Tier 4 Gen-set Dominant Hybrid Rebuild/Repower Package for Switcher Locomotives

Task 2 Report

for:

New Technology Research and Development Program

582-11-11147-3264

Submitted by:

Alternative Motive Power Systems, LLC

Principal Investigators:

Dan Frederick

Brian Couchene

October 29, 2012

The preparation of this report is based on work funded in part

by the State of Texas

through a Grant from the Texas Commission on Environmental Quality

Table of Contents

ABSTRACT/EXECUTIVE SUMMARY **1**
INTRODUCTION/BACKGROUND **2**
PROJECT OBJECTIVES/TECHNICAL APPROACH **2**
TASKS **3**
TASK 2 3
DISCUSSION/OBSERVATIONS **6**
OBJECTIVES VS. RESULTS 6
CRITICAL ISSUES 6
SUMMARY/CONCLUSIONS **6**
CONTACT INFORMATION **7**
APPENDICES **8**
APPENDIX A: WRITTEN PROOF OF THE DELIVERY OF COMPONENTS AND SYSTEMS TO RAILSERVE 9
APPENDIX B: PHOTOGRAPHS OF THE PREPARED LOCOMOTIVE 10
APPENDIX C: DESCRIPTION OF THE TEXAS EASTMAN RAIL YARD 12
APPENDIX D: SIGNED PROTOTYPE TESTING AGREEMENT 13
APPENDIX E: PROOF OF INSURANCE FOR PERFORMANCE TESTING 16
APPENDIX F: LOCOMOTIVE DESIGN AND LAYOUT 17

Abstract/Executive Summary

The primary problem addressed in this project is emissions from switching and road switching locomotives including current gen-set offerings. Our approach is to create a “mild” hybrid power and control system, in modular form/package, that will totally eliminate idle emissions and minimize emissions with cleaner Tier 4I engines that will be controlled in a way that will allow them to operate at maximum efficiency. Smokeless start and the ability to move the locomotive or “index” railcars without starting an engine will contribute to further emissions reduction. The availability of this technology will enable clients to quickly incorporate this technology into existing locomotives. Overall contribution will be lower fuel consumption, reduced emissions, improved low speed tractive effort, and greatly enhanced diagnostics.

Introduction/Background

Locomotives used in switching and low speed short line applications are typically purchased from larger railroads once the locomotives are no longer suitable for Regional or Class 1 use. There are currently several gen-set options available; some even in kit form. To our knowledge no one has implemented a practical hybrid solution to date. Rising fuel prices, tightening emissions standards, and diminishing qualified maintenance personnel for aging fleets make the development of this kind of solution practical and significant.

Attempted solutions so far have been implemented, primarily, by engineers and manufacturers with a locomotive background rather than experience with locomotives and experience implementing the development of control schemes for a variety of hybrid vehicles. In some instances, poor battery technology was chosen. Hybrid technology is not the answer for every locomotive application.

Alternative Motive Power Systems' (AMPS) approach differs from other attempted solutions because of our ongoing experience and the development of new technologies that have finally matured. Our modular approach allows us and potential users of this equipment to choose a variety of engine and alternative fuel options depending on operational requirements. It also affords the option of incorporating more efficient and mature technologies as they are developed.

Project Objectives/Technical Approach

AMPS will finalize the design of a modular package for converting a conventional switcher locomotive into a hybrid gen-set switcher locomotive. AMPS will build a prototype modular package and contract with Railserve to install it and do performance testing on the resulting prototype locomotive. AMPS will work with Railserve to partner with a rail yard in Longview, Texas, to demonstrate the locomotive in a representative working environment and to complete load and emissions testing of the prototype in comparison to a conventional switcher locomotive.

Project Objectives included in the Grant Activities (Scope of Work) are:

- To demonstrate that repowering of an in-use conventionally powered road switcher locomotive with a multiple gen-set/hybrid gen-set package reduces NO_x emissions from a conventionally powered diesel locomotive by up to 98% and by 25% compared to a non-hybrid gen-set package.
- To demonstrate the commercial viability and cost effectiveness of the modular approach to the design and installation of the multiple gen-set/hybrid gen-set package.

In order to achieve these objectives AMPS will:

- Refine the gen-set package modules in order to make system integration into the locomotive chassis as quick and simple as possible.
- Undertake in-use measurement of the emissions before and after the installation of the multiple gen-set/hybrid gen-set dominant package.
- Determine the fuel consumption before and after repowering with the gen-set package.
- Assess operator acceptance of use of the installed system.

