



Hawaii's Conversion to Gasoline Ethanol Blends

Gasoline Facility Operators Workshop

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Section I

Presented by:

Robert E. Reynolds

President

Downstream Alternatives Inc.

1657 Commerce Dr. Suite 20 B

South Bend, IN 46628

Office Phone: (574) 233-7344

Reynolds Cell: (574) 250-2811

Email: rreynolds-dai@earthlink.net



Beginning April 2, 2006, at least 85% of Hawaii's gasoline must contain 10v% ethanol. This blend is commonly referred to as E10.

The refiners have been preparing their facilities, terminals and transportation equipment for several months to facilitate this change over.

However, there are also some important steps to be taken at the retail level as well, and that is what I want to cover with you today.

Initial Conversion - Retail & Fleet Facilities

The guidelines for implementing and maintaining a successful gasoline/ethanol blend sales program at the retail level can be divided into three phases, the Investigative/Preparatory Phase, the Conversion Phase, and the On-going Phase. Each of these phases require certain steps.

Slide 1

Retail Facility Operator Checklist **Investigative/Preparatory**



- Verify tank material compatibility. Also submersible pumps.
- Investigate tank water problems and correct. Review history of water problems and initiate any necessary corrective action.
- Tight seals on fill caps and proper water run off from man hole covers.
- Remove water bottoms (if present). Check for tilted tanks.
- Clean tank bottom, if necessary.

Investigative/Preparatory Phase: Prior to converting a retail unit to gasoline/ethanol blends it is necessary to assess that units suitability for handling such products. The major concerns in this area are determining the compatibility of tanks (or tank liners) and

determining tank history for any water problems.

Tank Compatibility - Steel tanks and nearly all fiberglass tanks are compatible with gasoline/ethanol blends. In some instances, tanks may have been lined with polyester or epoxy linings to prevent leakage. Although many of these lining materials are compatible with gasoline/ethanol blends not all are. Epoxy and polyester linings which are not suitable for gasoline/ethanol blends can deteriorate resulting in degradation of the gasoline being dispensed into the automobile. If a tank was lined due to leakage, the leak could reoccur if the lining is chemically incompatible with the blend. Fiberglass tanks also must be checked for suitability for use with gasoline/ethanol blends. If it is unknown whether a tank is steel, fiberglass, or "lined", this should be determined prior to conversion. It is imperative that the tank integrity and type be known prior to conversion to gasoline/ethanol blends. If there is any doubt regarding the suitability of a tank, contact the tank manufacturer or lining contractor prior to conversion.

Materials Compatibility - Above ground equipment such as nozzles, hoses, and meter seals have long been compatible with ethanol and should not present any need for modification. Very old submersible pumps may require modification to operate with gasoline/ethanol blends. Although this is rather rare, a determination should be made as to the compatibility of these pumps with gasoline/ethanol blends. Some units could require replacement of impellers and/or seals to avoid impeller "swell". If any doubt exists as to the compatibility of these units, the manufacturer should be consulted.

Control of Water Levels - Underground storage tanks frequently have small amounts of water at the bottom of the tanks, referred to as water bottoms. Excessive water levels can cause the ethanol in a gasoline/ethanol blend to "phase separate" resulting in a phase of

water and ethanol on the bottom of the tank. Therefore, it is imperative that water be eliminated from the system. The maintenance history of all tanks to be used for storage of gasoline/ethanol blends should be reviewed. Any tank with a history of excessive water problems should be reviewed closely. The source of water entering the tank must be identified and eliminated before the tank is to be converted to gasoline/ethanol blends. If historic data is not available, it is recommended that historic data be developed and reviewed prior to conversion.

Once the investigative/preparatory phase is complete, the unit can be converted to gasoline/ethanol blends.

Slide 2

Retail Facility Operator Checklist
Conversion Plan (before first delivery)



- Equip pump or dispenser with 10 micron filter. (or "water slug" filter)
(Remember - SAFETY FIRST - SHUT OFF BREAKER)
- Recheck for water bottoms and remove any present.
- Issue alcohol compatible paste. Discard any old incompatible pastes.
- Procure proper pump labels.
- Confirm any applicable accounting procedures.

Conversion Phase: Prior to the first delivery of a gasoline/ethanol blend, several steps should be taken. These steps include the following.

