ABSTRACT

AN INTERNSHIP WITH THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY PACIFIC SOUTHWEST REGION WASTE MANAGEMENT DIVISION

By: Laurel Hricik

This paper details various projects conducted at the United States Environmental Protection Agency Pacific Southwest Office located in San Francisco, California from June 2006 through December 2006. During this six-month internship, my primary role involved creating the EPA’s first regional biodiesel website and actively participating in the creation of a partnership between EPA Region 9 and the University of California. This report details my experiences, the information associated with them, as well as my reflections on my internship.
INTERNSHIP WITH THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
PACIFIC SOUTHWEST REGION WASTE MANAGEMENT DIVISION

An Internship Report

Submitted to the

Faculty of Miami University

in partial fulfillment of the requirements for the degree of

Master of Environmental Science

Institute of Environmental Sciences

By

Laurel Hricik

Miami University

Oxford, OH

2007

Advisor: __________________________________________

Dr. Adolph Greenberg

Reader: _________________________________________

Dr. Sandra Woy-Hazelton

Reader: _________________________________________

Robbyn Abbitt
# TABLE OF CONTENTS

## II. BACKGROUND INFORMATION

<table>
<thead>
<tr>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Careers Organization</td>
<td>1</td>
</tr>
<tr>
<td>The U.S. EPA Pacific Southwest Region 9 (Structure, Operations and Functions)</td>
<td>2</td>
</tr>
<tr>
<td>Waste Management Division</td>
<td>3</td>
</tr>
<tr>
<td>Strategic Planning and Partnerships Office</td>
<td>3</td>
</tr>
</tbody>
</table>

## III. INTERNSHIP PROJECTS: BIODIESEL

<table>
<thead>
<tr>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Background Information</td>
<td>5</td>
</tr>
<tr>
<td>Region 9’s Interest in Biodiesel</td>
<td>6</td>
</tr>
<tr>
<td>Current Biodiesel Projects</td>
<td>6</td>
</tr>
<tr>
<td>People, Prosperity and the Planet (P3) Survey</td>
<td>7</td>
</tr>
<tr>
<td>Region 9 Biodiesel Website</td>
<td>9</td>
</tr>
<tr>
<td>Western Regional Pollution Prevention Conference Presentation</td>
<td>10</td>
</tr>
<tr>
<td>University of California Office of the President Meeting</td>
<td>10</td>
</tr>
<tr>
<td>Energy Alternative Solutions, Inc. Biodiesel Plant Opening</td>
<td>11</td>
</tr>
<tr>
<td>Fiscal Year 2007 Biodiesel Targets</td>
<td>11</td>
</tr>
</tbody>
</table>

## IV. INTERNSHIP PROJECTS: DEPARTMENT OF DEFENSE

<table>
<thead>
<tr>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustainable Biodiesel Consortium-Hawaii</td>
<td>13</td>
</tr>
<tr>
<td>Guam Memorandum of Agreement</td>
<td>14</td>
</tr>
</tbody>
</table>

## V. CONCLUSION

<table>
<thead>
<tr>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relationship to IES Curriculum</td>
<td>15</td>
</tr>
<tr>
<td>Reflections</td>
<td>15</td>
</tr>
</tbody>
</table>

## APPENDIX A: UNITED STATES ENVIRONMENTAL PROTECTION AGENCY REGIONAL OFFICES

<table>
<thead>
<tr>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>...........................................................................................................</td>
<td>17</td>
</tr>
</tbody>
</table>

## APPENDIX B: UNITED STATES ENVIRONMENTAL PROTECTION AGENCY REGION 9

<table>
<thead>
<tr>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ORGANIZATIONAL STRUCTURE</td>
<td>18</td>
</tr>
</tbody>
</table>

## APPENDIX C: UNITED STATES ENVIRONMENTAL PROTECTION AGENCY REGION 9 WASTE

<table>
<thead>
<tr>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>MANAGEMENT DIVISION ORGANIZATIONAL STRUCTURE</td>
<td>19</td>
</tr>
</tbody>
</table>

## APPENDIX D: STRUCTURE AND FUNCTIONS OF THE STRATEGIC PLANNING AND

<table>
<thead>
<tr>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>PARTNERSHIPS OFFICE</td>
<td>20</td>
</tr>
</tbody>
</table>

## APPENDIX E: BIODIESEL WEBSITE BRIEFING

<table>
<thead>
<tr>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>...........................................................................................................</td>
<td>21</td>
</tr>
</tbody>
</table>