The prototype multiple gen-set/hybrid gen-set package will be installed on a GP9 road switcher locomotive purchased by AMPS from Railserve. The gen-sets will be provided by a contractor to meet AMPS specifications and AMPS will provide any interface components required. The gen-sets will be installed in the road switcher by Railserve at the Union Tank Car Repair Shop in Longview, Texas.

The energy source for the initial commercial version will be two generator sets installed in parallel in the road switcher locomotive in place of the original 1,500 to 2,000 horsepower (hp) diesel engine, one of which will be a battery hybrid module with a 150 kilowatt (kw) diesel generator and, the other a 400 kw diesel generator set. Both engines in the gen-sets will be Tier 4 certified engines (as allowed under 40 CFR section 1033.150 Interim provisions). In the hybrid module, in addition to the 150 kw diesel engine, there will be a battery pack module.

Where the induction generator is coupled to an engine in the more conventional diesel engine gen-sets, AMPS uses an induction generator electrically connected to an alternating current (AC) inverter. This inverter, by varying the electrical slip in the generator, generates a constant direct current (DC) bus voltage. This voltage is then fed to either a set of storage batteries or to individual traction motor controllers, or to both.

In the hybrid gen-set, the electricity will flow directly to the DC bus on the traction motor propulsion drives. The batteries will be charged by the smaller gen-set once a predetermined state of charge is sensed. This will allow the smaller gen-set to run at peak efficiency almost 100% of the time. If the full capacity of the larger gen-set is not required for locomotive propulsion, it will be used for additional battery charging. If required the locomotive can operate on batteries alone.

The gen-set modules will be assembled by a supplier designated by AMPS. Both the operator control stand and the locomotive will be equipped with quick connectors to the control cabinet and the traction motor propulsion drive skid respectively. This will allow for major systems testing to assure proper function and quick, on-site assembly.

Tasks

Tasks included in the Grant Activities (Scope of Work) are:

- Task 1: Finalize design of gen-set package modules
- Task 2:Control and power system design, assembly, and programming
- Task 3: Locomotive systems installation and performance testing
- Task 4: Emissions and fuel economy testing of conventional and prototype locomotive, and
- Task 5: Evaluate operator acceptance of prototype locomotive

The Task 2 accomplishments are summarized below.

Task 2

From the Grant Activities (Scope of Work):

> *Task 2: control and Power System Design, Assembly, and Programming*
>
> *2.2. Task Statement: The PERFORMING PARTY will purchase all components required for subsystems, assemble components into modular subsystems, perform required programming, test subsystems, and ship them to Railserve yard in Longview, Texas, prior to installation.*
>
> *2.2.1. The PERFORMING PARTY will prepare the demonstration road switcher locomotive for repower, including removing the long hood assembly, the prime mover, the main generator, and accessories; cleaning the platform; and preparing the cab for installation of the control stand and the air brake equipment.*

2.2.2. The PERFORMING PARTY will purchase the gen-sets, the battery, and the primary control components including the main power assembly, air compressor assembly, traction motor blowers, and special mounting hardware.

2.2.3. The PEFORMING PARTY will assemble and program, complete preliminary testing of, integrate, and complete final testing of subsystems including the control cabinet, main contactor panel, main gen-set, battery hybrid rack assembly, traction motor drive rack, and operator control stand. Testing will assure the proper functioning of individual components and of all programming.

2.2.4. The PERFORMING PARTY will ship the completed subsystems to the Railserve yard in Longview, Texas.

2.2.5. The PERFORMING PARTY will select the working rail yard in Longview, Texas, where the prototype locomotive will be performance tested. The PERFORMING PARTY will submit to the TCEQ a description of the selected railyard, a signed agreement with the selected railyard, and proof of any required insurance for the performance testing at the railyard.

2.2.6. Schedule: The PERFORMING PARTY shall complete this task within 16 months of the signed Notice to Proceed Date as issued by TCEQ.

2.2.7. Deliverables: The PERFORMING PARTY shall submit a report to the TCEQ upon completion of this task including pictures of the prepared demonstration road switcher locomotive, written proof of delivery of subsystems to Railserve, a description of the selected railyard, a signed agreement with the selected railyard, and proof of insurance required by the TCEQ for the performance testing at the railyard.

