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FIREFIGHTER LIFE SAFETY INITIATIVES

Ethanol- Alternative Fuel

Know Before You Go!!

A Firefighters Approach

Greg Hayes
Crawford Wiestling

Endorsed by

Objectives

The student will be able to;

- Identify the purpose for Ethanol based fuels.
- Identify how Ethanol based fuels are produced.
- Identify the growth of Ethanol production facilities across the U.S.
- Identify the hazards located at an Ethanol facility.
- Identify the shipping methods of Ethanol based fuels.
- Identify a firefighters response to an Ethanol emergency.

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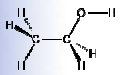
16 Firefighter Life Safety Initiatives

These are the ones we will cover in this program;

1.) Define and advocate the need for a cultural change within the fire service relating to safety; incorporating leadership, management, supervision, accountability and personal responsibility.
2.) Enhance the personal and organizational accountability for health and safety throughout the fire service.
3.) Focus greater attention on the integration of risk management with incident management at all levels, including strategic, tactical, and planning responsibilities.
4.) All firefighters must be empowered to stop unsafe practices.
5.) Develop and implement national standards for training, qualifications, and certification (including regular recertification) that are equally applicable to all firefighters based on the duties they are expected to perform.

Program Design

This program is not designed to be highly technical in nature



This program is designed to give you a basic understanding of the Ethanol production process and hazards

Scenario

In a quiet little town of less than 1000 population located the Midwest sits a facility which produces a “bio fuel” call “Ethanol”.

The facility supplies jobs to some in the community and is located only a few hundred yards from other facilities.

The local fire department is a volunteer fire department with 20 members. They have training to the Awareness level in hazardous materials with a hand full at the Operational level.

So what if??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Incident #2
Know Before You Go!!

What are some of the issues here?

- Water supply??
- Chemical Hazards??
- Economic Impact to the community??
- What else??

What is E-85?

- Ethanol is a clean burning high octane fuel.
- Ethanol is grain alcohol produced from corn.
- Ethanol is mixed with gasoline for consumer use. The mixture is;
  - 85% Ethanol
  - 15% Gasoline
- Today in the U.S. there are more than 4 million vehicles are “flexed fueled” for E-85 use.

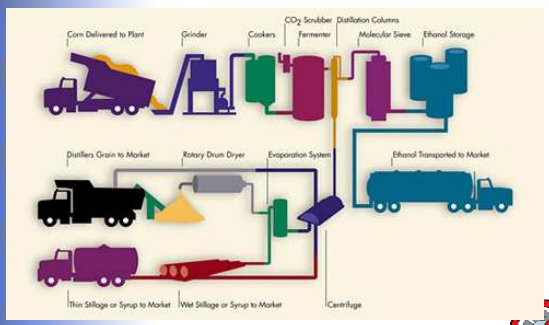
Why Ethanol Based Fuels??

Benefits of using Ethanol

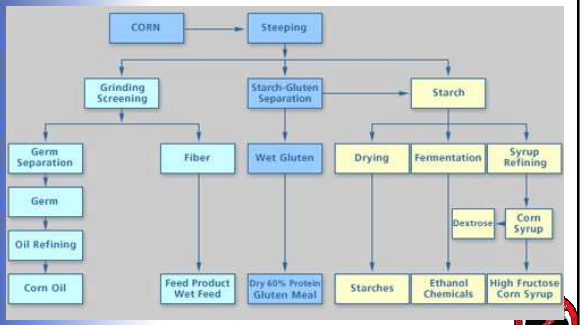
Production

- There are 8 steps to the production of E-85.
- 2 Types of processes are used.
  - Dry Milling
  - Wet Milling
- Dry Milling is the most common production type utilized.

Dry Milling Process



Wet Milling Process



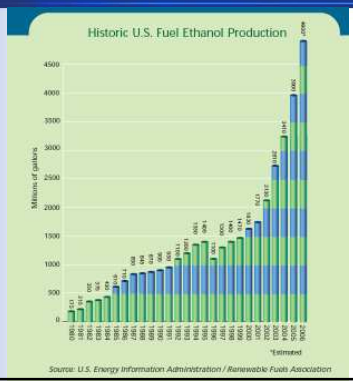
Ethanol Production is the U.S.

U.S. Ethanol Production Capacity by State

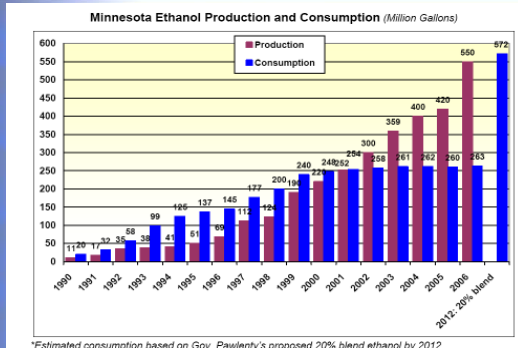
	Online	Under Construction/ Expansion	Total
Iowa	1701.5	1535	3236.5
Nebraska	655.5	965	1620.5
Illinois	831	341	1172
South Dakota	532	378	910
Minnesota	541.6	240.5	782.1
Indiana	102	551	653
Kansas	212.5	295	507.5
Wisconsin	230	272	502
Texas	0	370	370
Ohio	3	330	333
Michigan	155	107	262
North Dakota	83.5	150	233.5
New York	0	164	164
Missouri	155	0	155
Oregon	0	143	143
Colorado	85	40	125
Tennessee	67	38	105
Georgia	0.4	100	100.4
California	68	0	68
Arizona	0	55	55
Washington	0	55	55
Kentucky	35.4	0	35.4
New Mexico	30	0	30
Wyoming	5	0	5
Total	5493.4	6129.5	11,622.9

