F-D-1

[1] If two or more nominal locomotives are used for one particular physical locomotive, show only the nominal locomotives that qualify as ULELs. If necessary, add letters (e.g., A, B) to the physical locomotive's ID No. to identify the nominal locomotives. See paragraphs III.B.1 and III.C.4 of the Memorandum for additional information.

[2] Any adjustment to CL should be made in accordance with paragraphs III.C.1 and III.C.3 of the Memorandum. If an adjustment is made to any CL, complete Part I of Form F-D-3 unless Part I of Form F-A-3 or Part I of Form F-C-3 is completed.

Note: The phrase "Adjustment to CL" is used throughout this Appendix F to mean an adjustment to EL_i in accordance with paragraphs III.C.1 and III.C.3 of the Memorandum.

[3] To comply with the definition of ULEL, all entries in column 6 must be:

- Less than or equal to 4 g/bhphr if this form is being submitted for a calendar year from 2002 through 2011, or
- Less than 3 g/bhphr if this form is being submitted for a calendar year from 2012 through 2014.

[4] Locomotive Days of Operation should be calculated in accordance with the definition contained in Section II of the Memorandum.

[5] Weighting Factor is determined as follows:

If Locomotive Horsepower is less than 2,000:	Factor = 1
If Locomotive Horsepower is 2,000 through 2,999:	Factor = 2
If Locomotive Horsepower is 3,000 or more:	Factor = 5

[6] If the Participating Railroad believes that one or more adjustments to the preliminary weighted average emission level of ULELs are appropriate in a manner similar to the Adjustments to FA permitted in accordance with paragraph III.D.1 of the Memorandum, show the total of such adjustments and complete Part II of Form F-D-3.

Proceed to Form F-D-2.

Form F-D-2

Calculation of FAC from ULELs

Calculation of FAC from ULELs:

A.	Weighted average emission level of ULELs (Line D of Part II of Form F-D-1)	_____
B.	Maximum FAC from ULELs (Fleet Average Target - Line A)	_____
C.	Multiply Line B by the total of Column 7 from Part I of Form F-D-1	_____
D.	If Line A is greater than or equal to 3 g/bhphr, multiply Line A by 30,000 and subtract 70,500. If Line A is less than 3 g/bhphr, multiply Line A by 2,500 and add 12,000.	_____
E.	Divide Line C by Line D	_____
F.	FAC from ULELs in g/bhphr (the smaller of Line B or Line E; round to nearest 0.1 g/bhphr)	_____

Proceed to Forms F-D-3 and F-D-4, if applicable.

Form F-D-3

Adjustments to CL
and
Adjustments to Preliminary Weighted Average Emission Level of ULELs

I. Adjustments to CL

Do not complete this Part I if Part I of Form F-A-3 or Part I of Form F-C-3 is completed.

For each ULEL whose CL was adjusted in column 5 of Part I of Form F-D-1, complete the following information. Use additional pages as needed.

<u>ULEL ID No.:</u>	_____
A. Adjustment to CL shown on Form F-D-1 (g/bhphr)	_____
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?	_____
C. If Line B is Yes, enter date. If Line B is No, go to Line F.	_____
D. Has locomotive been remanufactured, as defined in the Final EPA National Locomotive Rule, since the date shown on Line C?	_____
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	

<u>ULEL ID No.:</u>	_____
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	

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

**Adjustments to CL
and
Adjustments to Preliminary Weighted Average Emission Level of ULELs**

II. Adjustments to Preliminary Weighted Average Emission Level of ULELs

For each Adjustment to the Preliminary Weighted Average Emission Level of ULELs made in accordance with paragraph III.D.1 of the Memorandum, and included on Line C of Part II of Form F-D-1, complete the following information. Use additional pages as needed.

<u>Adjustment No.:</u> (Number each Adjustment, beginning with "1")	_____
A. How much of the total Adjustment included on Line C of Part II of Form F-D-1 is attributable to this Adjustment (in g/bhphr)?	_____
B. Has this Adjustment 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 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. 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-D-4

FAC Balance For Years Before 2010 in Which Fleet Average is Not Determined

If Section A, Section B, or Section C is completed, do not complete this form. Instead, complete Form F-A-6, Form F-B-2, or Form F-C-4, respectively.

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

	(1) Created <u>Pre-2010</u>
A. Ending FAC balance -- last annual report	_____
B. FAC acquired from Other Participating Railroad since last annual report, if any	_____
C. FAC created from ULELs during the year, if any (Line F of Form F-D-2)	_____
D. FAC transferred to Other Participating Railroad or others since last annual report, if any	_____
E. Ending FAC balance -- this annual report (Line A+Line B+Line C-Line D)	