## APPENDIX F: US EPA REGION 9 BIODIESEL WEBSITE

<table>
<thead>
<tr>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>...........................................................................................................</td>
<td>26</td>
</tr>
</tbody>
</table>

## APPENDIX G: BIODIESEL WEBSITE PRESS RELEASE

<table>
<thead>
<tr>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>...........................................................................................................</td>
<td>44</td>
</tr>
</tbody>
</table>

## APPENDIX H: FISCAL YEAR 2007 BIODIESEL PROJECT PRIORITY MATRIX

<table>
<thead>
<tr>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>...........................................................................................................</td>
<td>46</td>
</tr>
</tbody>
</table>

## APPENDIX I: WESTERN REGION POLLUTION PREVENTION CONFERENCE

<table>
<thead>
<tr>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>...........................................................................................................</td>
<td>47</td>
</tr>
</tbody>
</table>

## APPENDIX J: ACRONYMS

<table>
<thead>
<tr>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>...........................................................................................................</td>
<td>53</td>
</tr>
</tbody>
</table>
Acknowledgements

I would like to thank the Institute of Environmental Sciences’ faculty and staff, particularly Dr. Adolph Greenberg, Robbyn Abbitt, and Dr. Sandi Woy-Hazleton for their guidance, advice, and time. The tools and information they provided me with helped prepare me for my internship and my career. Special thanks to Patrick Winnubst, Gina Hayes, Amy Alesch, Amy Mobley (Seitz), Brad Martin, Matt Lesher and all the other students in my class for their friendship and support during my years at Miami University.

I would also like to thank Keith Ljubi for his encouragement to apply for this internship, and his always present positive attitude and supportiveness throughout the duration of the internship.

Last but not least a thank you is deserved to my colleagues at the EPA Region 9. Thank you to my mentor, Olof Hansen for showing me the ropes and for all the biodiesel knowledge I have obtained. I feel that at the completion of my internship, I too was a mini biodiesel guru. I would also like to thank Lisa McClain-Vanderpool for her leadership and guidance on all the projects I worked on. And thank you to my boss, Patricia Norton, and all the partnership team members and staff in the Strategic Planning and Partnerships Office for making this internship so successful.
I. INTRODUCTION

As a graduate student seeking a Master of Environmental Science Degree from the Institute of Environmental Sciences at Miami University, I am obligated to complete a research requirement. This requirement is fulfilled by either completing a thesis, practicum or six-month internship.

I chose to complete an internship in order to fulfill my research requirement. I interned for the Environmental Careers Organization at the United States Environmental Protection Agency Region 9 located in San Francisco, California. I chose this internship to enhance my communication skills, learn about regional environmental issues and programs, and to gain insight on how the EPA operates and coordinates with outside organizations. The most appealing aspect of the internship was the opportunity to work with outside parties on innovative projects. The office I worked in was especially interesting in that it was non-regulatory, focusing on building voluntary partnerships and incorporating creativity into projects and planning. The communication, organizational and professional skills I gained from forming voluntary partnerships and working within a federal agency added greatly to my environmental management concentration.

The following report contains information about my internship responsibilities, projects and my reflections on the entire experience.

II. BACKGROUND INFORMATION

Environmental Careers Organization

The Environmental Careers Organization (ECO), headquartered in Boston, MA was a not-for profit organization that provided students with internship opportunities in federal agencies such as The Bureau of Land Management, EPA, U.S. Fish and Wildlife Service, U.S. Forest Service, and National Parks Service, as well as local and state governments, and various non-profits organizations. Sadly, the organization had to bring an end to its 35 years of operation due to an on-going federal investigation by the US Attorney’s Office regarding the management of ECO’s federal agreements. Having not the time or the money to legally pursue this endeavor, ECO’s board of Trustees voted to bring an end to this non-profit organization on April 27, 2007.
During my internship, ECO provided me with a contact to help me with my transition and answer any questions regarding travel, payment issues, opportunities, and any other questions. My obligations to ECO were minimal. I had to fill out the required paperwork prior to beginning my internship. At the start of my internship my direct supervisor, Patricia Norton and partnerships team leader, Lisa Mclain-Vanderpool were asked to sit down with me and discuss my expectations of the internship and what I wanted to learn. I was eager to improve on my communication skills (both interpersonal and public), improve my non-technical writing, and learn about the functions and interactions of the EPA region 9. At the completion of my internship I was again asked to fill out paperwork stating if I accomplished these objectives and could offer any suggestions.