Source: Renewable Fuels Association, January 2007

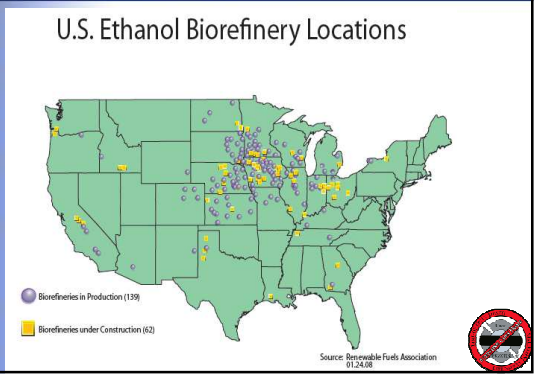
History of Ethanol Production



Growth in Minnesota



Biorefinery Locations in US



Economic Impacts of Ethanol

Minnesota Ethanol: Economic Impact

	Production (Million Gallons)	Output Impact ($ million)	Employment Impact (# of Jobs)
1980	11	29.91	195
1981	17	42.38	247
1982	35	88.30	520
1983	36	90.59	529
1984	41	101.43	590
1985	51	115.26	671
1986	90	203.51	1,085
1987	112	275.89	1,475
1988	124	254.28	1,382
1989	190	352.47	1,759
2000	220	511.48	2,231
2001	252	602.80	2,132
2002	300	742.24	3,858
2003	359	1,874.32	4,026
2004	400	1,478.31	5,017
2005	420	1,590.38	5,840
2006 (Projected)	550	1,705.89	8,401
2012 (10% blend)*	572	1,838.61	8,863

The Hazards at an Ethanol Facility

Chlorine- Water Treatment

Ammonia Storage

Carbon Dioxide

Acids & Bases- Cleaning

Sodium Hydroxide

Sulfuric Acid

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Storage and Transportation

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Bulk Storage- Ethanol

Natural Gasoline

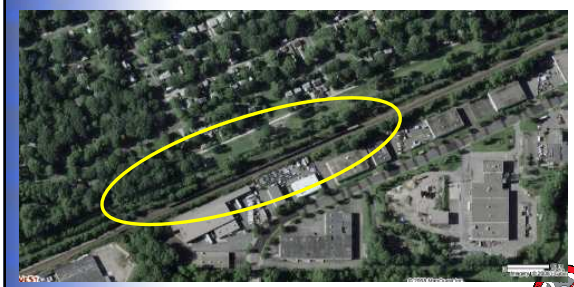
Ethanol

E-95 Storage for Shipment

Shipping- Facility to Refinery & Stations

Bulk Storage

Storage Example



Storage Example

Storage Example

Train Car Listing Sheet

E-85 Tank Truck Roll Over

Minneapolis Minnesota- 2008

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Pre- Incident Planning

Know Before You Go!!

Pre- Incident Planning Basics

- This plan is a firefighters look at the hazards within a facility or storage area.
- Some items identified in a pre-plan;
  - Address.
  - Facility/ area site & floor plan.
  - FD access routes- primary & secondary.
  - Chemical stored & shipped.
  - Hazards of those chemicals.
  - Fire protection systems.
  - Water supply issues.
  - Pre-fire considerations and operational planning.

NFPA 1620 *Recommended Practice for Pre-Incident Planning*

Steps to complete a Pre-plan

- Contact the facility manager or shipper.
- Meet them on-site for a tour.
- Ask them what they feel the risks/ fire hazards are for responding.
- Recommend training with the FD and facility personnel.

What needs to be Pre-Planned?

Facilities

- Identify chemical hazards.
- Identify the process hazards.
- Identify the quantities stored.
- Identify the water supply.
- Identify the foam needed- *NFPA 11 Specifies .10gpm/sqft to .16gpm/sqft- We will re-visit this latter.*
- Identify protection considerations for the area community.

What needs to be Pre-Planned?

Storage Facilities/ Areas

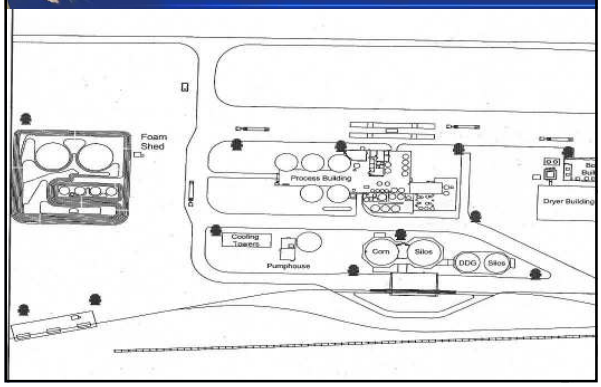
- Identify the quantities stored. Daily.
- Identify shipping routes.
- Identify FD access routes to the storage area.
- Identify the water supply challenges.
- Identify the foam needed- *NFPA 11 Specifies .10gpm/sqft to .16gpm/sqft- We will re-visit this latter.*
- Identify protection considerations for the area community.

