

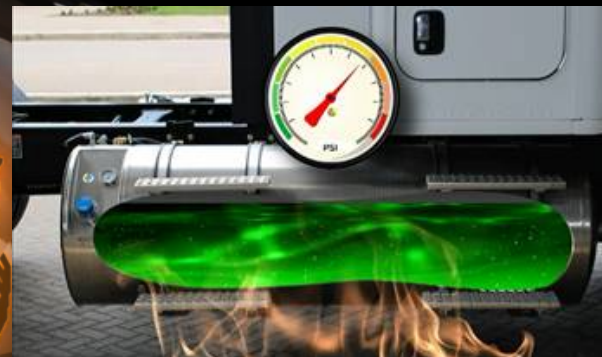


ALTERNATIVE FUEL VEHICLES

SAFETY TRAINING PROGRAM

2016 DOE Vehicle Technologies Program Review Presentation

Nationwide AFV Emergency Responder, Recovery, Reconstruction, & Investigation Safety Training



Andrew Klock
Principal Investigator
National Fire Protection Association
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Nationwide AFV Emergency Responder, Recovery, Reconstruction, & Investigation Safety Training

Project Overview

Timeline

Project Start Date

May 29, 2015

Project End Date

May 28, 2017

50% Complete

Barriers

- AFV Vehicle Manufacturers are less responsive about constructing and disseminating safety knowledge & info.
- Propagating information about the training materials deep into the Fire Service, Law Enforcement, Fire Investigation, Crash Reconstruction, EMS & Tow/Salvage communities may be challenging.

Budget

Total Project Funding

DOE share: **\$685,000**

NFPA share: **\$187,501**

DOE Funding Received

FY 2015: **\$30,381**

FY 2016:* **\$507,790**

Partners

Sub-Recipients

- Argonne National Laboratory
- Virginia Clean Cities
- Fire Protection Research Foundation

Gaseous Fuel Vehicle Manufacturers

American Power Group, Amtrol, Bluebird Bus Co., Diversegy, Emcara, Green Buffalo Fuel, IMPCO – GM/Ford, Momentum, Northwest Propane, OPW, Quantum, Superior Energy Systems, Roush - Ford, Wrightspeed, Hino, Peterbilt

* (Estimated)



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Relevance: Project Objectives

- **Overall Objective:** Establish & provide free T-t-T, classroom and/or online training programs for the spectrum of responder, recovery, reconstruction, and investigation operations involved with AFVs during or after an incident.
- **Budget Period 1 Objectives (May 2015-May 2016):**
 - Reach out to AFV OEMs, form partnerships, and gather vital safety data
 - Enhance existing Fire Service T-t-T classroom course with gaseous fuels practices.
 - Construct a Fire Investigation T-t-T Course addressing all AFVs safety awareness.
- **Impact:** Compelling manufacturers to supply NFPA with their AFV safety information, and then educating the nationwide safety communities for free will help keep responders and the public safe, promote AFV acceptance, and avoid serious high profile events.



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Relevance: NFPA Standards Alignment

Align Training to Applicable NFPA Codes & Standards

- NFPA 2:** Hydrogen Technologies Code
- NFPA 30A:** Motor Fuel Dispensing Facilities
- NFPA 52:** Vehicle Gaseous Fuel Systems Code
- NFPA 1500:** Occupational Safety & Health Standards for Fire Fighters
- NFPA 1001:** Fire Fighter Professional Qualifications Series
- NFPA 1600:** Disaster Planning and Emergency Preparedness
- NFPA 472:** Competence of Responders to Hazardous Materials
- NFPA 1670:** Standards for Technical Rescue Incidents
- NFPA 921:** Fire Investigation

National Electrical Code®

- Article 625:** Electric Vehicle Charging Stations
- Article 220:** Residential power consumption and how EV charging infrastructure will effect power consumption and emergency



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Project Milestones (Budget Period 1)

