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Importance and need for First Responder Safety Training for AED Vehicles

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Abstract

The National Alternative Fuels Training Consortium (NAFTC) is a pioneer and national leader in developing, managing, and promoting programs and activities that lead to energy independence, and encourage the greater use of cleaner transportation. In the ever-changing world of electric drive vehicles, the NAFTC has recognized the importance of and need for training first responders to safely respond to an accident involving advanced electric drive vehicles. The NAFTC has developed the Advanced Electric Drive (AED) Vehicle Education Program funded by the U.S. Department of Energy. This program, through a state-of-the-art educational suite, will educate first responders on how these vehicles differ from conventional vehicles using hands-on training, and cutting edge technology such as phone apps, a quick reference guide, on-line learning tools and hands-on activities.

These training materials combined with classroom instruction and hand-on activities will create a suite of state-of-the-art training materials, including a Quick Reference Guide (QRG). The QRG is a comprehensive manual (also available as an iPhone and Android app) that details identification, securing the vehicle, warnings, key components and cut zones, safety methods and images for currently available advanced electric drive vehicles. The Key components and cut zones section of the manual includes top and side view illustrations of the vehicle showing possible locations of the components that the first responders need to recognize. This provides a transparent view of the vehicle so first responders know where to look for specific components. It also provides information on areas that are unsafe to cut so first responders do not expose themselves to high voltage components and harmful gases.

Keywords: *Education, electric drive, First Responder, safety*

1.0 Introduction

In 2006, a traffic crash occurred every five seconds, someone sustained a traffic-related injury every 12 seconds, and someone died in a traffic crash every 12 minutes.¹

The scene of any traffic accident is chaotic. First responders (including fire, police, EMS, EMT, paramedics and other emergency personnel) must ensure their personal safety, as well as the safety of their team and the vehicle's passengers while

working with limited information and within critical time constraints. The increasing popularity of electric drive vehicles, including hybrid electric vehicles (HEV) plug-in hybrid electric vehicles (PHEV), battery electric vehicles (BEVs) and fuel cell electric vehicles (FCEVs), presents new safety issues for first responders. When an accident involves an electric drive vehicle, an imperative balance between speed and caution must be achieved as many potential hazards are present.

1.1 Electric Drive Vehicles

Electric drive vehicles have raised several safety concerns for and from emergency response personnel. While these vehicles have the appearances of a conventional vehicle, they contain components that can be dangerous to first responders who are unfamiliar with them. For example, HEVs contain battery packs in excess of 500 volts and FCEVs contain hot surfaces which can cause second-degree burns.

Almost 1.9 million HEVs have been sold in the U.S. since 1999² and U.S. and international auto manufacturers continue to increase current production and introduce new HEVs and other electric drive vehicles to their inventories to meet increased demand. As the number of HEVs and other electric drive vehicles on the roads increases, so does the likelihood that First Responders will encounter these new vehicles at the scene of an accident.

According to an article printed in the Carolina Fire Rescue EMS Journal, there is a distinct information gap between the automobile industry's development of new vehicle technology and emergency responder awareness.³ First responders need standardized training to recognize the dangers inherent in electric drive vehicles and learn the proper procedures to follow on accident scenes that involve an electric drive vehicle. First Responder Safety Training will better prepare first responders to ensure their safety, that of the individuals involved in the accident, and bystanders. This training can be accomplished through the development and dissemination of specialized workshops and courses that meet industry standards and the offering of such courses through a network of trained instructors. There are few comprehensive training programs for working safely with damaged electric drive vehicles at the scene of an accident. Resources to provide this

type of safety training for first responders are also limited.

The National Alternative Fuels Training Consortium (NAFTC) headquartered at West Virginia University is positioned to provide this training. The NAFTC is an educational non-profit that has over 19 years of experience conducting and providing technical guidance and expertise, as well as education and outreach, in the field of alternative fuels, alternative fuel vehicles, advanced technology vehicles, and related technologies. The NAFTC also manages a network of nearly 50 National and Associate Training Centers from across the nation to aid in this mission.

2.0 First Responder Safety Training

Many groups and individuals make up the network necessary to support the electric drive vehicle industry, including current and prospective users (fleets and consumers); vehicle and component manufacturers; other industry representatives including electric vehicle supply equipment vendors; government officials; automotive service technicians; and perhaps most importantly, first responders.

Ensuring that these groups and individuals are properly informed about the key aspects of the vehicles, fuels, and technologies is essential to the continued success of alternative fuel and advanced technology vehicles. Myths and misinformation related to electric drive vehicles can spread quickly and have negative effects on the industry as a whole. Education, outreach, and training are critical elements to ensure that the groups involved are presented with an accurate picture of the industry.

Electric drive vehicles are important for many reasons, including their potential to significantly reduce the nation's consumption of petroleum and the vehicles are common on today's roads. First responders must understand the roles these technologies play. When responding to the scene of a vehicle accident, the mission of emergency personnel is to free passengers from the vehicle quickly without additional harm or suffering to victims and without injury to themselves. It is critical that they are prepared to respond to incidents involving electric drive vehicles.