One aspect of ECO I really enjoyed was the opportunity to travel. I was awarded a travel budget in the amount of $1500 to be used specifically for on-the-job training and to attend related conferences. I used my travel money to attend a Turning of the Tide Sustainability Conference at University of California Santa Barbara and to present at the Western Regional Pollution Prevention Network Conference in San Diego, California. Both experiences provided indispensable knowledge and up to date information on current environmental issues, which is useful to have when working for an environmental agency.

ECO also provided great networking opportunities. Every ECO intern was invited to a Leadership and Networking conference held in Washington D.C. I was unable to attend since I found out about the conference after the conference was already held. ECO also organized an ECO symposium for all interns in the state of California. This was held fairly early into my internship and was a good way to connect with other students and share internship experiences. Activities and discussions on problem solving, leadership and networking were held and we had several occasions to hold group discussions on the aforementioned topics.

The U.S. EPA Pacific Southwest Region 9 (Structure, Operations and Functions)

My ECO internship was at the United States Environmental Protections Agency, Pacific Southwest Region 9. Headquartered in San Francisco, California, Region 9 works to protect the environment and public health in the states of Arizona, California, Hawaii and Nevada, as well as 140 federally recognized tribes and U.S. trust territories in the Pacific Islands. There are field offices in Los Angeles, CA; San Diego, CA and Honolulu, HI. Region 9 is comprised of the
following divisions: Regional Administrator, Regional Counsel, Superfund, Waste Management, Water, Air, Public Affairs, Community and Ecosystems, and Policy and Management (refer to Appendix B). I worked in the Waste Management Division with Division Director Jeff Scott.

**Waste Management Division**

The Waste Management Division (WMD) administers and manages activities of the hazardous waste, solid waste, pollution prevention, and underground storage tank programs under the Resource Conservation and Recovery Act (RCRA). The WMD is comprised of the following offices: RCRA Enforcement, RCRA Corrective Action, RCRA Facilities Management, RCRA Information Management, Underground Storage Tanks, Pollution Prevention and Solid Waste and Strategic Planning and Partnerships (refer to Appendix C). Working in the WMD exposed me to RCRA and CERCLA and gave me a better understanding of the legislation and what particular programs are associated with the Acts.

**Strategic Planning and Partnerships Office**

My internship was in the Strategic Planning and Partnerships Office (SPPO) within the Waste Division. The SPPO is unique in that we were one of the only offices within the WMD that did not have any regulatory duties. The main functions of the office include managing the division finances, compiling division documents, managing State grants, and building and maintaining voluntary partnerships with other federal agencies as well as in the private sector. These programs are completely voluntary and are not forced on any other governmental sector or private company. It is a unique opportunity to be able to build partnerships with willing participants, participants that want to make a change to better their community, customers/residents, and environment. I was involved in partnerships in the areas of biodiesel use in campus transportation systems and promoting sustainable practices within the Department of Defense. Both of these partnerships will be discussed in detail as this report progresses.

During my internship there was much discussion about partnership criteria. For example, when are collaborations officially deemed partnerships, how should partnerships be selected, what are the general guidelines for establishing and announcing partnerships, etc. During many weekly meetings we discussed these parameters and finally established them at a partnerships team retreat in December. The following are the criteria the partnership team uses when evaluating potential partnerships:
1. The project addresses a significant environmental problem.
2. There is a distinct and unique role for the EPA that adds value to the resolution of the problem.
3. The project supports one or more of the Government Performance and Results Act (GPRA) goals.
4. The project has the potential to result in a significant and measurable improvement in the environment or has the potential to result in or contribute to a cultural/behavioral change.
5. The partnership will provide a model that can or will be applied regionally and/or across the whole industry.
6. The collaboration advances management’s priorities and has the support of division management.

Once it is deemed that the collaboration meets these criteria, the projects are continually evaluated and placed in one of three categories: 1) Prospective partnership, 2) Forming partnerships, or 3) Established partnerships.

Prospective Partnerships are in the researching and scoping stages, which includes activities that will influence the partner’s infrastructure and shows promise of development. Examples include the military transfer/build-up of Guam (one partnership I was involved with), establishing a national standard for recycled paint, and certain Green Venues programs.

The Forming Partnerships stage includes projects in which a relationship with a particular partner is developing. Activities include providing technical assistance and support, convening, collaborating and providing recognition of the partner’s activities. Examples of partnerships in these stages included the UC biodiesel from waste cooking oil partnership, biodiesel partnerships with publicly owned treatment works (POTW), and energy efficiency in military housing in Fort Huachuca, AZ.