What needs to be Pre-Planned?

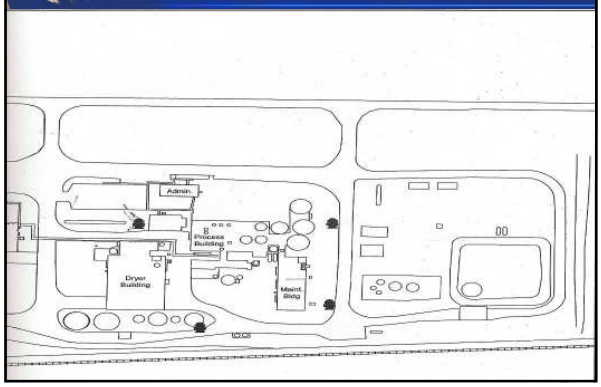
Major Transportation Routes

- Identify the methods of shipping.
- Identify the chemicals being shipped.
- Identify the containers.
- Identify the water supply challenges.
- Identify the foam needed- *NFPA 11 Specifies .10gpm/sqft to .16gpm/sqft- We will re-visit this latter.*
- Identify protection considerations for the area community.

Pre-plan Example



Pre-plan Example



Pre-plan Example for fires

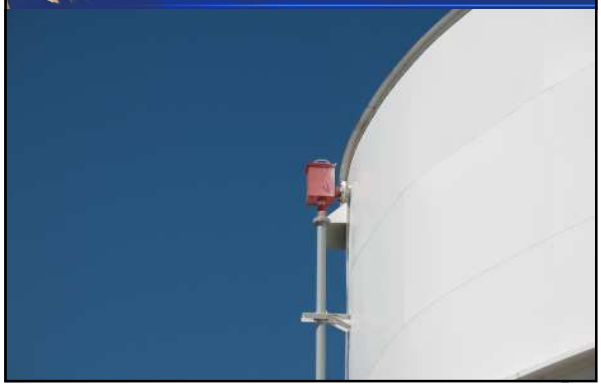
Pre-plan Example for fires

Pre-plan Example for fires

Pre-plan Example for fires

Pre-plan Example for fires

Pre-plan Example for fires



Pre-plan Example for spills

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Ethanol in Use

Know Before You Go!!

Which Vehicle Runs on E-85??

Ethanol in Use

- Identifying a vehicle which uses Ethanol based fuel can be somewhat easy.
- A few ways;
  - Look at the rear of the vehicle stating “Flex Fuel”
  - Look at the gas cap. Some are yellow.
  - The inside of the gas fill cover may clue you in.

Type or Grade of Ethanol

- E-10 10% Ethanol, 90% Gasoline
- E-20 20% Ethanol, 80% Gasoline
  Tactics Change
- E-85 85% Ethanol, 15% Gasoline
  Transportation Mode
- E-95 95% Ethanol, 5% Gasoline
- 200 Proof Ethyl Alcohol

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Hazard Identification

Know Before You Go!!

Physical Properties- States of Matter

Solid, Liquid & Gas

Solid to a Liquid= ***Melting Point***

Liquid to a Gas= ***Boiling Point***

Gas to a Liquid= ***Condensing***

Liquid to a Solid= ***Freezing Point***

Solid directly to a vapor= ***Sublimation***

Important Terms

- **Vapor Pressure-** Pressures exerted on a container by a liquid in the vapor space.
- **Vapor Density-** Comparison of the weight of a vapor to the equal amount of air. Video Ex.
- **Specific Gravity-** Comparison to the weight of a liquid to the equal amount of water.
- **IDLH- Immediately Dangerous to Life and Health-** The maximum from which a worker could escape without any impairing symptoms or irreversible health effects with 30 minutes.

Important Terms (Cont.)

- **LEL- Lower Explosive Limit, the lower limit at which a fuel and air mixture of a flammable can be ignited.**
- UEL- Upper Explosive Limit, the upper limit at which a fuel and air mixture of a flammable can be ignited.

Polar- Water miscible, has the ability to mix with water.

Non-Polar- Will not mix with water.

Why is all of this technical stuff important?

Chlorine

- Synonyms- Molecular Chlorine
- LEL- N/A
- UEL- N/A
- IDLH- 10 PPM
- I.P.- 11.48 ev
- Vapor Pressure- 6.8 atm
- Vapor Density- 2.47
- Flash Point- N/A
- Routes of Entry- Inhalation, Ingestion, Absorption, Skin and Eye contact.

1017

Ammonia Hazards

- Synonyms- Aqua ammonia
- LEL- 15%
- UEL- 28%
- IDLH- 300 PPM
- I.P.- 10.18 ev
- Vapor Density- .6
- Vapor Pressure- 8.5 atm
- Routes of Entry- Inhalation, Ingestion, Absorption, Skin and Eye contact.