Providing training on how to respond to electric drive vehicle accidents allows them to continue saving lives without being concerned with unfamiliar automotive components. Well-trained first responders = lives saved.

2.1 Overview of AED First Responder Safety Training

The Advanced Electric Drive Vehicle Education Program (AED), funded by a U.S. Department of Energy grant under the American Recovery and Reinvestment Act, is a public-private partnership with the mission of “Educating America on Next Generation Vehicles.” The program features curricula, training, outreach and education activities, a website and support of National Alternative Fuel Vehicle Day Odyssey. This program provides education and accurate, timely information to consumers, first responders, secondary school educators and students, charging infrastructure engineers and installers, automotive technicians, and fleet operators.

2.1.1 First Responder Safety Training

The NAFTC’s *Advanced Electric Drive Vehicle Education Project*, an ARRA Transportation Electrification Award from the U.S. Department of Energy (USDOE) Vehicle Technologies program, will help accelerate mass market introduction and education of advanced electric drive vehicles to help reduce the country’s dependence on foreign oil. The end result will be a cutting-edge nationwide program for education, training, outreach, and public awareness for advanced electric drive vehicles, electric system components, and supporting electrical infrastructure.

The NAFTC has developed an Advanced Electric Drive (AED) First Responder Safety Training as part of this project. This AED First Responder Safety Training includes four stand-alone workshops, one each for HEVs, PHEVs, BEVs and FCEVs. These workshops may also be offered as one eight-hour course. The projected audience for the AED First Responder Safety Training includes first responders and public safety officers (e.g., fire fighters, law enforcement personnel, paramedics, hazard response teams, vehicle retrieval personnel, emergency medical technicians, code officials, construction permitting officers, etc). These workshops were designed specifically to prepare first responders and public safety officers to

respond to incidents involving advanced electric drive vehicles and their supporting infrastructure.

Each module includes an introduction to the specific vehicle technologies; characteristics for each type of electric drive vehicle; battery technologies; active and passive safety systems and service disconnects; methods to identify each type of vehicle including warnings, placards and color coded wiring; first responder procedures including personal protective equipment; approaching, assessing, and securing the vehicle; disabling the high-voltage systems, and extrication.

2.2 Suite of Training Products

The NAFTC’s First Responder Safety Training features a suite of modern technology products and training for electric drive vehicles. The suite of products includes instructor and participant manuals, workshop booklets, a Quick Reference Guide, mobile device app, and online training.

2.2.1 Electric Drive Vehicle First Responder Safety Training Instructor’s Manual

The *Electric Drive Vehicle First Responder Safety Training Instructor’s Manual* includes information on HEVs, PHEVs, BEVs and FCEVs, and addresses vehicle history, operations, infrastructure, and first responder procedures, such as vehicle identification, personal protective equipment, and extrication. The Instructor’s Manual also includes teaching suggestions and tips, PowerPoint slides, answer keys to module review questions, and other supplemental resources.

2.2.2 Electric Drive Vehicle First Responder Safety Training Participant Manual

The *Electric Drive Vehicle First Responder Safety Training Participant Manual* also covers all electric drive vehicles while detailing what first responders need to know when responding to accident involving one of these vehicles. The Participant Manual is developed in cooperation with the Instructor’s Manual and details vehicle history, operations, battery technologies, infrastructure, and first responder procedures, such as vehicle identification, personal protective equipment, and extrication.

2.2.3 Quick Reference Guide

The *Quick Reference Guide* (QRG) is a durable flipbook for emergency personnel to use at the scene of an accident. The QRG details various makes and models of electric drive vehicles, alerting first responders to such items as high-voltage cables, cut zones, and other safety information pertaining to each model.

2.2.4 QRG Mobile App

The mobile app version of the quick reference guide allows emergency personnel to have at their fingertips all the advanced electric drive vehicle information contained in the hard copy flipbook.

The iPhone app is now available. An Android App is currently under development and will be released in the spring of 2012.

2.2.5 Online Course

The online course is a self-paced class that gives first responders the technical knowledge they need to safely respond to an incident involving an electric drive vehicle. The course is based on the printed Electric Drive Vehicle First Responder Safety Training materials and includes quizzes, tests, interactive learning activities, animations, and other online-based educational tools to help educate first responders.

3.0 References

1. U.S. Department of Transportation, Research and Innovative Technology Administration (RITA), *Transportation Vision for 2030: Ensuring Personal Freedom and Economic Vitality for a Nation on the Move* (January 2008).
2. U.S. Department of Energy Alternative Fuels Data Center. *U.S. Hybrid-Electric Vehicle Sales, 1999-2010*. <<http://www.afdc.energy.gov/afdc/data/>> (accessed March 18, 2011).
3. Shaw, Ron. "Hybrid Vehicle Rescue: Replacing Fear with Knowledge," *Carolina Fire Rescue EMS Journal*, Winter 2008: 44+.
4. U.S. Department of Energy, Energy Information Administration, *Primary Energy Consumption by Major Source, 1949-2009* (August 2010).

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