

## **Grease Recycling and Biodiesel Programs**

**Background** - One of the most common municipal problems facing communities across the country is that of sewer spills, known in the utilities industry as a sanitary sewer overflow or "SSO". Daphne, which is situated on a bluff overlooking Mobile Bay, is obviously located in an environmentally sensitive area and anything "bad" spilling onto the streets or ground in this area quickly finds its way into a wetland or waterway via normal surface runoff.

**Costs and Damages** - The damage from these occurrences is far more than simply "environmental". The monetary cost of the actual clean-up operation alone can run into the thousands of dollars per occurrence. Not all spills occur in "public" areas like streets or fields. Many occur in occupied buildings such as residential homes, retail stores and restaurants. Clean-up costs can run into the thousands as they often involve vacating effected buildings for days which adds dramatically to the financial impact. While municipalities and their utility arms have insurance policies to cover such events, these policies are not cheap and usually involve high deductibles reducing them to little more than "catastrophic loss" protection. Cities which fail to address routine sewer spills also suffer damage to their reputation, anger their citizens and cost themselves lost revenue from sales taxes and other sources.

**Causes** - One of the main causes of sewer spills in any system is oil and grease plugs in sewer mains. Oil and grease can enter a sewer system in many ways: waste oil poured directly into a drain or toilet, clean-up activities which washdown floors into a floor drain, even the simple act of washing dishes. Many common household foods contain oil and grease such as butter and margarine, food scraps, baking goods, sauces, and dairy products including ice cream! Home garbage disposals only make this problem worse by making it easier for a homeowner to dispose of food down a sanitary drain. Even a little oil or grease entering a

system has a big impact (if each of Daphne's 10,000 sewer customers caused a single cup of oil to enter the sewer system, this would be the equivalent of pouring more than ten 55-gallon drums of oil into the sanitary sewer system). While oil and grease may be liquid when it enters the sewer, it solidifies as it cools and becomes a gummy mess trapping food particles and "other" sewer debris in the wastewater. This thick, sticky mass will grow over time until wastewater flow is totally obstructed and a sewer spill occurs.

**Solutions** - In 2005, after numerous costly clean-ups, Daphne decided that a proactive response was necessary to combat this issue and began a Used Oil Recycling Program that was inexpensive and began results almost immediately! Recycling stations were eventually established at about 20 sites throughout the City where customers could obtain clean, sealable containers to use for recycling cooking oil and grease. Once the containers are filled with used oil, the customers can return it and obtain a new container all at no charge. An aggressive marketing program was begun to inform customers of the benefits to the environment for participating in the program. The "Cease the Grease" program was embraced by the community and has proved a great success in removing oil and grease from the sanitary sewer system. Sewer spill occurrences **dropped by more than 40%** since implementing the program translating into savings of approximately \$10,000 per year in clean-up costs alone.

**The Next Step** - The system currently collects approximately 600 gallons of used cooking oil per month through this program and the amount continues to grow. In the early days, this oil was simply disposed of at a local rendering plant, but the Utility soon found other ways to better utilize the oil. A partnership was formed with a local company, Earth Clean Technologies, to pilot a Biodiesel Plant using the recycled oil as feedstock. It quickly became evident that the Utility could produce high quality fuel from this waste cooking oil for less than \$1 per gallon (at a time when diesel fuel was running in excess of \$3 per gallon). The Biodiesel Plant has been upgraded and increased in size as participation in grease recycling has grown. The plant was inexpensive to construct and built using mainly salvaged materials

(discarded 55-gallon drums, decommissioned propane tanks, used water heaters, etc.). The current plant has the capacity to make over 1,000 gallons of biodiesel fuel in about 24 hours.

**Benefits** - The benefits from this overall program were numerous and immediate. Fuel savings amounted to around \$10,000 per year as the Utility has expanded its use of the fuel to all service trucks and heavy equipment (this will increase as more of the Utility's fleet is converted to diesel fuel). Diesel fumes are a thing of the past as biodiesel exhaust emissions smell distinctly like "french fries". Another innovative approach uses the biodiesel fuel in large generators which provide electrical power to the Daphne Wastewater Treatment Plant saving the Utility about \$500 per day in electrical costs.

**Creative Marketing** - The Utility has also found a highly creative use for the glycerin byproduct of the biodiesel process. Colorful hand soaps are made from this glycerin which serve as a cornerstone of customer education efforts in the community. Handed out by the hundreds in schools and at public events, these soaps effectively remind people to make use of the Oil Recycling Program. The impact of this soap-making process is hard to overestimate! It has proven to be a key "door opener" to a wide variety of groups that would not normally be inclined to stop and talk to a utility worker about oil recycling. While some see the glycerin as a by-product to be disposed of, Daphne Utilities recycles it heavily into its advertising and marketing of these programs and initiatives.

**The Costs** - Utility operations are not usually known as a haven of creativity or originality yet, with this innovative new program, Daphne has found a way to connect with its residents, lead the way in an important environmental cause and not "break the bank" doing so. The costs of starting such a program are minimal.

**Oil and Grease Recycling** - For a community populace of 15,000 – 25,000, a city can start a very effective program with only 15-20 stations located primarily near food stores and gas stations. Start-up costs for recycling bins (see picture) is about \$3,000. Oil recycling jugs

(see picture) total about \$600 for an initial bulk lot of 500. Labor will vary but pick-ups once or twice a week should be a minimum and total less than \$750/month.

**Biodiesel Plant** – The science behind this process is very simple and package biodiesel plants can be either be purchased online for \$3,000-\$5,000 or assembled from scavenged parts for less. The best “raw material” is clean yellow grease (waste grease from oriental restaurants is almost always of high quality for this purpose). Fuel production is a “batch process” running over about 3 days and is mainly limited by the amount of feedstock (used oil) available from the Oil Recycling Program.

**Glycerin Uses** – Glycerin is normally addressed as a waste by-product of biodiesel production and amounts to about 10% of the total batch size (making 1,000 gallons of fuel yields about 100 gallons of glycerin). This material can be composted and is not hazardous. It can also be cleaned and used in soap making which forms the basis of Daphne’s recycling public education program. This product is a great way to hook kids on recycling that they grow up with it as a normal part of their life.

**Making a Difference** – To date, Daphne has seen numerous “trickle down” benefits not only to the Utility operations, but to the City as a whole and even the State! As word spreads of the program, participation increases resulting donations of even more oil for recycling which in turn leads to further reductions in sewer spills. As biodiesel production increases, demand for used oil rises prompting the Utility to broaden recycling education further. In a spirit of cooperation Daphne hopes will flourish, the City seeks to share their recipe for success with other communities wishing to start their own “green” initiatives so as to answer questions and reduce risk to those new in the field. Utility companies from several cities around the state have inquired, studied and are adopting the Daphne model including those from Mobile, Bay Minette, Hoover, Brookside and others. Working together, the cities of Alabama can realize significant advances in this arena, save themselves money and serve as an example to the entire region. We’re proving that “making a difference” is not that scary, expensive or risky!

Photographs included on attached Disc –



Daphne Utilities Biodiesel Plant



Glycerin Soap made from used cooking oil (byproduct of biodiesel production)



Oil Recycling Station & container