

# NiMH Battery Spills and Exposures



RON SHAW — hybrid vehicles incidents

# PURE POWER



## One Team, One Goal... Customer Satisfaction

We are committed to providing you the very best support for your Caterpillar engine. For over 54 years, Gregory Poole Power Systems and Caterpillar have provided Cat Engine Power sales, parts, and service for on-highway trucks, buses, recreational vehicles, and fire and rescue vehicles.

Mike Howell  
919-755-7022



Walt Brandenburg  
919-755-7021

www.gregorypoole.com

## The ISI Viking Z SEVEN SCBA 2007 NFPA Compliant



The Viking Z SEVEN is ISI's latest advancement in SCBAs, designed to meet all NIOSH, CBRN and NFPA certification requirements. The Z SEVEN features a new proprietary wireless electronics package that extends battery life and reduces signal interference more effectively than Bluetooth technology; a new NFPA Standard-meeting

PASS device; a 2000 event data logging system; a two piece enclosed back frame that protects the pressure reducer, bell and PASS alarm; an easy to use control console; an improved Voice Amplification System (VAS) and many other features—all in a comfortable to wear, easy to use, simple to maintain package.

- **Improved Voice Amplification System**
- **Easy-To-Use Advanced Control Console**
- **A Better Wireless Solution**
- **NFPA Standard PASS Device and Data Logging**
- **Cylinder Options**

A full selection of cylinders is available, from 2216 PSI aluminum to 4500 PSI carbon cylinders with 30, 45 or 60 minute duration.

Authorized Sales, Service and Repair Center for North and South Carolina

Now hiring outside sales reps throughout NC & SC!



RDV  
First breath activation

AirSwitch  
Switch instantly from ambient air to cylinder air

Carolina Safety Systems congratulates the following on their receipt of the New 2007 NFPA Compliant Z7 Airpack:

- Bear Creek Fire Dept. and Chief Glen Zurek
- Carteret County Fire Marshal Office and Fire Marshal Ben Barnett
- North Myrtle Beach Fire Department and Chief Tom Barstow
- Tar Heel Fire Dept. and Chief David Hunsinger



Carolina Safety Systems, LLC

866-305-4899 • fax: 910-602-7564 • css@ec.rr.com

The Trusted Force In Frontline Protection, Worldwide. AVON

*(Editors Note: This is the final segment of the four part series on hybrid vehicles addressing responder concerns and safety recommendations at the scene of an incident involving a hybrid vehicle. Included is a general overview and guide on how to cope with hybrid vehicle (auxiliary low voltage, and high voltage) battery spills and exposures.)*

With permission from Toyota Motor Sales of USA, Inc., this article is based on the Toyota hybrid ERG spill and first aid model templates. Toyota has been the forerunner providing relevant information to emergency responders enabling them to safely mitigate hybrid vehicle incidents. Their product information, training and recommendations have been utilized by other manufacturers for their own use, as well as responders worldwide.

This article is intended to serve as an informational reference, and should not replace any existing hybrid vehicle response standard or SOPs/SOGs that your agency may have for vehicle rescue. The Toyota recommendations have been written in a generic format that will be useful for agencies developing their own hybrid vehicle rescue SOPs/SOGs.

### High Voltage Nickel Metal Hydride (NiMH) Battery Packs

NiMH is the most popular type battery currently being utilized by the automotive



Ford hybrid HV Battery Pack. Photo courtesy of Ford Motor Company.

industry for hybrid vehicle battery packs. As discussed previously, hybrid battery packs are comprised of low voltage modules bundled or connected in series to make a large high voltage output battery or battery pack.

When isolated, each module of a high voltage battery pack has a low output. However, when configured in se-

ries the total sum of HV modules in the battery pack are added together producing a high voltage (DC) output.

Boosting the battery voltage output using multiple low voltage modules is not a new concept. It is similar to a 9 Volt battery commonly used in a smoke detector or toy. The 9V battery is made up of (six) pen style batteries or cells each having an output of 1.5 Volts. When the batteries/cells are connected in series, their total (voltage) sum would increase the voltage to approximately 9 Volts.