2.2.8. Approval to Proceed with Further Tasks (phases): TCEQ will determine whether additional tasks will be approved and funded depending upon the success of completing this task. The PERFORMING PARTY must receive written approval from TCEQ to proceed with any further tasks, in order for those tasks to be eligible for additional funding under this Agreement.

AMPS has purchased all major components listed in Task 2.2 with the exception of the air compressor which is a stock item with a short lead time and will be purchased from Railserve, Inc. in Longview and requires no special programming for its control. The locomotive deck has been cleared (engines, generators, air compressor, traction motor blowers, cab, short hood and long hood), power washed and all unnecessary bracketry removed. The deck is fully prepared and all major components are on-site, including the populated and prepared cab/ short-hood module. All components and sub-systems have been tested as completely as possible prior to shipment to Railserve (see Appendix A for acknowledgement of delivery of components and systems to Railserve at the Longview Repair Shop). All relevant programming for sub-systems and components has been verified. The battery pack has been "exercised" multiple times to ensure proper pack and battery management function. The battery rack was shipped to Longview but we have delayed shipment of the batteries until we are ready to install them on the locomotive. While this is a slight change to the SOW, we feel that this is the best choice for minimizing the potential for physical damage to the pack. Both the Generators and the John Deere engines were tested by the respective manufacturers. As mentioned in previous monthly reports, the engine shipment was delayed by John Deere. The assembled gen-sets will not be able to be fully tested until placement on the locomotive and connected to the traction motors. Communication with the J1939 engine control module has been established.

Testing and validation of AMPS control of engines, generators, ATS propulsion system, traction motors, axle generators, braking system, operator display screen, and data acquisition system have been continually refined over the last four years on the Railserve LEAF™ gen-set locomotive. Our control of dynamic/ regenerative braking has been in testing for more than six months on four proto-type military vehicles. Our system development strategy has consisted largely of "real world" experience with each of

the systems incorporated into this locomotive design. While AMPS has not incorporated all of these sub-systems into one vehicle/locomotive, our programming since the award of this grant has been developed to quickly and simply incorporate the battery pack and regenerative braking into this locomotive.

The modules began with an SD40 cab and short-hood purchased by AMPS. We prepared/modified this cab and short-hood to become a "module" by:

- Stripping all unnecessary components and bracketry;
- Lowering the long hood point of attachment;
- Adding windows on the long hood end of the cab;
- Adding a substructure with removable lifting eyes and rigging to enable safe lifting of the cab/short-hood module;
- Sand blasting and priming the whole module;
- Adding doors in the short-hood (one hinged and one roll-up so the propulsion system could be installed);
- Installing the complete propulsion system;
- Installing new floor;
- Painting the inside of the cab with a special durable/sound-proofing paint (Lnex); and
- Installing operator control stand, interior lighting, air brake system, and ducting for HVAC.

Because of the approach AMPS has taken with the cab/short-hood module the following work scheduled to be completed in Task 3 has already been accomplished:

- Additional windows have been installed for improved visibility,
- The interior floor has been installed,
- The interior of the cab has been painted,
- Interior lighting has been installed,
- The operator control stand has been installed,
- The air brake components have been installed,
- Access doors have been installed in short hood,
- The propulsion system from American Traction has been tested and installed in its permanent location in the short-hood, and
- Plumbing for cooling system has been installed and pressure tested.

Photographs of the prepared demonstration road switcher locomotive are attached in Appendix B

The working railyard selected by AMPS for the performance and emissions testing of the protype locomotive, the Texas Eastman railyard located in Longview, Texas, is owned by Railserve and contracted to Texas Eastman to operate. Railserve affirms that the contract currently in place with Texas Eastman allows Railserve to select appropriate equipment for use in moving Texas Eastman rail cars. Railserve also affirms that it has advised Texas Eastman of its intent to test the prototype locomotive on the Texas Eastman Railyard and that Texas Eastman has granted explicit permission for AMPS and Railserve to do the testing at the Texas Eastman Railyard.

See Appendices C, D, and E for a description of the railyard, a copy of the signed prototype testing agreement between AMPS and Railserve, and proof of insurance for performance testing at the Texas Eastman Railyard.