Established Partnerships are projects that have a formalized partnership either through a national program, press event/release, or signed agreement with the understanding that at a minimum the results/measurements will be shared with EPA and EPA will provide recognition for the partner’s activities. Examples in this area are the National Partnership for Environmental Priorities Program (NPEP), Federal Electronics Challenge (FEC), and Coal Combustion Products Partnership (C^2P^2) (refer to Appendix D).
III. INTERNSHIP PROJECTS: BIODIESEL

Background Information

Biodiesel is an alternative fuel made from virgin vegetable oil, animal fats or used cooking oil. It is produced through a process called transesterification. The process combines oil, an alcohol (methanol or ethanol) and a catalyst (usually lye) to produce biodiesel and a by-product glycerin. Biodiesel can be used straight (B100) or blended with petroleum diesel in various percentages. For example, B20 is 20% biodiesel and 80% petroleum diesel. Depending on the quality of the glycerin, biodiesel’s by-product, it can be used in soaps and hygiene products, animal feed or composted.

Biodiesel offers many environmental, economic, quality and energy benefits. It is the only alternative fuel to pass Tier I and Tier II of the Clear Air Act Health Effects Testing requirements. In addition, biodiesel significantly reduces air pollution emissions of sulfur dioxide, particulate matter (soot), and carbon dioxide. When produced from used cooking oil, biodiesel diverts a waste from landfills and prevents costly sewer spills from clogging municipal sewer pipes. These environmental benefits in turn produce economic savings.

Biodiesel production is a costly endeavor. Nearly 75% of production costs are attributed to the raw material (feedstock) used to produce biodiesel. Most frequently used feedstocks include soybean oil, vegetable oil, or waste cooking oil. Growing crops such as soy beans specifically for fuel-related purposes increases production costs substantially. When using or purchasing waste cooking oil, production costs plummet since there are minimal costs associated with obtaining the feedstock. In addition to low production costs, biodiesel users such as vehicle fleet managers at universities, cities, etc. benefit economically since there are no costly conversions when diesel vehicles are converted to biodiesel.

A national specification for biodiesel (B100 as used as a blend) has been established by the American Society of Testing Materials (ASTM). This specification (ASTM D 6751) requires that biodiesel produced meets pre-established criteria for certain properties such as flash point, cetane number, water content, total and free glycerin, lubricity, and many more properties. This requirement protects consumers from low-grade/quality fuel and reduces the cost of buying and selling biodiesel. In addition, biodiesel produced meeting this standard offers increased lubricity and cetane number, which in turn aids in engine performance. If biodiesel does not comply with ASTM requirements, vehicle emissions and performance can be compromised.
The largest problem (although highly debated) with the use of biodiesel is the potential increase in nitrogen oxide emissions when the fuel is burned. Nitrogen oxides (NO\(_x\)) are a group of gases that form when fuel is burned at high temperatures. These gases contribute to ground-level ozone, acid rain, visibility impairment, and smog. The trend of NO\(_x\) emissions from use of biodiesel is still uncertain. Several studies show an increase in NO\(_x\) emissions, while others show a decrease. Further research is still needed on NO\(_x\) emissions from engines burning biodiesel. The EPA recognizes this issue and is addressing it by providing funds for additional research.

**Region 9's Interest in Biodiesel**

The Waste Management Division has made efforts to promote the development and use of waste derived biodiesel. Region 9 has the worst air quality in the United States. Using biodiesel can help to reduce air particulates, sulfur oxide emissions and greenhouse gases. In addition, Region 9 has limited agricultural land to grow crops used in biodiesel production but has many urban and metropolitan areas with restaurants, hotels, and casinos that generate large amounts of waste grease.

**Current Biodiesel Projects**

Biodiesel is not a new concept; Region 9 had already been focusing attention on this topic before I began my internship. The SPPO currently manages two biodiesel grants, which are funded by the Office of Solid Waste and Emergency Response (OSWER). The first OSWER Innovations Workgroup Grant (IWG) was awarded to the University of Nevada, Reno (UNR) to address the issue of nitrogen oxide emission increases, and also evaluate and address the high production costs associated with the production of biodiesel. UNR has developed a computer-controlled continuous production unit. This unit produces larger amounts of biodiesel at lower temperatures, uses less energy, with more economic and time savings when compared to the traditional batch process. UNR is attempting to reduce the nitrogen content of the used cooking oil before biodiesel production in hopes that the reduced nitrogen content will reduce nitrogen oxide emissions.

The second 2006 IWG grant was awarded to Ecology Action, a non-profit organization located in Santa Cruz, CA. This project aims to create a local sustainable biodiesel market by using the waste grease produced from local restaurants to produce a fuel supply available to the
area’s residents. Midway through the project, Ecology Action has finished a survey on the waste grease generated by the local restaurants.