Milestone	2015 Q1	2015 Q2	2015 Q3	2015 Q4	2016 Q1	2016 Q2	2016 Q3	2016 Q4	Description	Status
Technical Advisory Panel formed									Representatives from concerned entities within emergency services, automotive & AFV industries.	Complete
OEM Partnerships Formed									New Partnerships with AFV OEMs/up-fitters will be established.	Complete
Fire service & investigation classroom modules									Core fire service & investigation classroom modules, instructor's guide & student manual complete.	Complete
Comprehensive review of materials (Go/No Go)									Report delivered to DOE regarding developed training materials.	Complete
AFV Safety Summit Complete									All planning complete & document Summit results.	Q4 2016
Fire Svc & Investigation Trainings Complete									All training offerings (TtT, videos, classroom, online) completed.	Q3 2017
Marketing Activity Complete									Results disseminated to emergency responders	Q3 2017
One Hundred Percent of Classroom Trainings									All planned classroom training sessions delivered.	Q3 2017
Final Report Completed									Report Delivered to DOE	Q3 2017



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Approach: Project Scope Overview

AFV Risks

- Silent Movement
- Venting Fuel/Gases
- Stranded Energy
- Fires, Re-ignition
- Nearly Invisible Flames
- Ruptured Gas Lines
- PRD, Potential Bleve
- Pooling Gases
- Submersion
- Extrication
- Refueling Station Involvement
- Hazardous Materials





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Approach: Overview & Addressing Barriers

Approach:

- 1) Work with Argonne Laboratory to gather and refine their past work with AFV gaseous fuel safety and stranded energy -- incorporate into best practices.
- 2) Reach out to AFV OEMs and gather vital safety data to be used in training & reference materials.
- 3) Establish relationships with various community organizations (ie: N. American Fire Associations, State Police, EMS & Towing Associations, Fire Investigation Technical Committee) to find out what they need to know about AFVs & which training methods are most effective in their communities.
- 4) Work with Virginia Clean Cities to deliver training in various forms (video, online, classroom, T-t-T, manuals, datasheets) free to the various communities.

Addressing Barriers:

- Partnering with, assisting and applying pressure on OEMs to construct and provide safety info & data on AFV vehicles.
- Distributing materials on NPFA website, Clean City Coalitions, Eblasts to fire, EMS, law enforcement, tow/salvage & fire investigation communities.



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Approach: Strategic Plan

Strategy:

- 1) Invite AFV OEMs to participate on a Technical Advisory Panel, giving them input into the safety process and raising their awareness of responder safety needs. This will break down the OEM responder safety blind spot.
- 2) Produce highly engaging, interactive training courses using the latest 3-D simulations, videos and technology to entice the various safety communities to participate in our trainings.
- 3) Make materials for all courses available on NFPA's websites, through Clean City Coalitions nationwide, and set up links on selected safety organization's websites.
- 4) Target the 15 top AFV populated states and provide 20 fire service T-t-T trainings. This will kick-off the future training sessions to be held by the attendees and continue to propagate the safety trainings throughout the states.
- 5) Form a relationship with the Fire Investigation Technical Committee (NFPA 921) and conduct 3 Fire Investigation T-t-T Courses to key trainers in key locations, to begin the dissemination process.



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Approach: Project Schedule





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Progress: Technical Advisory Panel Formed (Milestone 1)

- **David Bryson, National Highway Transportation and Safety Administration (DC)**
- **Daniel Bates, New York State Police, (NY)**
- **Jim Carroll, NAFTD & CT Fire Academy (alt to J. Cunningham) (CT)**
- **Frank Cheatham, National Association of EMS Officials (VA)**
- **John Cunningham, NAFTD**
- **James Francfort, Idaho National Laboratories (ID)**
- **Gregory Frederick, Metro Chiefs & Louisville Fire & Rescue (KY)**
- **Bill Giorgis, Michigan Towing Association, (MI)**
- **Terry McDonnell, New York State Police, (NY)**
- **Todd Mackintosh, Chair of SAE J2990 & GM (MI)**
- **Phil Oakes, National Association of State Fire Marshals (WY)**
- **Gregg Cleveland, NFPA Fire Service Section & La Crosse Fire Dept. (WI)**
- **Ron McGraw, IAFF, (DC)**
- **Steve Pegram, IAFC & ISFSI (OH)**
- **Robert Strassburger, Alliance of Automobile Manufacturers (DC)**
- **Scott Schmidt, Alliance of Automobile Manufacturers (Alt to R. Strassburger)**



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Progress: Content Development & Delivery Team Onboarded

Jason Emery, Captain

- A 26-year veteran of the fire service,
- Captain Member of the Rescue/Haz-Mat Unit.
- Lectured extensively on AFVs, and has published numerous AFV articles.