Several manufacturers of hybrids utilize Panasonic prismatic type HV modules, each having six (or more) sealed cells. The individual module cells have integrated partitions making them very rigid.

High voltage battery packs typically used in a hybrid vehicle are encased in a battery cabinet (metal or plastic), which is secured on top of the floor pan to the vehicle frame.

Should there be a catastrophic collision where an opposing vehicle's extreme mass (such as a heavy truck or bus) breached the battery pack, it is possible that a leakage may occur. This would be considered an extreme and rare occurrence.

### HV NiMH Battery Properties

The NiMH batteries all have a commonality; the electrolyte. Unlike a common automotive battery utilizing an acid electrolyte (2-3 pH), NiMH battery electrolyte is a strong base or alkaline (13.5 pH).

The NiMH battery electrolyte also differs in viscosity. The automotive battery acid electrolyte viscosity is similar to that of water. This is evident when an acid battery casing has cracked in a collision and acid electrolyte freely leaks out. The NiMH electrolyte differs, in that the viscosity is similar to machine oil and is contained within a fibrous

see NiMH page 22

**GET INFORMED. GET TRAINED. GET READY.**  
**THE LIFE YOU SAVE MAY BE YOUR OWN.**

**1-800-457-3728**

**Rescue SOURCE** WHEN YOUR LIFE DEPENDS ON THE RIGHT EQUIPMENT AND TRAINING YOU WANT THE BEST.

**Rescue 3 International**

**Mass Incidence Response requires oxygen... and lots of it!**

**We've got the solution.**

**MEDLOX**  
 MULTI-PATIENT O<sub>2</sub> DISTRIBUTION SYSTEMS

**MedLox Group of Essex Cryogenics**  
 8007 Chivvis Drive  
 Saint Louis, MO 63123  
 1-314-832-8077  
 www.medlox.com

**Introducing a new generation of Multi-Patient Oxygen Distribution Systems from the MedLox Group.**

**Our proven mass oxygen supply systems provide:**

- « Higher Gaseous Oxygen Capacity by Volume (as much as 13 H cylinders)
- « Greater Number of Patients Served
- « Lighter Gross Weight
- « Better Safety
- « Reduced Space Requirements

**MODS-75 | MASS OXYGEN DISTRIBUTION SYSTEM |**



- Over 64,000 gaseous liters stored as a liquid
- Provides 450 LPM of gaseous oxygen for distribution to multiple PDK's
- Vehicle or trailer mount options (100 foot oxygen hose reel kit available)

**PDK-10 | PATIENT DISTRIBUTION KIT |**



- Distributes gaseous oxygen to 10 patients
- Adjustable oxygen flow (0-15 LPM) at each patient location (ten 20-foot hoses included)
- 50 PSIG outlet pressure
- Use with MODS or high-pressure gas source

**NiMH Battery Spills and Exposures**

continued from page 20

separator/plate. And, will not normally leak even if the casing is cracked during a crash. High voltage battery packs are also encased in a steel or plastic sheet metal cabinet and securely fastened to the vehicle's floor pan.

Should there be a catastrophic crash and leakage does occur to a hybrid battery, the leakage should NOT normally warrant declaration of a HazMat incident. This type incident would be classified as an incidental spill. By definition, there is not enough spillable product (electrolyte) to pose a significant risk to health and/or safety for a HazMat.

*(NOTE: As a precautionary measure, wherever a spill is encountered (regardless of spill size) responders should always wear the proper PPE to prevent possible exposure or injury.)*

In the prismatic Panasonic NiMH HV battery modules utilized by Toyota/Lexus products, there is less than one fluid cup of electrolyte. The viscous electrolyte fluid, for the most part, saturates and will be contained within the fiber separator sheets/plates. Even if an individual module case is breached (cracked or crushed), leakage beyond the module would be rare. In this instance, the local dealership or manufacturer should provide assistance in removal and recovery operations.