**People, Prosperity and the Planet (P3) Survey**

In recent years, there has been an increasing interest in biodiesel, especially in Region 9. My manager, Patricia Norton along with co-worker, Olof Hansen were interested in biodiesel and exploring the idea of creating a biodiesel partnership. One area that came to mind was universities and what research and projects were being done across the country to explore this alternative fuel. Both my manager and co-worker wanted me to research the People, Prosperity and the Planet (P3) competition. The P3 competition is an EPA program that encourages college students to research and design projects pertaining to a sustainability issue of their choice. With direction from my manager, I began researching and contacting the winners of the People, Prosperity and the Planet competition to learn about their experiences in a campus-driven biodiesel project. The four universities I examined were Oberlin College, Middlebury College, Oregon State University, and Pennsylvania State University.

Middlebury College investigated the chemical, economic, and geographic feasibility in producing waste-based biodiesel on campus. The waste grease was collected from the local community and from the college cafeteria. Biodiesel was produced using waste grease and methanol derived from bacteria. This biodiesel was tested in campus diesel vehicles and home furnaces, and the effectiveness of the biodiesel was measured in BTU production and air emissions.

Oberlin College also relied on the local community for efforts in their research, but in a much larger scale. Oberlin College not only collected the waste grease from local restaurants, but also relied on students and local residents to supply the energy needed to produce the biodiesel. Oberlin’s goal was to have an off the grid biodiesel production facility. They did this by engineering a small production facility powered by a bicycle. The students and residents took turns peddling to produce the fuel. This provided an affordable fuel available to the local community, however in a very small amount.

Oregon State University built a small on campus biodiesel production facility and ran it on waste grease. The students found difficulties in securing the necessary building permits and administrative approval in building this facility. After interviewing local farmers, the students
were disappointed to learn, that a regional biodiesel network would not be feasible since the choice biodiesel production crop would interfere with the current production crop.

Pennsylvania State University is a very large agricultural school. The engineering students at PSU wanted to produce ASTM-compliant fuel to use in the Farm Operations Group tractors. Waste grease from the campus dining halls and local restaurants was collected and used in the chemical engineering labs to produce biodiesel. The goal was to give the engineering students hands-on experience and to supply the school’s 100 tractors with fuel.

Common to all the P3 projects, was the desire to use a cheap feedstock—waste grease from campus eateries and/or local restaurants. All projects worked closely with the community in generating feedback, supplying biodiesel or obtaining feedstock (waste grease). To investigate the programs more closely, I constructed a questionnaire that was partially catered to each university’s project, but also included common questions (i.e. what were the obstacles, successes/failures, level of community involvement etc.). I e-mailed the questionnaire to the appropriate contact person(s), but received little to no response. As a secondary approach, I decided to call each contact to further explore the projects. Once contacted, most project spokespersons were eager to talk about their projects and the subject of waste-derived biodiesel. From the information obtained from these discussions, I concluded some basic benefits and problems common to all four of the projects. All of these projects were beneficial educationally (both academically and for the communities involved), financially (student run, inexpensive feedstock), and environmentally friendly. However, there were some drawbacks to the projects. All of the universities found it quite difficult to comply with the ASTM standards for biodiesel. For example, non-compliant ASTM biodiesel can clog filters and lines, and is more susceptible to bacterial colonization. Most universities found it hard to obtain enough waste grease to produce the amount of biodiesel to meet their predicted future needs. Although all projects were in the pilot stage, they found that securing the adequate permits and certifications needed to produce biodiesel on campus were major hurdles in creating a large-scale biodiesel facility. The information I gained by examining these projects and the contacts I made in researching these projects was extremely beneficial in introducing me to the biodiesel industry, but also this information and these contacts would be even more beneficial later on in my internship (see University of California Office of the President Meeting).
**Region 9 Biodiesel Website**

I began working on the Waste Management Division’s biodiesel website in July 2006. Prior to my involvement, SPPO and the Office of Public Affairs (OPA) met to discuss the possibility of creating a regional biodiesel website and loosely discussed its structure and purpose. Since the biodiesel website was a WMD project, the website would focus on waste derived biodiesel. I met with co-workers to discuss organization and began compiling interesting EPA and regional biodiesel stories. My primary tasks were to research stories, write the stories, and to update and edit the content of the website. I also gathered graphics for the website and gained permission for their use.

I met regularly with Olof Hansen to edit, review, and discuss the importance of each story and its placement. After the SPPO was satisfied with each story, I would send the stories to OPA and there a contractor would put the stories into EPA’s website template. We met on several occasions with OPA to discuss the design and usability of the website.