1005

Carbon Dioxide Hazards

- Synonyms- Carbonic Acid Gas
- LEL- N/A
- UEL- N/A
- IDLH- 40,000 PPM
- I.P.- 13.77 ev
- Vapor Density- 1.53
- Vapor Pressure- 56.6 atm
- Routes of Entry- Inhalation & Skin and Eye contact.

1013

Sulfuric Acid

- Synonyms- Battery Acid
- LEL- N/A
- UEL- N/A
- IDLH- 15 mg/m^3
- I.P.- N/A
- Vapor Density- ??
- Vapor Pressure- .001 mgHg
- Flash Point- N/A
- Routes of Entry- Inhalation, Ingestion, Skin and Eye contact.

1830

Sodium Hydroxide

- Synonyms- Caustic Soda, Lye, Soda Lye
- LEL- N/A
- UEL- N/A
- IDLH- 10 mg/m^3
- I.P.- N/A
- Vapor Pressure- 0 mmHg
- Vapor Density- 2.47
- Flash Point- N/A
- Routes of Entry- Inhalation, Ingestion, Skin and Eye contact.

1824

Gasoline

- Synonyms- Light Petroleum Distillate
- LEL- 1.4%
- UEL- 7.6%
- IDLH- PPM
- I.P.- N/A ev
- Vapor Density- 4.0
- Specific Gravity- .72
- Flash Point- -45 ^{o}F
- Routes of Entry- Inhalation, Ingestion, Skin and Eye contact.

1203

Ethanol Hazards

- Synonyms- Ethyl alcohol
- LEL- 3.3%
- UEL- 19%
- IDLH- 3300 PPM
- I.P.- 10.47 ev
- Vapor Density- 1.5
- Specific Gravity-
- Flash Point- 55^{o}F
- Routes of Entry- Inhalation, Ingestion, Skin and Eye contact.

1170
1203
1987
1993
3475

E-85 & Ethanol Motor Fuels/ Biodiesel Blends

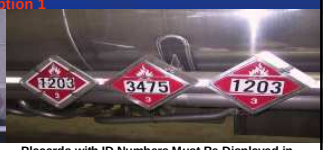
Material	Current Name	New Name *Required 10/01/2010*
Gasoline, with no ethanol	Gasoline, UN1203	Gasoline, UN1203
Gasoline, not more than 10% ethanol	Gasohol, NA1203	Gasohol, NA1203 or Gasoline UN1203
Gasoline/ethanol blends with more than 10% ethanol	Flammable liquid, n.o.s.,UN1993 or Gasohol, NA1203 (not more than 20% ethanol)	Ethanol and gasoline mixture, UN3475
E-85 (85% ethanol, 15% gasoline and other seasonal blends)	Flammable liquid, n.o.s, UN1993	Ethanol and gasoline mixture, UN3475
Denatured alcohol (95% ethanol, 5% gasoline) or **E-95**	Denatured Alcohol, NA1987 or Alcohols, n.o.s., UN1987	Denatured alcohol, NA1987 or Ethanol and gasoline mixture, UN3475 Or Alcohols, n.o.s., UN1987
Diesel fuel, B-2 and B-5 (blends up to 5% biodiesel)	Diesel fuel solution, NA 1993 or Fuel Oil solution, NA1993	Diesel fuel, NA1993 or Fuel Oil, NA1993
Diesel fuel, B-10 and B-20 or higher (all blends with more than 5% biodiesel)	Diesel fuel solution, NA1993 or fuel oil solution, NA1993	Diesel fuel solution, NA1993 or Fuel oil solution, NA1993

Marking & Placarding Multi-Compartment Cargo Tanks Containing E-85 & Petroleum Fuels

(example: Compartment #1 Gasoline #2 Diesel Fuel #3 E-85 #4 Gasoline)

Option 1

Front & Rear Placarded Flammable (No ID Numbers)



Placards with ID Numbers Must Be Displayed in Sequence on Both Sides

Option 2

Placards with ID Numbers on Front and Rear

Placards with ID Numbers on Both Sides in Any Sequence

ID Number UN1993 Can Be Used for E-85 Until October 1, 2010

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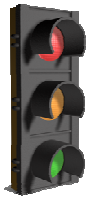
Risk Based Response

Know Before You Go!!

What Is Safe?

- All Of These Guidelines Have One Thing In Common — **Remain Below These Values And The Exposure Is Considered Safe To The Average Healthy Adult By All Information That Is Known By Today's Health And Safety Professionals.**



What Is Unsafe?

- A General Rule For Responders Should Be That If The Material Has Been Released From Its Container, **Assume That An Unsafe Atmosphere May Exist And Some Form Of PPE Is Required.**

What Is Dangerous?

