Ethanol & Alternative Fuels – The Public Safety Questions

The Problem.

- Ethanol and Alternative Fuels are a Present and Growing Reality.
  - Demand for alternatives to Fossil fuels
  - Domestic business opportunities
  - Enhance investment in rural communities
  - Environmental Issues
- The growth of ethanol production and alternative fuels research has grown at an exponential pace in the past decade.
- Our challenge as first responders, particularly Fire, Rescue and HAZMAT is that the general knowledge and ability of the fire service to effectively respond to an ethanol or other alternative fuel emergency has not grown at the same pace.
  - Illinois is in the eye of the ethanol production and distribution "storm."
  - As a result, the Illinois fire service have met organizations to discuss what we know and did not know about potential Ethanol-relate emergencies
  - What we found may surprise you … for we discovered that first responders throughout the state had very little specific knowledge about response to an Ethanol emergency…and were even less well prepared or equipped to respond.
  - Today, there are nearly a dozen operational ethanol plants in Illinois with an annual production of some 1.5 bil gallons.
  - At the same time, there are more than 50 permits under consideration
  - While numerous hearings have been and are being held in those communities that might host a production plant, the hearings most often focus on the business and environmental aspects of the potential plant. The questions that are usually asked are:
    - "Where will the plant be located?"
    - "What are the incentives for and restriction on the construction of the plant?"
    - "How much water will be taken from the aquifer?"
  - What we do not hear?
    - "What are the potential emergencies in this plant and the transportation avenues that support it?"
    - "Is the local fire department / fire protection district capable of responding to these emergencies?"
  - What I would like to share with you today are the questions we need to ask and answer, not just for production facilities, but for all of the Fire and Rescue organizations that will be asked to respond to an emergency involving Ethanol or another Alternative Fuel.

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What are some of the challenges of ETHANOL to Firefighters

- Ethanol is the most prevalent alternative fuel sold and used in America today. It presents several unique challenges to firefighters:
  - Highly Flammable
  - Water Soluble but often lighter than water, so fires can rapidly extend through run off of firefighting operations…dilution rates of even 500:1 still burn
  - Requires Alcohol Resistant Foam or dry chemical with specific application methods and rates to extinguish fires.
  - Nearly invisible flame
  - May rapidly off gas into vapor from liquid when exposed to air
- Other alternative fuels will have their own unique characteristics, which, because they will eventually be distributed nationwide, will have to be understood by all firefighters and fire departments.
- The great challenge is to provide the pre-planning, knowledge, tools and training to all firefighters who will be asked to respond to alternative fuels emergencies…all will have to:
  - What is done as part of preplanning to reduce first response risks and requirements…plant design, location, built-in containment and suppression, availability of water and AR foams?
  - What do firefighters do when they are confronted with Ethanol in situations and quantities for which they are neither trained nor equipped?
    - How many departments have AR foam and are trained and equipped to employ it?
    - Do ethanol plants, terminals and transportation have unrealistic expectation for the response capability of local responders to Ethanol or other Alternative Fuel emergencies?
    - Are agreements in place to provide AR foam to responders with appropriate eductors to respond to an sizable Ethanol emergency?
      - Are they trained?
      - Do they have adequate water supplies?
      - What should they attempt to respond to or not respond to?…example LP fire in Illinios some years ago…Canton, IL.

The Current Fire Service Response

- Today's fire service is composed of some 30,300 fire departments and fire protection districts. There are 1.1 million firefighters nationwide…28% are full-time career and 72% are volunteer / paid on-call. 20-25% turnover.
- 95% of the volunteer firefighters are in departments that protect fewer than 25,000 people. Now some of the best firefighters I know are volunteers, but they can only respond effectively to what they are trained, equipped and have the reaction time to respond to.
- Here in small rural communities is where Ethanol plants are being built! These plants are the primary source of the more than 5 billion gallons of Ethanol we are feeding onto the road, rail and water transportation systems.
- Rural Fire organizations are often fire protection districts protecting hundreds of square miles with very limited apparatus and volunteer manning.
  - For water, they seldom have fire hydrant coverage at the point of a fire, relying on tender-delivered water or remote water storage tanks.
  - They have little or no training for Ethanol or Alternative Fuel emergencies.
  - They have limited equipment and apparatus and little, if any AR foam.
  - Their average response to a 911 call may be 25 minutes for the first arriving engine.
- Paid fire departments in communities that have a fuel storage terminal, a major railway or interstate highway are also challenged to respond to an Ethanol emergency…. Most foam sold to fire departments is NOT ALCOHOL RESISTANT. In fact, even large metropolitan fire departments have very limited qualities of AR foam.