The website highlights regional and EPA biodiesel activities, provides information on the benefits and challenges of using and producing waste derived biodiesel, and contains an informative question and answer section. In addition, the site offers information on funding opportunities, particularly grants, and includes links to related biodiesel websites, scientific reports, and current statutes and regulations. There is also a link to a unique feature which allows the user to look up near-by biodiesel fueling locations (refer to Appendix F).

After I was finished constructing the website, I met with the Waste Management Division Director, Deputy Division Director, Associate Director, and my direct supervisor to brief them on the contents of the website, its importance and relevance to the public and the EPA (refer to Appendix E). The briefing went well and my superiors offered feedback and support. After the website was approved by both the Air and Waste Management Divisions, it was sent to EPA headquarters for final approval.

The final step was launching the WMD biodiesel website. Region 9 EPA requires that the launch of a website be tied to a larger related event in order to gain more publicity and website hits. This standard became a hurdle for my section and the launch of the website. After several attempts of trying to tie the website to grantee research results (UNR and Ecology Action), Air Division grants, and writing Press Releases (refer to Appendix G); the announcement of the website was made at the opening of Energy Alternative Solutions, Inc.’s biodiesel production
facility in Gonzales, CA. The website will also be highlighted in two West Coast Collaborative grant announcements set to be released in January. All organizations involved in the creation of the website were notified and many provided a link to the EPA website, organizations included Pacific Biodiesel and the University of California Office of the President. During the site’s first five days, the website generated 515 hits! The site will help to inform the general public and biodiesel users, and will continue to provide updates on regional biodiesel success stories.

**Western Regional Pollution Prevention Conference Presentation**

My mentor, Olof Hansen, widely known for his expertise in the area of waste derived biodiesel, was invited to present at the Western Regional Pollution Prevention Conference in San Diego, CA. He was unable to attend, but referred the conference coordinator to me. I gladly accepted the invitation and presented on the topic of waste derived biodiesel, and EPA WMD’s involvement. I opened up by giving brief details on Region 9, the importance of using biodiesel, benefits and challenges, provided updates on EPA grantees (Ecology Action and University of Nevada at Reno), and conclude with a glimpse into fiscal year 2007 biodiesel project foci (refer to Appendix I).

**University of California Office of the President Meeting**

On December 6, 2006, University of California (UC) fleet managers and associated personnel from all twelve of the satellite campuses, US EPA region 9, and other biodiesel users and experts met to discuss and explore the possibilities of using/producing biodiesel within the UC system. I was surprised to hear that some of the UC campuses were already using, or have experimented with biodiesel. The San Diego campus which runs 44 buses on B2 had experienced minor problems such as clogged filters. Fleet managers and other participants shared their experiences, problems, questions and concerns with each other. This fostered an environment of problem solving and trouble shooting. Olof Hansen expressed Region 9 WMD’s interest in partnering with the University of California system. He shared updates on UNR and Ecology Action’s waste-derived biodiesel programs, and offered SPPO’s technical assistance in providing information and networking. I shared with the group the experiences (triumphs and tribulations) of the P3 awardees. Many fleet managers and participants seemed eager to learn about other university’s biodiesel production and transportation programs. I provided contact information after the meeting to the interested parties in hopes that the universities could benefit from one
another’s experiences and knowledge. In general, I feel that the meeting was a productive and much needed information gathering and sharing event, as well as an excellent networking experience; a feeling that I am sure was echoed by all the participants.

**Energy Alternative Solutions, Inc. Biodiesel Plant Opening**

During my internship I had the opportunity to attend the opening of the first biodiesel production facility along the central coast in California. The plant was built by Energy Alternative Solutions, Inc. The 10,000 square foot plant is estimated to produce 2.5 million gallons of biodiesel each year, from predominately virgin soy beans but also waste grease. The plant was designed by industry pioneers, Bob and Kelly King of Pacific Biodiesel from Maui, HI. Currently, there are only three biodiesel plants in the state of California, but EASI plans to open an additional seven plants within the next few years, bringing production up to 25 million gallons annually.

My supervisor, Patricia Norton spoke at the opening festivities and also promoted Region 9’s biodiesel website. I had the chance to meet the President and Chief Executive Officer, Richard Gillis, as well as Bob and Kelly King. Mr. Gillis mentioned that there was interest in pursuing biodiesel production crops using innovative production sources such as algae and exotic plant species. Overall, this was an amazing opportunity to meet with entrepreneurs in the biodiesel field and to see first hand a biodiesel production facility.