Matt Paiss, Captian

- A 19 year veteran of the San Jose Fire Department.
- Currently serves as the International Association of Fire Fighters (IAFF) primary representative to NEC (P-04).
- Specializes in electrical safety training, curriculum development & instruction

James Plaster, Captain

- A 21+ year veteran of the fire service with the Bristol, Connecticut fire department.
- Served as an adjunct instructor with the Wolcott State Fire School for 14 years, and 8 years with the Connecticut Fire Academy.
- Served 7 as a police officer.

Creative Media

- Cost effective videographers producing high quality, professional results
- Specializing in both online training videos and film clips.
- Significant experience filming AFVs and their infrastructure.

Inmania Design

- 25 years of experience in digital media design and business communications
- Past experience producing high quality and cost effective animations for NFPA
- Knowledge and expertise to produce animations that will greatly benefit this project.





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Progress: OEM Partnerships

- NFPA has developed a database for the tracking of AFV partnerships, technical vehicle data, training aids, and other OEM-specific safety information received. This database now includes 41 AFV OEM's (which includes 18 new gaseous fuel AFV), many of whom have provided valuable safety information to add to our AFV responder safety website and our training material.
- New OEM partnerships include:
 - American Power Group Northwest Propane
 - OPW Amtrol
 - Agility Fuel Systems Diversegy
 - Green Buffalo Fuel Momentum
 - Quantum Amtrol
 - Wrightspeed Peterbuilt
 - Bluebird bus company IMPCO – Ford/GM
 - Roush Peterbuilt
 - Superior Energy Systems Hino Trucks

MILESTONE 2: Original Equipment Manufacturer (OEM) Partnerships Formed



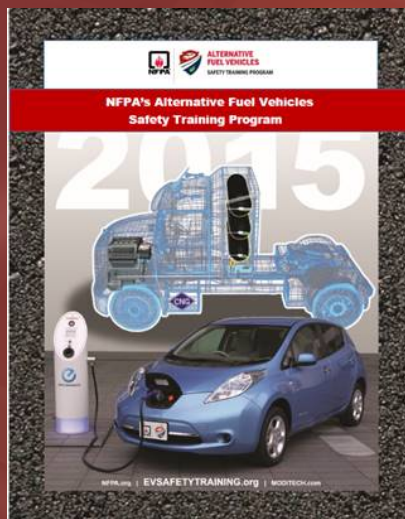
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Progress: Fire Service/Investigation Classroom Modules

Fire Service T-t-T Classroom Course Completed

- Complete Gaseous Fuel Safety Modules added
- 42 new gaseous fuel AFVs PowerPoint slides
- 32 new or revised graphics/animations.
- 7 new gaseous fuel AFV video clips



Fire Investigator T-t-T Classroom Course Completed

- Complete AFV Safety T-t-T Course
- 165 p. instructor guide / 98 p. student manual
- 193 AFVs PowerPoint slides & Pre/Post Test
- 46 graphics & animations
- 12 AFV safety video clips & exercises

Course Overview

- Basic Electrical Concepts & Hazards
- P/HEV & EV Systems and Safety Features
- Initial Response Procedures
- Emergency Operations
 - Extrication, Vehicle Fires, & Submersion
- Fuel Cell Vehicles
- *Understanding Gaseous Fuels
- *Vehicle Systems
 - CNG, LNG, LPG
- *Fueling Stations
- *Initial Response Procedures
- *Emergency Response Procedures
 - Extrication, Vehicle Fires, & Fueling Station Incidents

*Newly Developed Content

MILESTONE 3: Fire Service/Investigation classroom modules complete



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Progress: Classroom Course Video Production Complete





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Progress: Comprehensive Review of Developed Materials

- The Fire Investigation Technical Committee (NFPA 921) met in April to review and discuss the Fire Investigation Training. It was unanimously approved, with a few changes and additions suggested.
- The Technical Advisory Panel has met three times during the past year to provide direction and final review of the Fire Service deliverables.
- The Panel has reviewed all fire svc manuals, videos, exercises, and tests and have approved the materials to be published and disseminated.
- The Panel will meet in June 2016 at the AFV Safety Summit to continue providing direction and review of the EMS, Tow/Salvage & Reconstruction deliverables for budget period two.