**NiMH Battery Composition & Ingredient Information**

**Electrolyte**

- Potassium hydroxide
- Sodium hydroxide
- Lithium hydroxide

**Positive Electrode**

- Nickel hydride

**Negative Electrode**

- Nickel Metal Alloy
  - Nickel
  - Cobalt
  - Manganese
  - Aluminum
- MISCH Metal Alloy
  - Lanthanum
  - Cerium
  - Neodymium
  - Praseodymium

**Spill Control Recommendations**

The following is a generic guide that would be beneficial should a NiMH spill occur at an incident involving a hybrid vehicle.

**1. Minimum Personal Protective Equipment (PPE)**

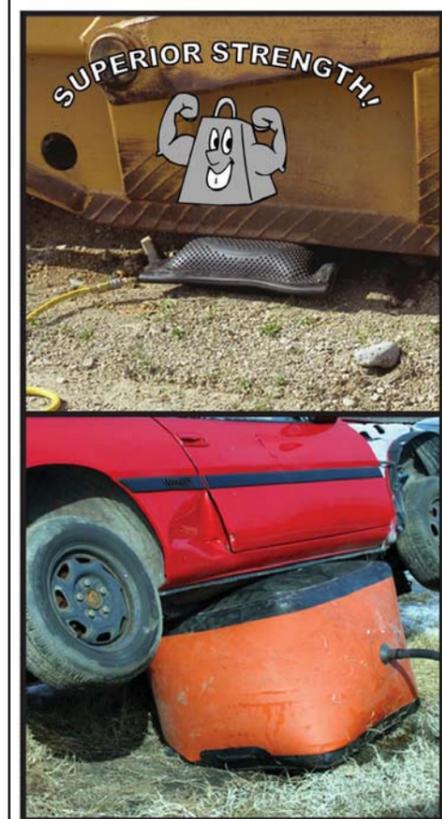
Containment/recovery personnel should don proper PPE suitable for a strong acid and alkaline, such as but not limited to the following:

- Splash shield or safety glasses (helmet shields are NOT acceptable for electrolyte spills).
- Apron
- Rubber, latex or nitrile gloves.
- Rubber boots or suitable protective boot covers.

*(WARNING: NiMH electro-see CLEANUP page 66*

**MATJACK** **When failure isn't an option!**

TOLL FREE: 1-800-827-3755 PHONE: 1-317-359-3078  
 FAX: 1-317-359-3079 EMAIL: matjack@sprynet.com



**MATJACK has been among the industry leader's in innovation and airbag technology for over 27 years. Matjack has enjoyed tremendous success worldwide due to its cutting edge manufacturing, superior strength and long lasting airbags and cushions.**

**With lots of sizes, both high and low pressure, Matjacks can solve all your lifting needs with just the push of a button.**



**!! Matjack 5 year warranty !!**

Indianapolis Industrial Products, Inc./ 1441 Sadlier Circle West Drive/ Indianapolis, Indiana 46239

Visit our website **www.matjack.com**

Indianapolis Industrial Products, Inc. Certified ISO 9001:2000

**Congratulations to:**  
 Elmendorf AFB- Fire/Rescue, AK • Aigestat Company, Canada  
 SAIC Corp., New Mexico • Deerfield Beach FD, Florida  
 Emergency Response Safety Institute, Delaware  
 on their recent purchase!

Join the ICS Toolbox Training Team by purchasing your own NIMS-City Tabletop Training System today!

**ICS Toolbox**  
 Command Training Center Resources and Services

**NIMS CITY ICS TABLETOP TRAINING SYSTEM**

DEVICES ARE MADE OF DIE CUT STYRENE AND LAMINATED.