**Fiscal Year 2007 Biodiesel Targets**

To prepare for the following fiscal year, myself, Olof Hansen and a co-worker from the air division met regularly to discuss and explore potential biodiesel partnerships. During one of the first meetings, we made a list of all the potential biodiesel partnerships. I compiled the candidates into a priority matrix (refer to Appendix H) to better focus our efforts on the most promising projects. The potential partnerships where rated on a scale of 1(unlikely) to 5(most likely) on the following criteria: likelihood of quick results, biggest bang for the buck, use of waste grease, sustainability, West Coast Collaborative approval, WMD approval, likelihood of success, transferability, and likelihood of Region 10 incorporation. I provided a summary sheet of the biodiesel projects to WMD co-workers and asked them to rate the potential projects. After I received the completed matrices, I averaged the scores and ranked the projects. One of the most highly rated projects was collecting the waste grease trapped in Publicly Owned Treatment
Works (POTW) and producing biodiesel to run the city’s diesel fleet. The development of the priority matrix and rating/ranking of potential projects stemmed from the Methodology class offered at IES. I feel this carry-over of knowledge from classroom to boardroom was a useful tool to focus the team’s attention and efforts on projects with the highest potential and was well received by co-workers and management.

IV. INTERNSHIP PROJECTS: DEPARTMENT OF DEFENSE

Throughout the year upper management within the EPA Region 9 had expressed an interest in partnering with the Department of Defense (DoD) to promote and encourage sustainability, not only between federal government agencies, but also within the surrounding communities. This agenda was communicated to my office, and we responded by creating what we called, the “Greening DoD” team. To generate some ideas on sustainability issues facing the DoD, myself, as well as a couple of co-workers held an internal interdepartmental meeting. Many departments within Region 9 had worked with the DoD on previous projects, and had contacts. Ideas that were generated during the meeting included biodiesel production and use on naval carriers and bases, promoting and/or creating an energy efficiency rating system for on-base residential housing, and lobbying for a sustainable build-up/military transfer on Guam from the former military base located in Okinawa, Japan.

We used the next couple of months to further explore the ideas generated by our colleagues at the internal meeting. We generated contacts, explored existing and potential DoD sustainability projects, and met and communicated with appropriate DoD officials.

The first significant conference call was with the DoD Service Representatives on September 14, 2006. This was a quarterly meeting with the environmental service representatives from the U.S. Army, Marines, Air Force, Navy and EPA. My team members and I were invited to this meeting to present our DoD sustainability proposal. During the meeting we explained that we were looking for three to four DoD facilities who were interested in developing sustainability partnerships with Region 9. We explained how environmental stewardship can support a facility’s mission and contribute to meeting the government’s sustainability principles, as well as improve a facility’s image, and improve the relationship between the military base and the surrounding community. We explained specific benefits and EPA program vehicles to help achieve sustainability on bases (e.g. biodiesel use and production, green venues, use of recycled
This conference call was a necessary first step in introducing our ideas and goals to the DoD and creating an open dialogue with the DoD.

The scoping portion of developing a partnership was the longest and most tedious part of the process. For the months of October and November we explored our leads and options with different bases. Through talking with our contacts, we found that the US Army had taken the lead in sustainability initiatives within the DoD. We spoke with Kevin Palmer of the Army Sustainability Initiative, and he described the process for incorporating sustainability practices into the long-term plan of a base. He told us that the key to making sustainability a primary goal on base is to get the Commander’s support. He mentioned that the Commander of the Schofield base in Hawaii was beginning the process to incorporate sustainability into the base’s mission and suggested we participate in the sustainability discussions and planning.

**Sustainable Biodiesel Consortium- Hawaii**

After holding many internal meetings, SPPO decided to focus on sustainability projects in Hawaii. Our contact from Port Hueneme Naval Base, Gary Gasperino, headed the Hawaii Sustainability Initiative, which is a collaboration of Army officials with the goal of incorporating sustainability practices into army bases within the state of Hawaii. We provided Gary a proposal for the quarterly Hawaii Sustainability meeting. The proposal outlined how EPA Region 9 can contribute to and be an asset in Hawaii’s sustainability efforts. Unfortunately, the proposal did not get reviewed due to time constraints and delays.