- When Concentrations Continue To Increase **Above Unsafe Levels, There Is A High Potential For Life-threatening Injuries Or Death To Occur**. This Concentration Level Is The IDLH
- There Are Four General IDLH Atmospheres:
  - Toxic
  - Flammable
  - Oxygen Deficient
  - Oxygen Enriched

Physical Indicators Of Likely IDLH

- Outside Or Open Air Environment
  - –Visible Vapor Cloud
  - –Release From A Bulk Container Or Pressure Vessel
  - –Large Liquid Leaks
- Inside Or Limited Air Environment
  - –Below Grade Rescues Or Release
  - –Confined Spaces
  - –Artificial Or Natural Barriers

Physical Indicators Of Likely IDLH

- Biological Indicators (Using Your Common Sense!)
  - Dead Birds, Discolored Foliage, Sick Animals
  - Physical Senses And "Street Smarts" — Be Aware Of Strong Odors And Other Sensory Warnings
  - Hazmats With A Potential For Quick And Rapid Harm
    - Poison Gases
    - Explosives and Some Oxidizers
    - Materials With Very Low IDLH Values
  - Firefighting Overhaul Operations

Hazards when Responding to Ethanol Based Fuels

What happens when you add water?

- The **water miscible** Ethanol mixes with the added water.
- The Hydrocarbon **does not mix.**
- The new mixture has the hydrocarbon on the surface as the Specific Gravity is less than water.

What happens when you add water? (cont.)

- In this state, the hydrocarbon vaporizes off first, leaving the alcohol/ water mixture.
- The alcohol/ water mixture looks like a clear murky solution.

Product Given Time to Settle

What happens when you add water? (cont.)

- When burning, the hydrocarbon burns normally.
- Visible flame is produced along with black smoke from any unburned carbon particles.

What then happens when the hydrocarbon is gone?

- After the hydrocarbon is burned off only the alcohol/ water is left.
- At this point you are dealing with an alcohol fire.
- IN DAYLIGHT, there is little to NO visible flame or smoke.

Going

Going

Gone

Still Gone

Video Example

- Ethanol test done by Bruce Roed, MNSCU

E-85 Test

Identifying the Hazard

How can I identify the hazard

- Look
- Listen
- Monitoring- 4-gas
- Old fashion technique- Straw Broom

Look- Placards

CAUTION- There is no standard of how it is being done

"The federal government contributes to the emergency response confusion, especially when it comes to placarding for transportation. While pure ethanol must carry the 1170 placard, there are three different placards for use with ethanol/gasoline blends — 1203 (gasoline containing up to 20% ethanol), 1987 (ethanol containing up to 5% gasoline), and 1993 (approved for varying concentrations of gasoline/ethanol)." – Bulk Transporter-

Find this article at: http://www.bulktransporter.com/mag/transportation_ethanol_poses_critical/index.html

Thermal Cameras

- Thermals will be able to identify the difference in the heat of the flames
- May not be as apparent as one would think. Use caution and careful evaluation.

Listening

- As the fire on the surface is burning it is heating the liquid.
- The water will “boil” as the alcohol is burned.
- You will may hear a distinct “boiling” sound .

4- Gas Monitors

- A 4-gas monitor will identify;
  - LEL- Flammable
  - O2- Oxygen
  - CO- Toxic
  - H2S- Toxic
- They come in many different shapes and sizes.
- The BASIC operations are IDENTICAL.

Correction when monitoring for Ethanol

Calibration- Methane

Ethanol Correction Factor

What is the actual reading when at 10%?

RAE Systems Technical Note 114

Toxic Gas Sensors

- There are other types of sensors in a monitor.
  - –CO
  - –Cl2
  - –NH3

Photo-Ionization Detectors (PID)

- New emerging technology within the past 10 years.
- Excellent in identifying a wide range of chemicals.
- Requires a higher level of knowledge to interpret the readings.

Monitoring for Firefighters

- The very simple approach. If it "beeps" back away.
- For the following sensors use the following placards.

LEL 

CO 

H2S 

O2
Low 

High 

PID 

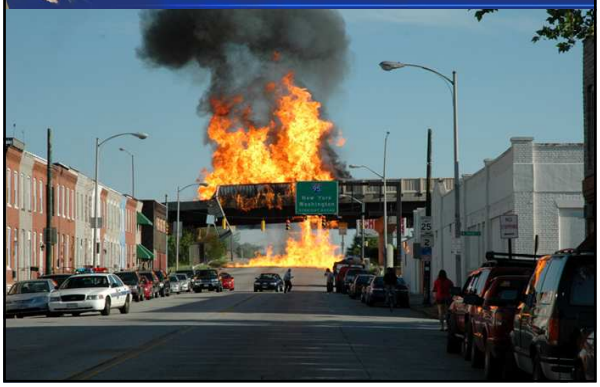
An old way to identify a "safe" approach.

- When you suspect a alcohol based fire in daylight conditions.
- You can not identify if the spill area is on fire.
- Then use the following;
  - Thermal imaging camera
  - Straw type broom
  - Listen for the sound of boiling liquid.

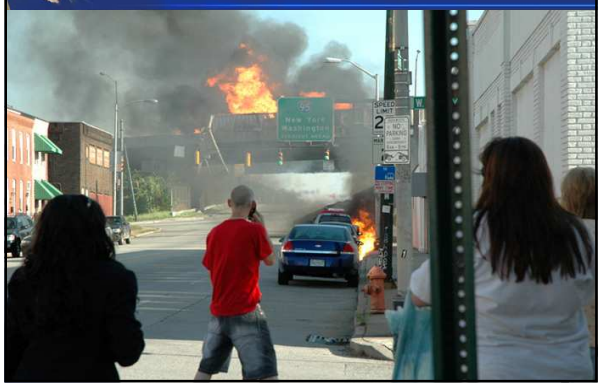
Straw Broom

- Approach from the upwind and uphill side of the spill.
- Hold the broom out in front of your close to the surface.
- Move the broom side to side covering the width of the spill area.
- Watch for any ignition of the straw.