**NIMS City™** The best "portable" - ICS Command Training Center Tabletop system in the country. Training aids are designed to support the new DHS version 2.0/April 2008 ICS 100-400 courses including Fire operations, Disaster exercises, WMD- HazMAT, MCI exercises, Special Events Planning and most importantly "Company Officer and crew training"

**757-302-0399** or email: [info@ics-toolbox.com](mailto:info@ics-toolbox.com)  
 Free training scenarios and instructor info: [www.ics-toolbox.com](http://www.ics-toolbox.com)

## Recommended Cleanup Materials

continued from page 22

lyte can be absorbed by leather products (such as boots and gloves) and can burn through in time. The electrolyte can also penetrate other natural and manmade articles of

PPE/clothing causing exposure to human tissue. Always use proper PPE for chemical spills.)

### II. Recommended Cleanup Materials

Minimum items recommended for containment of soiled/contaminated materials due to a small NiMH spill:

- Absorbent material such as spill pads/rags suitable

for alkali spills.

- Heavy duty plastic bags similar to those used for a small HAZMAT clean-up.
- (5) Gallon plastic disposal container for items or contaminated products that would rupture a plastic bag such as broken plastic NiMH modules.
- Labels and/or marker to identify contaminants.
- Neutralizing agents for acid and NiMH battery electrolytes

### III. Neutralizing Agents

A. Auxiliary Acid Batteries: Hybrid auxiliary (automotive

acid) batteries are like any (lead) acid type automotive batteries used in conventional vehicles. Precautions are the same as any acid automotive battery.

The acid electrolyte can be absorbed, diluted and neutralized with

a base solution of baking soda and water.

Formula: Base Solution for Acid Electrolyte

A 50/50 mixture of baking soda to water is the ideal solution for cleaning batteries. Chemically, this mixture is a base, which neutralizes the battery acid (Interstate Batteries).

B. High Voltage Battery Pack: Panasonic manufactures all the Toyota/Lexus and other hybrid NiMH batteries, has recommended a weak boric acid solution as a neutralizing agent for NiMH electrolyte.

Using boric acid as a neutralizing agent has two drawbacks; it is not readily available, and the recommended solution needs to be mixed.

It should be noted that household vinegar is a suitable substitute for boric acid. This can be used directly from its container without the need for dilution.

Vinegar has several advantages over boric acid:

- Availability; sold at most retail grocery stores.
- Ready to use; does not require mixing.
- Can easily be stored on apparatus in non-breakable plastic containers.



**Honda HV Battery Pack. Photo Courtesy of Honda.**

The Honda HV NiMH "D" size batteries (unique to Honda) are bundled together in series then shrink wrapped with bright orange sleeves color coding for visual identification as a high voltage component.

The rated voltage output for this particular HV battery pack can be calculated by multiplying the individual module's output of 1.2V by the total number of batteries in the pack.

Similar to metal cabinets used by other manufacturers, Honda's rigid plastic cabinet gives this battery pack increased safety during a collision.

- Has a long shelf life.
- Minimal cost.

**(WARNING: When mixing a boric acid solution always wear the proper PPE. Never add water to the acid concentrate, this may cause an adverse chemical reaction. Boric acid should slowly be added and mixed to the water.)**

Formula: Boric Acid Solution for NiMH Electrolyte

The author recommends using vinegar as a suitable neutralizing agent. Since boric acid is recommended by the electrolyte manufacturer,

**POCKETJET® PRINTER**  
REINFORCEMENT  
BY MAX AND PENTAX

**AS TOUGH AS YOU ARE**

Now there's a compact, ultra portable printer that's durable enough to keep up with even the toughest jobs. Introducing the PENTAX PocketJet® Printer. This rugged and reliable, easy-to-use printer is just 10" long and works in or out of your vehicle.

PENTAX advanced technology gives you portability with toughness and performance you can count on.