Discussion/Observations

Objectives vs. Results

The project objectives for Task 2 have been met very successfully. Key technical accomplishments include:

- Development of improved axle generator design which has been undergoing field testing on a locomotive in Midland, Michigan, since April 2012.
- Development of programming for "blended braking" for independent locomotive air brakes to allow for energy recovery without the use of dynamic brake
- Successful implementation of AMPS data acquisition system tested on a Railserve LEAF™ dual gen-set locomotive.
- Incorporation of programming to allow adjustable current range for locomotive throttle controller in each of the eight "notch" positions.

Critical issues

No critical issues have been identified at this time.

Technical and commercial viability of the proposed approach

Technical goals of this project have been met and in some cases surpassed. Ultimately, the final field testing of the locomotive will be the test for success.

We have tested and verified all systems being used in this locomotive design and have a very high confidence level that the locomotive will perform as promised

We believe that this locomotive will be commercially viable for the following reasons:

- Price point should be similar to pricing of other gen-set offerings
- Modular design will afford quick conversion of existing locomotives
- Battery component affords: zero idle emissions, improved fuel economy; and optimal efficiency when engines are running

The locomotive design layout is attached at Appendix F

Intellectual Properties/Publications/Presentations

- Patent Pending: A CONTROL SYSTEM, A HYBRID CONTROL MODULE, AND METHOD FOR CONTROLLING A HYBRID VEHICLE Serial No. 61/324,283 filed on April 14, 2010
- IP: AMPS Programming and control methodology

Summary/Conclusions

Work is proceeding as expected and we are ready to fully undertake the work of Task 3 Locomotive Systems Installation and Performance Testing as soon as approval is received from TCEQ.

Contact Information

For further information about this project please contact:

Dan Frederick
Alternative Motive Power Systems
740-924-9479
dan@ampsonboard.com

Appendices

Appendix A: Written proof of the delivery of components and systems to Railserve

AMPS

Alternative Motive Power Systems

October 15, 2012

Below is a list of items that have been shipped by AMPS to the Railserve Longview, TX facility for the AMPS grant project with TCEQ.

Item	Manufacturer
DC/DC Converter	US Hybrid
Traction blower fan and motor	Cincinnati Fan
Reverser (Magnetic Switch 24V)	DLL, Inc.
Engine 600hp	Superior Diesel
Engine 250hp	Superior Diesel
Generator 150Kw	Marathon Electric
Generator 400Kw	Marathon Electric
HVAC	Motive Equipment
Coupler (for 150Kw generator)	American Vulkan
Coupler (for 400Kw generator)	American Vulkan
Batteries	Corvus Batteries
Bellows for radiator	A&A Manufacturing
EMI Filter for Hotel Power	Radius Power
Transformer for Hotel Power	Pepco

Please confirm and sign below.

Tim Morrow

Railserve Representative

Appendix B: Photographs of the prepared locomotive

Appendix C: Description of the Texas Eastman rail yard

The Texas Eastman facility sits on 5,000 acres and has 35 miles of track on site. Railserve switches railcars for them around the clock seven days a week. There are currently eight locomotives on site: three conventional locomotives and five Railserve LEAF locomotives. This location averages about 75 cars into the facility and 75 cars out of the facility every day. The typical pull for a single locomotive ranges between 1 and 50 cars with the duration of some of the daily "long" pulls being a little more than 10-minutes and just over 1 mile in length. The grades onsite are up to 1% in some areas. The availability of multiple LEAF and conventional units on-site affords an ideal opportunity for comparative performance and emissions testing.

The proto-type Railserve LEAF was commissioned and tested at this facility. Texas Eastman was an accommodating host during this process and was happy enough with the experience to allow five LEAF units to currently operate at this location. As a result they welcomed the opportunity to host another prototype locomotive from AMPS and Railserve.

Appendix D: Signed prototype testing agreement

AMPS

Alternative Motive Power Systems

PROTOTYPE TESTING AGREEMENT

This agreement is by and between Alternative Motive Power Systems, LLC, an Ohio Limited Liability Company, having a principal place of business at 8550 Jug Street, Alexandria, OH 43001 ("AMPS") and Railserve, Inc., a Delaware Corporation, having a principal place of business at 1691 Phoenix Blvd., Suite 110, Atlanta, GA 30349 ("Railserve") and has an effective date of October 25, 2012.