Go/No-Go Decision: Comprehensive Review of Developed Materials



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Collaboration

- **NHTSA, SAE, ANSI, NTSB, NREL**

- **Fire Service and Law Enforcement**

International Association of Fire Chiefs (IAFC)
National Volunteer Fire Council (NVFC)
International Fire Marshals Association (IFMA)
National Association of State Fire Marshals (NASFM)
International Association of Fire Fighters (IAFF)
Metropolitan Fire Chiefs
U.S. Fire Administration (USFA)
North American Fire Training Directors (NAFTD)
International Association of Chiefs of Police (IACP)
National Sheriffs' Association (NSA)
Towing and Recovery Association of America (TRAA)
State Fire Marshals/ Regional Fire Investigation Teams
12 Fire Service Subject Matter Experts
NFA Curriculum developer

- **Alliance of Auto Manufacturers (AAM)**

- **Association of Intl Auto Manuf. (AIAM)**

- **41 Vehicle Manufacturer Partnerships**





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Remaining Challenges & Barriers

- No significant Project Challenges or Barriers remain.
- AFV manufacturers are often protective of proprietary information that could be critical to responder safety. NFPA will continue working with OEMs to develop safety information & disseminate.
- States chosen to hold Fire Service T-t-T sessions are as follows:
Nevada, California, New York, New Jersey, Connecticut, Texas, Florida, Georgia, Utah, Wisconsin, Pennsylvania, Arizona, Oklahoma, Missouri, Indiana, Virginia
- Site location for these trainings may involve some negotiation and cooperation within state fire organizations and local Clean City Coalitions.
- Marketing of programs will continue, in order to reach millions of responder, investigation and tow/salvage communities.
- NFPA will continue to stay on top of continuing safety developments in the AFV arena and will update the safety programs as warranted.



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Future Work: Plans for Remainder of Project

- Coordinate, schedule, & conduct AFV Safety Summit. Document findings.
- Coordinate & deliver 20 **Fire Service Classroom Courses** across 15 states.
- Coordinate and deliver 3 **Fire Investigation Classroom Courses**.
- Develop the EMS Online Training Course with video segments.
- Develop interactive **3-D Vehicle Models** to enhance training experience & provide opportunity to become familiar w/ various AFV vehicle components.
- Revise **Tow & Salvage Training Video** to incorporate gaseous AFV content.
- Conceptualize and develop a **Crash Reconstruction Training Video**.
- Conduct **Product Marketing** (NFPA, Clean Cities & Trade Show Channels).
- **Dissemination of Safety Training Materials** through NFPA's website.



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Summary & Questions

Relevance: Gathering info, determining best practices & disseminating knowledge from OEMs, SMEs and National Laboratories to Emergency Responders/Investigators. Will reduce property damage, injury, loss of life, and help achieve U.S. public acceptance of high volume AFVs.

Approach: Through carefully planned and executed development, partnerships and distribution strategies, NFPA will offer free, high value, standards-based safety education programs nationwide through Clean Cities, NFPA & partners' web sites, and training officer propagation.

Accomplishments/Progress: Formed a technical advisory panel with representatives from all targeted responder/investigation communities for direction and review of products -- who approved all first budget period deliverables. Established numerous working partnerships with AFV manufacturers to facilitate safety information flow for input into deliverables and to enhance our website knowledgebase for safety communities. Enhanced fire service & developed fire investigator AFV safety classroom T-t-T courses and reference materials, videos, and data sheets. Chose 15 States to hold fire service trainings in, and setup training within many states.

Collaborations: Active partnerships with many Clean City Coalitions, all high level U.S. fire service orgs, AFV OEMs (42), police, EMS, Tow/Salvage and multiple governmental agencies.

Proposed Future Work: Hold an AFV Safety Summit; Deliver 20 Fire Service Classroom Courses across 15 states; Deliver 3 Fire Investigation T-t-T Courses; Develop an EMS Online Training Course; Develop interactive 3-D Vehicle Models; Revise the Tow & Salvage Training Video to incorporate gaseous fuel AFV content; Develop a Crash Reconstruction Training Video; Conduct Product Marketing; nationally disseminate safety training materials.

National Fire Protection Association
1 Batterymarch Park, Quincy, MA

Andrew Klock
617-984-7089

Project ID: TI067
aklock@nfpa.org