**PENTAX®**  
pentaxtech.com • 800-543-6144

**Get A Grip with...**

Engage & Disengage Tire Chains from a Dashboard Switch Without Stopping

**ONSPOT**  
Automatic Tire Chains Since 1977

Traction in forward and reverse for 1/2 ton to Class 8 vehicles including:

- Utility Trucks • Fire Trucks • Ambulances
- School Buses • Plow Trucks • Tractor Trailers

Approved for Use in States with Chain Control Areas

**(800) 766-7768**  
**www.onspot.com**

**DURA POLY IND. INC.**

DURAPOLY IND. INC 191 N HWY 314A SILVER SPRINGS FL 34488  
CALL: 888-353-0280 FAX: 352-625-7488  
EMAIL: durapoly@aol.com WEB: www.durapoly.com

their recommended ingredients and mix proportions are:

- 800 grams boric acid to 20 liters water or 5.5 ounces boric acid to one gallon water

**IV. Acid/NiMH Electrolyte Spill Actions**

Prevent any electrolyte from entering watershed or coming in contact with humans and animals. Clean up of an electrolyte on a surface can be done in a three step method:

1. Absorption
2. Dilution
3. Neutralize

It should be noted that there are strong acid and base electrolytes, both require a different neutralizing agent as noted by the following information.

**A. Acid Electrolyte**

Acid electrolyte surface spills can easily be cleaned by absorption, dilution and neutralizing.

**Absorption**

1. Using a suitable absorbent for an acid, absorb any spillage and properly discard the absorbent.
2. Repeat this step as necessary.

**Dilution**

- 1) Wet suitable rag(s) with water, and wipe/scrub the exposed surface using the wetted rag.
- 2) Repeat this step as necessary and properly discard the rag(s).

**Neutralize**

1. Cover the contaminated surface with a 50/50 mix of baking soda to water solution.
2. Absorb residue with a clean rag and properly discard.
3. Repeat steps as necessary.

B. NiMH electrolyte surface spills can easily be cleaned by absorption, dilution and neutralizing.

**Absorption**

1. Using a suitable absorbent for an alkali, absorb any spillage and properly discard the absorbent.
2. Repeat this step as necessary.

**Dilution**

1. Wet suitable rag(s) with water, and wipe/scrub the exposed surface using the wetted rag.
2. Repeat this step as necessary and properly discard the rag(s).

**Neutralize**

1. Cover the contaminated

surface with a weak boric acid solution or full strength household vinegar.

2. Absorb residue with a clean rag and properly discard.
3. Repeat steps as necessary.

*(NOTE: Never apply a neutralizing agent directly to contaminated body part! Doing so can cause further injury due to a chemical reaction, such as heat.)*



Toyota Camry hybrid HV battery pack encased in a metal cabinet shown mounted to the vehicle's floor pan/frame.

Photo by Extrication.Com with permission from Toyota.

**V. Disposal**

- Place all contaminated articles/materials in a suitable container and properly label container.
- Call the manufacturer's published hotline, local dealership, or authorized manufacturer's recycler for HV battery removal.

**First Aid Measures**

Emergency responders may not be familiar with a NiMH electrolyte exposure when rendering aid to a patient. Exposure to the electrolyte is unlikely except in a catastrophic crash or through improper handling. Utilize the following guidelines in the event of exposure.

*(WARNING: NiMH battery electrolyte is a caustic alkaline (pH 13.5) that is damaging to human tissues. To avoid injury by coming in contact with the electrolyte, personnel should wear proper personal protective equipment during recovery operations and rendering first aid.)*

**I. Minimum Personal Protective Equipment (PPE)**

Containment/recovery personnel should don proper PPE suitable for a strong alkaline, such as but not limited to the following:

- Splash shield or safety glasses (helmet shields are NOT acceptable for electrolyte spills).

see CONCLUSION page 70

**In 1972, we set the standard for rescue... and we continue to raise it.**

This lightweight and compact tool boasts powerful spreading as well as cutting capabilities. Made with premium quality components, including a heat-treated alloy steel piston and regrindable blades, the X-Tractor C combination tool takes multifunction to a whole new level. Experience the power and versatility of the X-Tractor C from Hurst Jaws of Life.