WHEREAS, AMPS has developed a prototype locomotive;

WHEREAS, AMPS desires to test its locomotive to prove its capabilities under its grant from the State of Texas; and

WHEREAS, Railserve wishes to participate in the testing of the locomotive;

NOW, THEREFORE, the parties agree as follows:

1. Location and Approval of Testing. All testing under this Agreement shall be performed at the Texas Eastman railyard located in Longview, Texas ("Texas Eastman Railyard"). The testing shall be performed, at least in part, by moving rail cars owned by Texas Eastman. Railserve affirms that it has a contract currently in place with Texas Eastman that allows Railserve to select appropriate equipment for use in moving Texas Eastman rail cars. Railserve affirms that it has advised Texas Eastman of its intent to test the prototype locomotive on the Texas Eastman Railyard and that Texas Eastman has granted explicit permission for AMPS and Railserve to do the testing on the Texas Eastman Railyard in accordance with this Agreement.

2. Testing Parameters. A variety of testing will be done by AMPS and Railserve. AMPS shall provide personnel to direct at least some of the testing. However, much of the testing will be done by Railserve and its staff. Because some of the testing requires a showing of durability over a period of time, Railserve agrees to keep written records of any difficulties or failures of the prototype locomotive over the period of time required by AMPS and the State of Texas. Railserve also agrees to keep written records of the subjective impressions of its employees who operate the locomotive during the testing period. Railserve agrees that AMPS is empowered to direct the testing protocols and will make its best efforts to comply with the instructions of AMPS employees relating to testing, to the extent reasonably feasible. AMPS and Railserve agree to cooperate to produce the desired test results. If at any time there is a disagreement relating to the scope of the testing, AMPS and Railserve agree to use their best efforts to resolve it and produce the desired test results. At least the following testing shall be performed:

A. Static testing of locomotive systems with power applied; voltage testing of traction motors, control systems, cooling fans, and the air compressor; physical inspection of all instrumentation and devices; re-inspection of all torque values and crimps in electrical connections; a rolling test of the locomotive; and assuring programming and functioning of all systems and sub-systems.

B. Load testing will to include at least ten forward and reverse load tests with proper time delays to pull the equivalent of 7000 tons on minimal grade and 10 load tests to pull the equivalent of 7000 tons on minimal grade on wet track. If necessary, the same tests may be done with a conventional locomotive for comparison purposes.

8550 Jug Street • Alexandria, Ohio 43001
614.568.7838

C. Testing of the locomotive by placing it in regular use including 16 to 24 hour shifts and normal stops and starts. This testing shall continue for at least one month or sufficient time to demonstrate proper operation and appropriate tuning of the locomotive.

3. Term. This Agreement is for about a two months term beginning on the date the locomotive is delivered to Railserve at the Texas Eastman Railyard and ending when the testing has been satisfactorily completed. It is understood by both AMPS and Railserve that various modifications to the prototype locomotive may be required after it is put into service, and that the period for testing is, therefore, fluid. It is anticipated that the delivery date will be sometime in January, 2013.

4. Bailment. The delivery of the prototype locomotive from AMPS to Railserve is a bailment of the prototype locomotive. The prototype locomotive at all times remains the property of AMPS. Upon request by AMPS or at completion of the testing, Railserve shall return the prototype locomotive to AMPS. Railserve shall take reasonable precautions to protect the prototype locomotive and shall be liable to AMPS for all damages, destruction of, or abuse of the prototype locomotive while it is in the care, custody, or control of Railserve, and Railserve shall notify AMPS of any such damages, reasonable wear and tear excepted. Railserve agrees to indemnify AMPS for any damages to another due to the operation of the prototype locomotive by Railserve's employees.

5. Insurance. During the term of this Agreement, Railserve shall maintain insurance to cover property damage to the prototype locomotive in at least the amount of $1.5 million and liability insurance in the amount of at least $1 million per person/$5 million per occurrence. Railserve need not separately insure the prototype locomotive for property or liability losses as long as its current insurance covers damages to and by non-owned locomotives.

6. Termination. The Agreement shall terminate upon completion of all necessary testing and the transmission of all test results from Railserve to AMPS. After the termination of this Agreement, Railserve agrees that it will continue to cooperate with AMPS to clarify or otherwise modify test result documents until such documents are deemed acceptable by the State of Texas.