Holy C#@&

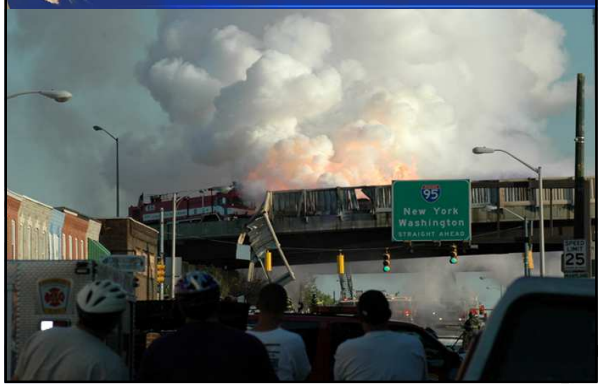


Look Closely at the Surface Street



Look at the fire on the Street.

The Airport Crash Truck gives it a try!



When all Else Fails, Water

Photos by MDE Emergency Response Division

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Implementing a Response

Know Before You Go!!

Implementing a Response

The Eight Step Process©

These Eight Functions Typically Follow An Implementation Timeline At The Incident.

The Elements Are:

1) Site Management And Control
2) Identify The Problem
3) Hazard And Risk Evaluation
4) Select Personal Protective Clothing And Equipment
5) Information Management And Resource Coordination
6) Implement Response Objectives
7) DECON And Clean-up Operations
8) Terminate The Incident

PPE Needed

Simple way to identify what to wear

ALWAYS wear tour turnout gear and SCBA!!

Turnout Gear and SCBA

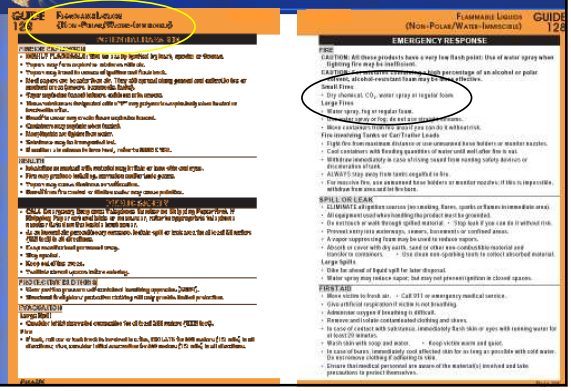
Chemical Protective Suit, SCBA

Setting the Hot, Warm and Cold Zones

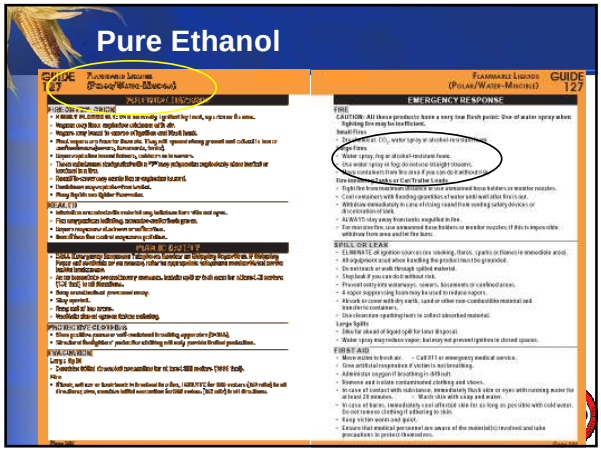
Setting the Hot, Warm and Cold Zones

Same incident- Any new thoughts on what is Safe??

Start with the Dot guide- Gasoline



Pure Ethanol



Train Derailment in Elk River

Fire Response

- Identify the type of product- gasoline vs E85.
- Choose the proper foam.
- Apply as any other class B type of fire.

Are all Class B foams the same??

Lets look at the Class B foam issue.

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Foam

Know Before You Go!!

Foam & Ethanol Based fuels

Ethanol Foam Tests

What Does this all mean to me?

The Simple Version of the Results

UL DEFINITIONS

"Top Side" Fire Tests

"Type II" application

- fixed discharge applied to a vertical surface so as to provide a more gentle application
- minimal plunging or submergence

"Type III" application

- agent applied directly to the surface of a burning liquid fuel
- technique allows for plunging and submergence of the agent when applied to the fire.

Sprinkler Application

- Allows for testing out of either air-aspirated or non-aspirated sprinkler devices as would be found in fixed protection for loading racks or other fuel transfer areas.

Technical Summary of Results:

I. Only Alcohol Resistant products (AR-AFFF & AR-FFFP) were capable of extinguishing any of the top side fire tests.

II. Only Type II fires were successfully extinguished with the two AR type products. The AR-FFFP required a higher application rate to extinguish the fire.