Setting the standard. WWW.JAWSOFLIFE.COM



For more information call  
Henry Schein Matrix  
800-845-3550



HURST / HURST HIGH PRESSURE / AIRSHORE / VETTER

GE  
Security

**StreetLab Mobile™**  
Chemical identification capabilities in a go-anywhere, user-friendly handheld unit.

StreetLab Mobile's innovative features include:

- Lightweight, easy to operate "point-and-shoot" Raman system
- Single-handed or hands-free analysis
- Remote operation through extended wireless range
- Capable of identifying chemicals in mixtures at concentrations as low as 30%\*
- Fast, accurate sample analysis of chemicals through glass and plastic

For more information about StreetLab Mobile or to schedule a demo, please call 978-909-1259.

Product specifications are subject to change.  
\* Dependent on mixture's specific chemical(s) and substances.

GE-Security, making the world safer.

www.streetlabmobile.com



imagination at work

## Conclusion to NiMH Batteries

continued from page 67

- Apron.
  - Rubber, latex or nitrile gloves.
  - Rubber boots or suitable protective boot covers.
- II. Exposures**
- A. Absorption Through Skin
- Perform gross decontamination by removing

affected clothing and properly dispose of the garments.

- Rinse the affected areas with water for 20 minutes
- Transport patient to the nearest emergency medical care facility.

unconscious person).

- If vomiting occurs spontaneously, keep patient's head lowered and forward to reduce the risk of asphyxiation.
- Transport patient to the nearest emergency medical care facility.

### Hybrid Questions and Answers

**Question:** At a crash involving a hybrid the incident commander declared a HazMat incident because there was a vapor cloud and an unknown spill on the ground; was this the NiMH electrolyte?

**Answer:** Upon looking at the facts of the incident, the release of gases was from a chemical reaction related to the release of the acid electrolyte from auxiliary battery (similar to that of a conventional vehicle battery), the HV NiMH battery was not compromised. Even if the total spillable amount

of electrolyte for the HV battery pack leaked, there would not be enough product to warrant declaration of a HazMat incident. This incident could have been handled as an incidental spill. Through proper education, responders will learn how to better cope with incidents such as this.

**Question:** Can responders receive a copy of the NiMH battery MSDS, there is none in the ERGs?

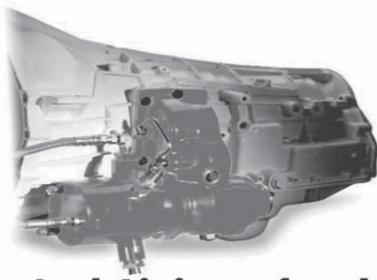
### "Why carry the extra load, when XRT delivers the power, every time..."

Save Time, Save Compartment space, and firefighters backs, with on-board power systems from XRT. We specialize in Power.

- Power three hydraulic tools simultaneously, independent of each other.
- 100% Customer satisfaction in the field
- Made in USA
- Compartment Space needed = 0
- New Ford 5R110 TorqShift & Ford 4R100 transmissions
- Allison EVS3000, 4000, MD & HD Transmissions (either Ports.)
- XRTpump system also available on Onan PROTEC Generators and Westerbeke diesel Generators
- Save Precious minutes off the "Golden Hour" with XRT
- Made in USA

Distributed By:  
**ENGINES1**  
3504 Shipwright Street  
Portsmouth, VA 23703

**800-548-6252**  
www.engines1.com



The 'scale' is in our favor!



### Conclusion

It should be evident after this four part series, which began in the fall 2007, that responders should have respect for any hybrid vehicle, and NOT fear them. With the

### Recovering/Recycling of NiMH Battery Pack

For Toyota products contact the following numbers:  
United States: 800-331-4331 Canada: 888-869-6829

### B. Inhalation

- 1) Non-Fire Situation
  - No toxic gases are emitted under normal non-fire conditions.
- 2) Fire Situations
  - Toxic gases are given off as by-products of combustion. All responders in the Hot Zone should wear proper PPE for fire-fighting including Self Contained Breathing Apparatus (SCBA).
  - Move patient from the hazardous environment to a safe area and administer oxygen.
  - Transport patient to the nearest emergency medical care facility.