7. Notice. Any notices required to be given under this Agreement shall be in writing and shall be sent certified mail or via telefax to the following:

a. If to AMPS,

Daniel C Frederick

Alternative Motive Power Systems, LLC

8550 Jug Street

Alexandria, OH 43001

740-924-9483

b. If to Railserve:

Tim Benjamin

Railserve, Inc

1691 Phoenix Blvd

Atlanta, GA 30349

770-996-6838

8. Force Majeure. No party shall be responsible for any losses or damages to any other party caused by delays in the performance or non-performance of any of its obligations when caused by

Acts of God, strike, acts of war or terrorism, inability of supplies or labor or any other cause beyond the reasonable control of the non-performing party.

9. Severability. If any provision of this Agreement is deemed to be invalid or unenforceable by any court of competent jurisdiction, such portion shall be deemed severed and the remainder of the Agreement shall remain in full force and effect.

10. Assignment. No party may assign or otherwise transfer this Agreement without the written consent of the other parties, except that any party may assign the right to receive payment to another. This Agreement shall inure to the benefit of and bind the parties hereto, their legal representatives, heirs, and assigns.

11. Governing Law and Jurisdiction. This Agreement shall be interpreted according to the laws of the State of Ohio. Any legal action relating to this Agreement may only be brought in a court of competent jurisdiction in Franklin or Licking County, Ohio.

12. Entire Agreement. This Agreement contains the entire agreement of the Parties and may only be modified by a writing signed by all the Parties.

13. Counterparts and signatures. This Agreement may be executed in various counterparts. This Agreement may be signed and transmitted by telefax or email and the signature be deemed valid. Any electronic version of the Agreement containing a true copy of all the signatures shall be considered a valid copy of the original of the Agreement.

IN WITNESS WHEREOF, the Parties have affixed their signatures below.

AMPS	Date
David C. Fuller	12-17-2012

RAILSERVE	Date
Tony I. Ryan	12-17-2012

8550 Jug Street • Alexandria, Ohio 43001
614.568.7838

Appendix E: Proof of insurance for performance testing

ACORD®

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): 10/26/2012

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER
Associated Insurance Agencies Inc
63 Commerce Park Dr
Westerville, OH 43082

CONTACT NAME:
PHONE (A/C, No, Ext): FAX (A/C, No):
E-MAIL ADDRESS:

INSURER(S) AFFORDING COVERAGE	NAIC #
INSURER A: Motorists Mutual	MOT
INSURER B:	
INSURER C:	
INSURER D:	
INSURER E:	
INSURER F:	

INSURED
Alternative Motive Power Syste
8550 Jug Street
Alexandria, OH 43001

COVERAGES **CERTIFICATE NUMBER:** **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSR	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	GENERAL LIABILITY			3326979320	11/10/2011	11/10/2012	EACH OCCURRENCE	$ 1,000,000
	☑ COMMERCIAL GENERAL LIABILITY						DAMAGE TO RENTED PREMISES (Ea occurrence)	$ 100,000
	☐ CLAIMS-MADE ☑ OCCUR						MED EXP (Any one person)	$ 5,000
							PERSONAL & ADV INJURY	$ 1,000,000
							GENERAL AGGREGATE	$ 1,000,000
	GEN'L AGGREGATE LIMIT APPLIES PER:						PRODUCTS - COMP/OP AGG	$ 1,000,000
	☐ POLICY ☐ PRO-JECT ☐ LOC							$
A	AUTOMOBILE LIABILITY			3326979320	11/10/2011	11/10/2012	COMBINED SINGLE LIMIT (Ea accident)	$ 1,000,000
	☐ ANY AUTO						BODILY INJURY (Per person)	$
	☐ ALL OWNED AUTOS ☐ SCHEDULED AUTOS						BODILY INJURY (Per accident)	$
	☑ HIRED AUTOS ☑ NON-OWNED AUTOS						PROPERTY DAMAGE (Per accident)	$
								$
	☐ UMBRELLA LIAB ☐ OCCUR						EACH OCCURRENCE	$
	☐ EXCESS LIAB ☐ CLAIMS-MADE						AGGREGATE	$
	☐ DED ☐ RETENTION $							$
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY						☐ WC STATU-TORY LIMITS ☐ OTH-ER	
	ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? Y/N ☐ (Mandatory in NH)	N/A					E.L. EACH ACCIDENT	$
	If yes, describe under DESCRIPTION OF OPERATIONS below						E.L. DISEASE - EA EMPLOYEE	$
							E.L. DISEASE - POLICY LIMIT	$