III. Of the two agents that were capable of passing the extinguishment requirements, only the AR-AFFF was capable of also passing the burn back resistance portion of the test.

IV. Only the AR-AFFF was capable of passing all of the top side fire test requirements of UL 162 but, only when using a Type II discharge scenario.

V. Only the AR-AFFF was capable of passing the sprinkler test with non-aspirating sprinkler heads. Each manufacturer's UL Listing will have to be referenced relative to the proper application rate for a sprinkler system.

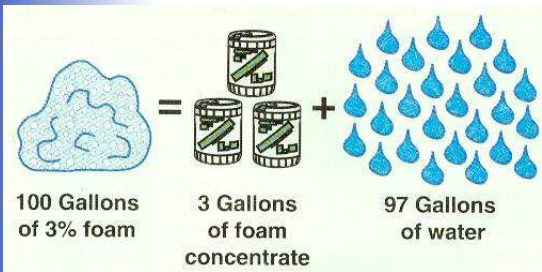
Extinguishing Agent Synopsis

	CHARACTERISTICS							
Extinguishing Agent	Fuel Class Usage	Ability to Wet	Ability to Foam	Ability to Insulate	Affinity to Carbon	Indifferent to Carbon	Reacts with Fuel
Water	A	★					
Wet Water	A	★★★					
Class A Foam	A	★★★	★★★	★★★	★★★		
AFFF	B	★★	★★★	★★★		★★★	
AR-AFFF	B	★★	★★	★★★		★★★	
FFFP & AR-FFFP	B	★★	★★★	★★★		★★★	
Emulsifier	A	★★					★★★
Gel	A	★		★★★			

☆ Poor ☆☆ Average ☆☆☆ Excellent

FOAMPRO

How Foam is Made.



Foam Application Rate- NFPA 11

Table 5.8.2.2 Minimum Application Rate and Discharge Times for Nondiked Spill Fire Protection Using Portable Foam Nozzles or Monitors

	Minimum Application Rate		Minimum Discharge Time (min)	
Foam Type	L/min- m2	gpm/ft2		Anticipated Product Spill
Protein and fluoroprotein	6.5	0.16	15	Hydrocarbon
AFFF, FFFP, and alcohol-resistant AFFF or FFFP	4.1	0.10	15	Hydrocarbon
Alcohol-resistant foams	Consult manufacturer for listings on specific products		15	Flammable and combustible liquids requiring alcohol-resistant foam

Master Foam Streams

Foam Concentrate Usage

Water Flow	Foam Conc. %	Foam Conc. Flow	Foam Conc. Usage 15 min.
350 GPM	3 %	10.5 GPM	157.5 gal.
350 GPM	6 %	21.0 GPM	315 gal.
500 GPM	3 %	15.0 GPM	225 gal.
750 GPM	3 %	22.5 GPM	337.5 gal.
1000 GPM	3 %	30.0 GPM	450 gal.

Is your foam supply large enough to support a master stream?

Remember Surface Area not Volume

- The calculation of foam needed is about surface area of the spill not the depth.
- A 1 million gallon tank fire can be much easier than a rolled over tank truck depending on the area the spill covers.

What Foam Do I Select

- In today's fire service we have many different choices.
- Class B AR-AFFF is the best choice.
- Look to a foam which gives you the most "bang for your buck"
- There are combination A & B foams on the market.
  - Some do not work on alcohols thus don't have the "AR" prefix.
  - Some work but don't have an "AR" prefix.
- The A/B foams have made then initial response and knock-down a simple process.

Consideration When Selecting Foam

- Today, when selecting a foam look to purchase one which is "Environmentally friendly".
- Perflorochemicals (PFC's) which are harmful to the environment and have contaminated drinking water systems.
- Class B foams have or have had PFC's in them.
- The MPCA is in the process of evaluating this issue and expect further action on the issue.

Field Test New Foam Products!!

Utilize large scale test facilities

Class B Foams

- Any AR-AFFF foam will work on the Ethanol based fuels.
- There are many large national foam producers who have test data on Ethanol based fuels.
- Choose the one which is used in your area due to the issues of mixing different brands of foam.

Foam Test A & B- October 15, 2008

Test conducted at Flint Hills Resources- Rosemount, MN

- Class A & B Foam
- Tested at 1%, 3% & 6%.
- Hydrocarbon Fires
- Ethanol (E-95) Fires

Extinguished ALL fire types at each percentage.

FULLY Biodegradable!

Which of the two should I use?

- Look to use a Class B AR-AFFF foam over the A/B foams.
- The AR-AFFF foams will have longer dehydration time and are more suitable for the applications.
- The A/B foams are good for the initial knockdowns as this is what might be on the front line engine.

Foam Application Challenges

- Training
- Real life
  - If no containment:
    - No film forming seal
  - Then alternatives are:
    - Class A foam
    - Emulsifiers

FOAMPRO

Quote

"A crash truck caring 3,000 gallons of AFFF and applying it at 500 to 1000 gpm can knock the heck out of a fire. But with ethanol involved, you might as well leave the crash trucks at home. The way we fight flammable liquid fire has to change."

David White, President, Fire & Safety Specialist, Inc.
July- August 2007 issue of Industrial fire World.