Check to see if tanks have excessive tilt. This can usually be done by sticking

opposite ends of the tank. If one end of the tank is lower, it will result in a higher stick reading than the other end. When one end of the tank is lower, water can collect at the low end and go undetected. In such cases, the low end of the tank should be tested for water prior to the first delivery as well as on an on-going basis. Also if tanks are equipped with tank bottom protectors, it is recommended that these be removed to test for and remove water. This will ensure that all water is removed.

Fill line caps should be checked for proper fit and seal. Any improper fit or seal should be repaired. Man hole covers should be checked for proper water run off and modified if necessary.

Each retail pump or dispenser should be fitted with a 10 micron filter. Some companies may desire to utilize a special filter such as a "water sorb" filter. It is desirable that the filter be installed at a location prior to the dispenser meter to eliminate any suspended sediment from entering the metering device. However this is not always possible.

Important Safety Note: When a unit is equipped with submersible pumps, product flow can be activated at a dispenser even though the dispenser is not turned on. In other words, if you are changing a filter on pump A and someone turns on pump B, if pump B is connected to the same submersible pump it will activate product flow. If you have the filter off of pump A when this happens, you could be sprayed with gasoline. For this reason, pumps should be deactivated at the breaker panel when filters are being installed or changed.

Utilizing water paste you should test for the presence of water bottoms, If any water bottoms are present, they should be pumped off and disposed of in accordance with any federal, state, or local laws and regulations.

Older tanks may have a build up of "silt" or sediment on the tank bottom or lacquer and gum build up on the tank wall. In such cases it is recommended that the tank or at least the tank bottoms be cleaned. This can be achieved by utilizing special equipment such as a Gorman-Rupp "Tank Kleenor".

Prior to the first load of gasoline/ethanol blends you should obtain an ethanol compatible water paste such as "Kolor Kut" or Sargel. Once you have been issued the appropriate water paste you should discard any old paste as it may not work properly with gasoline/ethanol blends.

Retailers should obtain the necessary dispenser labels and prepare placement instructions prior to the first delivery so they can be placed on the pumps/dispensers immediately after the first delivery. Accounting procedures at the time of conversion vary significantly from one company to the next. Retailers should ensure that they have obtained and understand the proper accounting guidelines to be used at the time of conversion.

There are basically three ways to convert to gasoline/ethanol blends. Those methods are as follows: A) To remove all product from the tank and replace with gasoline/ethanol blend.; B) To order enough extra ethanol in the initial delivery to accomplish upgrading of existing inventory; C) To lower inventory to extremely low levels and merely begin delivery of gasoline/ethanol blends (this procedure could result in product being below targeted blend levels for the first few deliveries).

Each of the procedures has advantages and disadvantages which in many cases are company specific. Additionally, each of the procedures may have certain variations

from one company to the next. However, once the initial delivery is made, the procedures become similar if not identical.

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Retail Facility Operator Checklist
First Delivery



- Check for water. Water bottoms must be removed before first delivery of ethanol blends.
- Follow normal delivery procedures and ensure that accurate tank gauge and dispenser readings are taken.
- Verify (with transport driver) correct compartment for correct tank.
- Pumps should be shut down during initial delivery. (check company policy)
- Purge lines from tanks to dispensers. (check company policy)
- Install required decals and if necessary change octane decals. Also repaint manhole covers to proper color code (e.g., API color code).
- Fill tanks to at least 80% of capacity. Keep as full as possible for 7 to 10 days.
- Test for water bottoms at the beginning of each shift for the first 48 hours after initial delivery.
- Check for water bottoms daily.
- Notify designated personnel if water is detected and have it removed at once.
- Replace filters if pump/dispenser is running slow.
- Check pump calibration two weeks after initial load conversion.

Before the scheduled delivery, retest tanks for water bottoms. Water bottoms should be removed prior to the initial delivery. Manhole covers should be color coded for new product (API color code).

When the initial load arrives, follow normal delivery procedures. Take stick readings and pump readings so that you have an accurate inventory record at the time of delivery.

When you have more than one tank for a specific product and you are attempting to upgrade (up blend) product in storage, be sure the driver is putting the correct compartment into the correct tank. It is recommended that pumps be shut down during the initial delivery.