Key Public Safety Questions

- What are the risks that the fire service must be prepared to address for Ethanol and Alternative Fuels?
- Follow the chain – Farm, grain haul, Production Facility, road/rail/barge transport, terminals, 306 by road to retail, vehicles on the highway.
  - **Grain haul and storage from Farm to Production facility**
    - With a 3 gal ethanol per bushel ratio, 2 billion bushels are moving on rural roads each year now and double that by 2010.
    - This is not harvest season grain traffic but rather year-round, perhaps even round the clock.
    - Are these roads improved to handle the increased, sustained heavy traffic?…or will accidents and truck roll-over events increase…because of rural road deterioration?
    - Are rural fire organizations trained and equipped for heavy vehicle extrication and roll-over events?
  - **Production facility**
    - Plant hazards include: ethanol, gasoline, chemical additives, high-voltage power, grain bin dust, storage facilities, process units, pipe racks, loading terminals for rail, road and barge transport.
    - Firefighters must know what the hazards are, what they can respond to and what they cannot.
    - A critical consideration must be if the plant is isolated to provide buffers of a half-mile (ERG minimums) or more, or would a fire or explosion or release immediately threaten population nearby, major transportation lines (rail & interstate), or sensitive environmental areas.
    - A fire in a plant will demand large amounts of water, AR foam and alcohol-compatible diking capabilities.
    - A rescue will require technician-level confined space and rope rescue skills….this requires 200+ hours of training alone.
    - A HAZMAT technician-level response may be required for some of the special additive chemicals involved.
    - Preplanning during the plant locating and construction process, close coordination and support of the fire organizations who will have to respond to such emergencies are essential….and it will be a mutual aid regional and perhaps selected state-wide response.

- **Transport** (road, rail, barge) consider the capacities of our Ethanol transport means
  - Road
    - Tractors with a 306 trailer carrying some 8,000 gal E-95 weighing in excess of 30 tons are moving now from production facility to terminal.
    - They are often moving at all hours and in all seasons.
    - They are moving on the same rural 2-lane roads that a significant portion fo 2 bil bushels of grain have moved…roads not designed for these types of continuous heavy use.
    - They are moving on all types of roads, in / thru all types of communities.
    - Are fire departments along these routes prepared to respond to 306 trailer turnovers and spills? Multiple vehicle accidents involving large quantities of Ethanol?
  - Rail
    - I have asked fire departments along major rail lines in Illinois how much Ethanol is moving through their community. While many can identify rail cars that contain 30,000 gal of Ethanol…most do not realize that the rail industry is now moving Ethanol in unit trains carry 2.5 mil gal.
    - How do departments respond to a rail derailment and fire involving 1 or more cars…or to an incident involving an entire unit train…Is there even a remote possibility that this is another Crescent City, IL Disaster is in the making? In today's environment it only takes one mad cow.
    - I know that the rail industry is doing training for first responders, but does the industry and fire service need to do more together? How we we organize and fund it for the greatest effect?
  - Barge
    - I understand that barges now carry 4, even 8 mil gal of Ethanol.
    - Are fire departments and the Coast Guard who protect barge loading and unloading facilities prepared to respond?
    - Who is prepared to deal with an emergency should a barge strike a critical bridge?
- **Terminals**
  - Terminals provide bulk storage of fuels before they are loaded into 306 trailers and delivered to the pump.
  - There has been E-95 delivered to, stored at and shipped from these facilities for years primarily to create E-10 and other special low-ethanol content gasolines…placarded as 1203.

- Now the quantities and mixtures will be significantly different…converting E-95 to E-85 that will be delivered to the pump placarded as 1987.
- What preplanning, equipping and training is in-place or must be added for the fire department protecting the terminal to address this change in the amount and type of product stored and mixed at the terminal…when it becomes an emergency involving an 1987product versus a 1203 product?

➢ **Retail distribution**

- Underwriter labs is currently testing retail distribution pump standards, because no one is quite sure of the long-term impact of E-85 on the retail distribution systems. For example, Brazil uses E-25 (gas & ethanol) and an E-92 (ethanol and water) where the long-term corrosion and polymer impacts are documented.
- How should a fire department respond to and attack an ethanol emergency involving storage tanks and pumps at a retail facility? Do they have the right AR foams, right application means and methods, and are the right passive and active safety systems in place?

