THE FEVER FLASH

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BACK ISSUES:

Back issues of the FLASH and links to numerous railroad related sites may be viewed at www.FremontRailroad.com.

BOARD OF DIRECTORS:

Note- the minutes of the January Board of Directors meeting are not included in this issue because of the space requirements of the feature article.

LEE WILMART

Members of the NRM were surprised and saddened by the death January 24 of Lee **Wilmart**, a member and friend for many years. Lee was a train crew engineer at NRM and worked at many other tasks up to the time in 2006 when he was severely injured in a fall. After a very long recovery period, he no longer was able to serve in that capacity, but he continued as a supporter of NRM.

He was born in 1940 in **Jamestown**, North Dakota, where he graduated from high school and later married his wife, Sharon. He was employed as a business consultant and developer and traveled extensively for a number of companies. In Jamestown, he was a volunteer fire fighter. He lived in Fremont since 1980, with a career in real estate until the time of his accident.

He is **survived** by his wife, son Jeff who lives in Sweden, son Brad of Fremont, daughter Stacey of Minot, ND, and sister Diann of Keene, TX. Surviving also are nine grandchildren and three great grandchildren.

The **funeral** was held Wednesday, January 29, 2014 at the Moser Memorial Chapel in Fremont.

NATURA.L GAS AGAIN:

The April 2013 FLASH issue mentioned the interest again in the use of natural gas as a fuel for locomotives. There was an interest in that use in the early 1990's but there was no economic **incentive** for its use instead of diesel fuel.

The very recent development of methods of recovering gas from previously unavailable sites by the use of "**fracking**" – the injection of water, sand, and chemicals under high pressure into shale formations to produce cracks - has changed the pricing structure. Gas and other products such as crude oil can flow through the cracks held open by injected sand to be collected by a well and brought to the surface.

This process is not without **controversy**, however, because of fear of water aquifer contamination and even fear of initiating seismic events. However, the process use continues and has the potential of making the Canada/United States regions major world petroleum product producers. Like coal, these products are not short-term renewable resources since all are the result of heat and pressure over geologic ages on organic matter.

Another recent development in production is that of **horizontal** well drilling where multiple bores can be made from one well head.

In addition to the concerns about the actual extraction of the products from the ground, additional problems have developed in **transporting** the product to refineries and eventual users. The media have covered the multiple recent oil train derailments which have typically resulted in fires and in one case nearly 50 fatalities and the destruction of a large part of a Quebec town. The FLASH has reported on many of these events.

The findings from these railroad accidents indicate that the tank cars used are mostly of an older design which do not have the accident **survivability** of newer specification units. The time needed to replace old units will take years.

The alternate petroleum transport is by **pipelines**, which may not deliver the products to the desired destinations, as in the case of delivery to the eastern portions of the United States and Canada where the majority of the railroad accidents have occurred. A currently proposed pipeline across the Mid-West – the XL – has not been completed, being under bureaucratic review for nearly four years.

The use of natural gas as a fuel has its main problems in the **storage** on a vehicle prior to actual use. Natural gas, when measured in comparative ways to gasoline and diesel, has only about 60 percent of the energy content of diesel and 70 percent of gasoline. This means that more natural gas volume must stored, even if liquefied, to obtain the same energy output as gasoline or diesel.

To use natural gas as a gas, the only option is to **compress** the gas to pressures exceeding 3000-3500 psi to obtain enough energy storage to be practical for vehicle use. Automotive retrofit generally results in the loss of much of trunk space in a passenger vehicle or in a pickup box bed space. Vehicles built for natural gas use can alleviate the problem by placing storage tanks in the under floor areas or in the case of buses, on top of the vehicle.

Highway vehicle use is generally **restricted** to urban areas where the travel is predictable and the refilling facilities are available. Dual fuel applications enabling operation either on natural gas or gasoline can be implemented, but at additional expense. Cold weather starting with fuels other than ordinary gasoline can be affected.

Dual fuel applications are necessary for situations where gas refueling is not always available. For spark **ignition** applications, the change in fuel involves shutting off the natural gas supply to intake air and turning on the gasoline injectors. With computer control, ignition timing and other engine parameters can be optimized for either fuel.

Where the heat of compression produces ignition (diesel), the process is more complicated because attainable cylinder temperatures are too low to produce auto ignition in natural gas itself. To overcome this problem, natural gas is added to the intake air and then in the operating cycle where ignition is needed, a small amount of **diesel** fuel is added through the usual injectors (at pressures as high as 20000 psi), The diesel fuel ignites and takes the place of a spark plug. In a typical application, the amount of diesel fuel needed can be only 5-10 % of the usual quantity, but that will vary with the load on the engine. If gas would not be available, the engine can operate on diesel only.

To provide enough fuel to operate a locomotive, natural gas must be liquefied by being cooled to a temperature of **-260 deg F** and then carried in an insulated tank car. Liquefaction eliminates the need for pressurized storage. The large tank car would need to be coupled directly behind the locomotive.

The **investments** in locomotive modifications, while not involving extensive internal prime mover changes, are still high. The need to provide a gas processing supply infrastructure would be another high cost item.

A critical consideration would be the new and largely unknown **dangers** of a major accident that would cause the leakage of the tank car contents. The rapid phase change of large quantities of natural gas from liquid to a gas could have devastating consequences.

Also, the **energy** from sources needed to obtain, transport, and compress the gas or to produce the liquefaction need consideration.

Finally, methane is known to be a more aggressive "**greenhouse**" gas than carbon dioxide and leakage possibilities would exist.