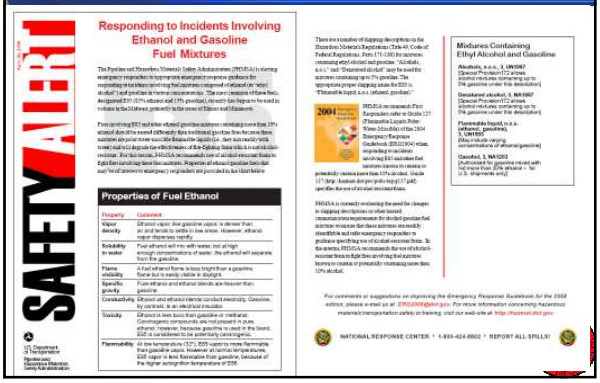
Spill Response

- Follow your current departmental operating Guidelines.
- Recommendations;
  - IF you suspect a spill with an Ethanol based fuel which is over 85%.
  - THEN treat as an Ethanol spill not a gasoline spill.
- Read the MSDS and follow the recommendations

Spill Response

- Use resource materials to identify the exact type of product it is.
- Don all firefighter protective gear including SCBA.
- Approach with caution.
- If there is no life threats, stay back and take a defensive position.

Use caution with some information



SAFETY ALERT

Responding to Incidents Involving Ethanol and Gasoline Fuel Mixtures

Properties of Fuel Ethanol

Property	Comment
Vapor density	Ethanol vapor, like gasoline vapor, is denser than air and tends to settle in low areas. However, ethanol vapor disperses rapidly.
Solubility in water	Fuel ethanol will mix with water, but at high enough concentrations of water, the ethanol will separate from the gasoline.
Flame visibility	A fuel ethanol flame is less bright than a gasoline flame but is easily visible in daylight.
Specific gravity	Pure ethanol and ethanol blends are heavier than gasoline.
Conductivity	Ethanol and ethanol blends conduct electricity. Gasoline, by contrast, is an electrical insulator.
Toxicity	Ethanol is less toxic than gasoline or methanol. Carcinogenic compounds are not present in pure ethanol; however, because gasoline is used in the blend, E85 is considered to be potentially carcinogenic.
Flammability	At low temperature (32°), E85 vapor is more flammable than gasoline vapor. However at normal temperatures, E85 vapor is less flammable than gasoline, because of the higher autoignition temperature of E85.

Mixtures Containing Ethyl Alcohol and Gasoline

Closer Look

Properties of Fuel Ethanol

Property	Comment
Vapor density	Ethanol vapor, like gasoline vapor, is denser than air and tends to settle in low areas. However, ethanol vapor disperses rapidly.
Solubility in water	Fuel ethanol will mix with water, but at high enough concentrations of water, the ethanol will separate from the gasoline.
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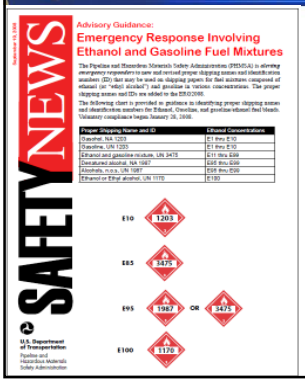
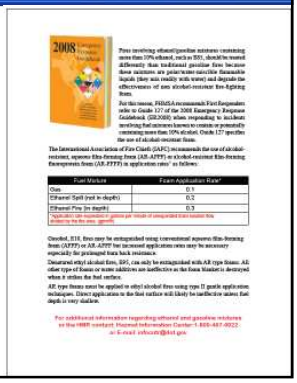
Other Information



SAFETY NEWS

Advisory Guidance:
Emergency Response Involving Ethanol and Gasoline Fuel Mixtures



A Basic Response Checklist

Receipt of Call & Responding

- ❑Attempt to Gather Chemical Name
- ❑Identify current weather conditions
- ❑Identify safe route of approach. Upwind & Uphill.
- ❑Safely drive to the incident location and provide a size-up once on-scene.
- ❑Make contact with caller or facility representative.

A Basic Response Checklist- Fire

Initial Actions

- ❑Stay back (1000 feet) from the scene and recon.
- ❑EVAC ½ mile around the scene.
- ❑Full turnout gear and SCBA.

Product/ Container is on Fire

- ❑Protect exposures
- ❑IF no threat to Life or Property, let it burn
- ❑IF suppression actions are needed, create a spill containment area and use AR-AFFF.
- ❑Daylight- APPROACH WITH EXTREME CAUTION!! Flames may not be visible.

A Basic Response Checklist- Spill

Initial Actions

- ❑Stay back (1000 feet) from the scene and recon.
- ❑Full turnout gear and SCBA.

Spill Only

- ❑Safely create spill containment area.
- ❑Identify leak source.
- ❑IF safe, attempt to shutdown leak.
- ❑Vapor suppression- use AR-AFFF.

Summary

- We identified the Ethanol production growth in the United States.
- Looked at a Ethanol production facility and the hazards which exist within the gates of the facility.
- Identified the chemical hazards around production and end use.
- Identified some basic response criteria for the identification of the hazard for a safe response.

Most Importantly

BE SAFE!!

Contact information

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