### C. Ingestion

- Do not induce vomiting.
- Allow patient to drink large quantities of water to dilute the electrolyte (never give water to an

proper information and training, hybrid vehicle incidents can safely be mitigated by the local authorities without fear.

There is relevant information and training material being offered by the hybrid manufacturers and credible faculties. There is also misinformation that is being circulated. Hopefully the readers of this series will be able to distinguish misinformation and pass along the correct information to other members of the emergency services.

## JANUARY 16 & 17, 2009

# 2009 PIEDMONT FIRE EXPO

### 34<sup>th</sup> Annual Expo held at the Winston-Salem Entertainment-Sports Complex

The Forsyth County Fire and Rescue Association will conduct our 34<sup>th</sup> Annual Piedmont Fire Expo on Fri., Jan. 16<sup>th</sup> from 10am-6pm and on Sat., Jan. 17<sup>th</sup> from 8am-5pm at the Winston-Salem Entertainment-Sports Complex at 2825 University Parkway, Winston-Salem. This is one of the largest indoor exhibits in the region with over 3,000 Fire-Rescue-EMS personnel from the mid-atlantic area.

- Lower admission price - \$5.00
- Over 3,000 Fire-Rescue and EMS attendees
- Manufacturing Reps on hand to help you with all your Emergency Service needs
- Live training classes
- Vendor Information available on-line

Winston-Salem Entertainment-Sports Complex  
2825 University Parkway  
Winston-Salem, NC 27127

#### Classes at the 2009 PFE are as follows:

- LPG Live Fire Training
- School Bus Extrication
- Instructor Methodology Upgrade
- ... plus more to come

#### SPONSORED BY

The Forsyth County Fire and Rescue Association

3000 Aviation Drive, Winston-Salem, NC 27105  
WWW.FORSYTHCOUNTYFIRE-RESCUE.COM  
WWW.PIEDMONTFIREEXPO.ORG

Phone: 336-703-2564 • Fax: 336-727-2078  
E-mail: griffijm@forsyth.cc



**ROOM & VEHICLE** **BE PROTECTED!**  
DISINFECTING • DECONTAMINATING • STERILIZING

### Dri-Mist™ Safely KILLS:

- MRSA & Hepatitis C
- TB & the "Bird Flu" Virus
- Deadly Bacteria & Viruses
- Toxic Mold & Mildew
- Bed Bugs, Lice & other Pests

**No Harmful Chlorine!**  
**No Visible Residue!**

Zimek Dealer for North and South Carolina



www.ZIMEK.com 800-344-7751 www.aircleaningspecialistsinc.com

**FEMA Grant Approved!**

MADE IN U.S.A.

Product demonstration available upon request

**Answer:** Toyota/Lexus does have a published Panasonic (battery manufacturer) MSDS that is available through CHEMTREC/CANUTEC during an incident.

It is this author's opinion that not all responders have been properly trained to interpret information contained in a MSDS, and/or the Department of Transportation (DOT) Emergency Response Guidebook. For this reason it was my recommendation that no MSDS be included in the ERGs.

Instead, all Toyota ERGs provide the necessary safety information for emergency responders to safely mitigate an incident involving a Toyota/Lexus vehicle, including: fire, spills, first aid and extrication. Additionally, each Toyota/Lexus hybrid ERG provides 24-hour emergency numbers where the NiMH HV Battery MSDS can be retrieved if requested.

Should an incident commander in North America, having jurisdiction at incident request a Toyota/Lexus NiMH HV Battery MSDS they may do so through CHEMTREC and CANUTEC.