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (Attach ACORD 101, Additional Remarks Schedule, if more space is required)

CERTIFICATE HOLDER

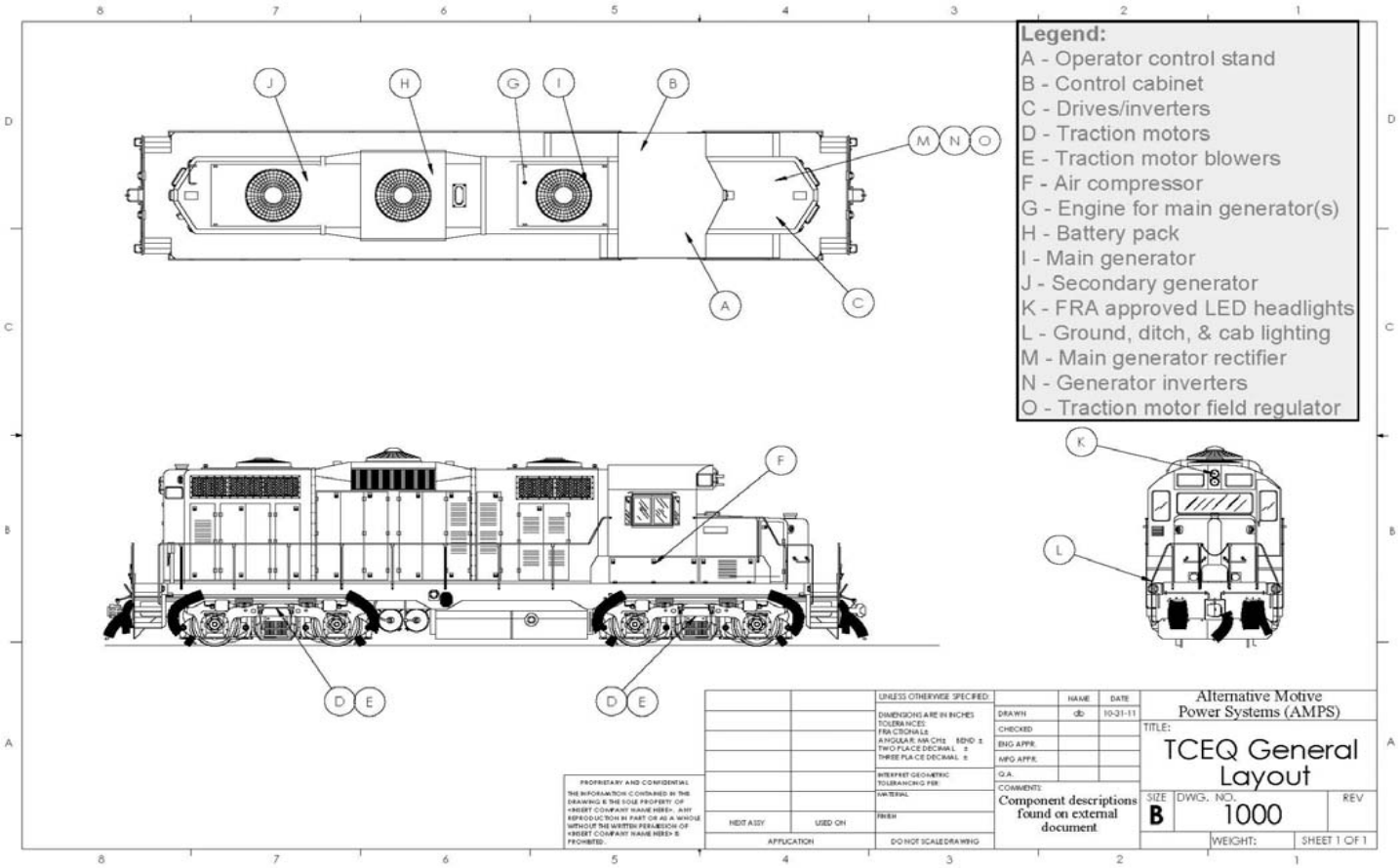
Texas Commission on Environmental Quality
121000 Park 35 Cir POBox 13087
Austin, TX 78753

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

© 1988-2010 ACORD CORPORATION. All rights reserved.

ACORD 25 (2010/05) The ACORD name and logo are registered marks of ACORD

Appendix F: Locomotive Design and Layout