➢ **Vehicles on the Highway**

- Ethanol in 20-30 gal fuel tanks still presents a fire suppression problem greater than gasoline. What happens when we have a multiple vehicle event involving different types of fuels mixing fire, EMS and rescue response in a complex accident scene? (Baltimore tunnel, Los Angeles Oct 07)

➢ **In the end, everyone of the 30,300 fire departments in the US must be trained and equipped to respond to emergencies involving ethanol today, and other alternative fuels in the future….and we must give them the answers to these questions:**

- How will the average fire department deal with an ethanol incident, either E-95 or E-85?
- How much foam concentrate (or other agent) and water are needed to handle a well involved tank truck, rail car, or processing plant fire?
- What is the recommended foam application rate? What sized foam eductors, nozzles, and pumps are required?
- What application techniques will be effective (or not be effective) on various types of ethanol fires…transport, production, transfer, storage, retail distribution, customer use?
- What are the public safety and fire department considerations for locating, constructing, and operating an ethanol production plant?
  - Built in fire protection systems
  - Available water (storage & mains)
  - Available foam concentrate on site
  - Roads, rail crossings & track (location & condition)
  - Buffers

- What factors to consider when making decisions regarding Offensive vs. Defensive operations?

- How to handle and what is required to deal with spills involving no fire?

- What special training and equipment will the local FD need to handle incidents in production facilities other than ethanol fires and leaks (such as dryer fires, grain dust explosions, fires involving gases and substances used in the production process, heavy vehicle accidents, confined space/rope/grain bin and other technical rescue situations, fires in DDGs by-products, etc., etc.)

➢ What about other alternative fuels??

<u>Training, Equipping and Planning for Response</u>

❖ ANSUL, the Renewable Fuels Assn. DOE. International Fire Chiefs Association, and we at IFSI are developing training programs (on-line and hands-on) that can be offered in Illinois and across the nation.)

❖ We need to ensure that key public safety issues and solutions are part of the discussion and planning by community leaders and boards as they decide to host alternative fuel production facilities. We need a comprehensive planning checklist.

❖ Training Programs must be assessable to all firefighters

➢ Build upon the 4 tiers of Firefighter Training (IFSI has begun to develop these programs)

- Awareness (Knowledge) …can be classroom, distance, CD,
- Operations (Defensive) …must be both knowledge and hands on
- Technician (Offensive)… primarily hands-on
- Incident Command … including hazards analysis, LEPC and NIMS – IAP application

➢ Example is LP training program

❖ We should have a systematic process where-by we bring product, techniques, first responders, the ethanol industry and researchers together to look at current and future trends, threats and solution and to package information and programs for nation-wide distribution.

❖ We have to make live-fire training with the actual product and appropriate foams, suppression and containment systems and representative transport, production, loading and storage facilities broadly available to the fire fighters….and ensure that firefighters who have primary responsibility for protecting key components of the Ethanol & alternative fuels systems are prepared to do so.

- We must ensure that fire departments have immediate access to and are trained to use adequate appropriate suppression systems (AR foams, etc)…probably need regional caches as part of a state mutual aid systems.

Next Steps

- Bottomline, we need a true a partnership between industry, elected local leaders, the fire service and the researchers to ensure public safety keeps up with the evolution and growth of alternative fuels in the U.S.
- Recently, I had a conversation with the lead researcher with the University of Illinois Center for Advanced Bio-Energy Research (CABER) funded, in part, by a grant from BP.
  - We agreed to try to organize a 1-2 day issues forum at the UofI in Champaign-Urbana next spring to bring together key individuals to address emerging alternative fuel issues…if you would like to participate please let me know….cards in the back. New need long-term partners to help make this a reality.
  - We discussed the possibility of building a research and training facility in conjunction with the UofI South Farms research facilities in Champaign-Urbana dedicated to Ethanol and other Alternative Fuel safety and emergency response during production and transportation (rail and road) and for local community emergency planning and incident management.
- National Fire organizations are undertaking efforts to address some of these issues, including the International Fire Chiefs Association and the State Fire Marshal's Association.
- In Illinois, we have taken the lead with other members of the Illinois Fire Services Association, representing all of the statewide fire organizations statewide, and the Governor's Fire Advisory Commission, led by State Fire marshal Dave Foreman to address these issues.
- We are all looking for an effective way to partner with the alternative fuels industry and others to protect our communities, our responders and the public trust in this new and important industry.