**Question:** Where can I ob-

**tain more information and training for hybrid vehicles?**

**Answer:** Manufacturers have technical links on the Internet for free downloads online as a public service to emergency responders. You may access these links by going to the following address: <http://extrication.com/erg.htm>

Toyota Motor Sales does have a free hybrid safety training program. The program contains a complete lesson plan with instructor notes, student handouts, Toyota/Lexus ERGs and slide show presentation. The program was first introduced in 2007 at the FDIC on CD, and has since been available as free download (zip format): [https://techinfo.toyota.com/techInfoPortal/staticcontent/en/techinfo/html/prelogin/erg/erg\\_presentation.zip](https://techinfo.toyota.com/techInfoPortal/staticcontent/en/techinfo/html/prelogin/erg/erg_presentation.zip).

Extrication.Com also provides new vehicle technology training throughout United States and Canada: [info@extrication.com](mailto:info@extrication.com)

*Ron Shaw was a career fire lieutenant (retired) with over 29 years of service and is nationally certified fire service instructor. He is a consultant to Toyota*

Motor Sales of U.S./Toyota Motor Company Japan assisting in writing all Toyota/Lexus ERGs. Shaw is founder of Extrication.Com,

who's company provides the latest vehicle technology and extrication training for fire, police, rescue, EMS, tow operators, and

military (DOD Extrication SME) personnel since 1989. For more information e-mail [rsdaw@extrication.com](mailto:rsdaw@extrication.com) or call 508-747-0860.

## Stop Breathing Toxic Exhaust Emissions... 3 Ways

### MagneGrip



1000s of INSTALLATIONS NATIONWIDE

World's most advanced systems for exhaust removal

- Easy-to-use systems for every application
- 100% effective capture... Guaranteed
- Fully automatic & lowest maintenance

BEST TECHNOLOGY AVAILABLE



### AirHAWK

Air purification systems

- With photo-catalytic process that neutralizes more toxic gases than other filtration systems



### HazVent

Pneumatic exhaust removal systems

- Air intake for engine protection & cooler operation—less wear, longer life

ISO 9001:2000 CERTIFIED

Call TODAY for No-cost Survey, Drawings & Grant Assistance

1-800-875-5440  
[www.magnegrip.com](http://www.magnegrip.com)



Toyota hybrid HV battery pack with cabinet cover removed to show individual prismatic HV battery modules that make up a hybrid HV battery pack. Toyota and other manufacturers utilize steel or plastic cabinets bolted to specific locations on the frame for increase protection during a collision.

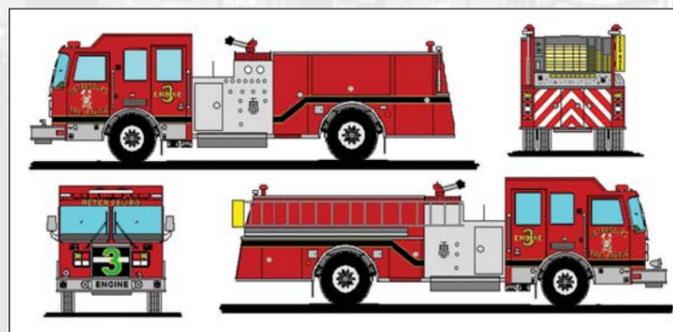
The rated voltage output for this particular HV battery pack can be calculated by multiplying the individual module's output of 7.2V by the total number of modules. Each Toyota ERG lists the total number of modules, which would be useful in recovery operations to ensure all of the modules have been recovered.

Photo by Extrication.Com with permission from Toyota.

## We Can Make This...



## Look like this...



Logan Fire Apparatus, LLC is excited to be offering a new way to shop for your department's apparatus. We offer you the chance to have your truck custom fabricated to your specs. We also offer a remount program to help you save your funds. We are proud to be an OEM for Spartan Chassis. We also offer mobile service, pump testing and a full service body and paint shop.

We take care of you so you can take care of your community.

Logan Fire Apparatus, LLC  
757-810-7669  
<http://loganfireapparatus.com>  
[paullogan@loganfireapparatus.com](mailto:paullogan@loganfireapparatus.com)



www.WINDSOK.com  
Since 1988

PORTABLE WINDSOCKS!

(800) 826-2719

\*Also Permanent, Replacement & Custom Imprint!