After the initial delivery is dropped, it is recommended that a few gallons of product be run through each dispenser to ensure that it is clear and bright. Ethanol blends have a solvency effect and may loosen sediment and sludge in tanks and fill lines. Once dispensed product is clear and bright, the tank can be placed back in service. Be sure to install any required pump labels, before tank is placed back in service. Also if the octane level is different than the previous product, the octane decal should be changed to reflect the correct octane.

NOTE: You should check with company management for the exact accounting and operational procedure to be used when using product to purge lines. As an example, some companies will return purged product to the appropriate tanks and list it as a pump test. Others may have lines purged by maintenance personnel who take the product to a terminal for disposal.

Conversion loads should fill tanks to 80% of capacity. If this is not accomplished with the initial load, a second load should be brought in immediately after the initial delivery. This allows the solvent effect of the ethanol to loosen any sediment or varnish type deposits from the sides and upper portions of the tank. It is recommended that the

tanks be kept as full as possible for the first seven to ten days to accelerate this process. This will result in dealing with any build up in tank bottoms during a time frame when everyone is acutely aware of the program conversion.

During the first forty-eight hours after delivery, tanks should be tested for water bottoms and/or phase separation once every eight hours. This should be done with a tank gauge stick and the appropriate water detection paste. If your unit is equipped with an automatic inventory measurement system and water detector alarms, you should still utilize a tank gauge stick and water finder paste as an added precaution.

After this initial forty-eight hour period, you should utilize the tank gauge stick and water finder paste on a daily basis to detect any water bottoms. At any sign of water build up, you should notify the designated personnel or maintenance contractor and have the water removed at once. **The most important step in ensuring that your ethanol blending program is a success is to eliminate any moisture from the system before it can become a problem.**

Unless there is a problem with the tanks or lines, you should not experience any water build up after the conversion phase. Gasoline/ethanol blends will pick up and remove trace levels of water from the system thus eliminating water build up in properly maintained tanks. None the less, you should continue to monitor for water on a daily basis.

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Some companies may utilize tank bottom samplers during the conversion process. These samplers help identify any build up of sludge in tank bottoms. The typical tank bottom sampler is affixed to the tank gauge stick. If your company intends to utilize such a device, they should provide instructions for its use.

Since ethanol loosens varnish like deposits in the tank, you may need to change pump filters once or twice shortly after your initial conversion load(s). Employees should watch for any signs of filter plugging (slow running pumps). If it is necessary to

change the filter, follow the procedures mentioned earlier. It is recommended that pumps/dispensers be recalibrated approximately two weeks after initial conversion. Occasionally, some meters will over-dispense a small amount when first converted to ethanol blends. This should be corrected to avoid any unnecessary inventory shortage.

Slide 5

Retail/Fleet Operator Checklist
Ongoing Maintenance



- Check for water. No level is acceptable.

Ongoing Maintenance – Once through the initial conversion period, you should notice no difference in your day-to-day operations except for the need to check for water on a daily basis.

Phase Separation - If proper steps are taken to eliminate water from the storage system, you should not experience any phase separation. If excess water is introduced into the storage tank (e.g. leaving a fill cap off), phase separation could occur. This can happen because excess water can combine with the ethanol in the blend, causing it to drop out of suspension or "phase separate". When this occurs, the product separates into two phases. The upper phase is gasoline and a small amount of ethanol while the lower phase is predominantly ethanol (approximately 70%) and water (approximately 20%) plus around 10% hydrocarbons. Since tank submersibles or pumps pick up product from the bottom of the tank, it is this mixture that would be dispensed into the vehicle. Obviously, vehicles cannot operate on such a blend, so if you experience a phase separation, all dispensers supplied from that tank must be deactivated immediately. The appropriate

company representatives should be notified. Since a portion of the phase separation contains some level of hydrocarbons, federal regulations require that they be treated as a hazardous substance. Their handling and disposal is therefore subject to very specific requirements.

I do want to provide some additional information sources. The Renewable Fuels Association has a lot of information on their website including RFA Publication # 960501 FUEL ETHANOL Industry Guidelines, Specifications, and Procedures which covers a lot of topics I've addressed today and much more. And of course the state has a website with a great deal of ethanol information as well.

<http://www.ethanolRFA.org>



<http://new-fuel.com>



For those of you wishing more detailed information or new information that becomes available, you might wish to check these two websites.

At this point, I would like to stop and see if there are questions thus far.