Conference calls with Kelly King, co-founder of the sole biodiesel production facility in the state of Hawaii, mentioned that convening interested parties into a sustainable biodiesel/biofuels consortium for the state of Hawaii might best suit our goals. After discussing this idea with the SPPO manager, we felt that this was the best partnership to pursue and began to focus our DoD sustainability efforts on this endeavor. On December 6, 2006 myself and a couple of colleagues met with Kelly King (co-founder of Pacific Biodiesel), Annie Nelson, Daryl Hannah, and others to discuss the sustainable biodiesel (biofuels) consortium. The purpose of this consortium was to bring together interested parties, hold meetings, and to create a rating system for sustainable biodiesel/biofuels for the state of Hawaii, with the eventual incorporation of other Pacific Islands. We brainstormed criteria to incorporate into the rating system. The criteria were divided into three categories, which included production, supply, and
transportation. Production criteria included using a renewable power source, recycling water during the production process, use of ethanol instead of methanol, no off gassing, cradle to cradle process, and beneficial use of glycerin. Sustainable supply criteria included the use of waste cooking oil, brown grease from POTW’s, locally-grown and native fuel crops. Transporting the biodiesel can use massive amounts of diesel fuel and create large amounts of air emissions. The transportation criteria would include creating a local network which produces the biodiesel locally and distributes the biodiesel to the surrounding community. We also discussed ideas for a catchy name for consortium and searched for a World Wide Web address.

**Guam Memorandum of Agreement**

In a related project, I began sitting in on the Guam Environmental Forum conference calls. During these calls we collaborated with the government of Guam, Guam EPA, and the DoD in writing a Memorandum of Agreement (MoA). In this agreement, the DoD would agree to implement certain specified sustainable practices during the build-up and would specifically incorporate green building/design (Leadership in Energy and Environmental Design certification) and alternative fuels into the operation of the base. The MoA also outlined the Government of Guam and EPA’s roles and responsibilities. Additionally, the MoA outlined the legal drivers (i.e. Executive Orders 13148, 13101, 13123, 13149, EPAct) that supported long-term sustainability on military bases.

The MoA was in the drafting phase at the completion of my internship. The initial goal was to have a final ready for signing for the U.S. Air Force, Navy, Government of Guam and EPA Region 9 to sign on November 30, 2006, but the project was postponed due for fear that the U.S. military felt too pressured and would not sign the MoA. The EPA Region 9 felt it was best not to press forward until we could persuade and convince the DoD that the MoA would be beneficial for the long-term plans of the base and not an additional burden or expense during the initial construction. This project was an important focus for Region 9 since this military build-up could have potentially devastating impacts on the small and delicate ecosystem of Guam.
V. CONCLUSION

Relationship to IES Curriculum

Many times during my internship experience I reflected on how IES’ curriculum has helped prepare me to face the challenges of the working world. I also drew parallels in the methods taught at IES to methods used within the EPA. One striking similarity was the creation of goals and objectives and the importance of a measurable outcome. The Division Operating Plan (DOP) is one tool that Region 9 used to create goals and meet objectives (part of the Government Performance and Results Act). Each Division, Organization/Group, and person are required to write down their goals and objectives for the following year and to keep track of their progress in meeting those goals. The DOP is then published and distributed to all employees, and is tool that the Regional Administrator uses to measure success. The Regional Administrator, Wayne Nastri stressed the importance of measurable results. Every project or partnership undertaken within any department in Region 9 had to outline how the success of the project would be measured.

In the SPPO we used a technique of webbing or thought mapping to help us examine a problem or potential partnership. We would first define our problem and put that in the center. We would then map out possible solutions to that problem, putting the solutions in bubbles outstretching from the center problem bubble. This thought map/brainstorming technique was also employed for our desired end result. We brainstormed with our fellow team members the different tasks needed to obtain the desired outcome. Risks and possible problems that may arise during the course of the project were also thought mapped and used to create a contingency plan in order to minimize the potential problem. In summation, practically every unit of the problem solving technique taught at IES had its own thought map/web.

Reflections

At the beginning of my internship I was asked to think about what I wanted to accomplish during my six months at ECO/US EPA Region 9. My answer was to improve upon my interpersonal skills, public speaking skills, writing skills, and to see first hand how a federal government agency works. My interpersonal skills improved through weekly meetings and networking, while my public speaking skills flourished at the WRPPN conference. I excelled at non-technical writing through writing the regional biodiesel website. Lastly, I got an insiders
view on the bureaucracy associated with a federal government agency and how that agency interacts with and relays information to state governments and to the public.

Overall, this internship was a learning experience which allowed me to grow both personally and professionally. Having the opportunity to do an internship as a part of my curriculum was extremely beneficial to my career placement, and hopefully beneficial in my advancement. Interning at a regional EPA office or at a federal government agency carries a lot of weight and is an impressive element to be able to put on a resume. I strongly believe that if it was not for this internship experience, I would not have been able to secure a position at my current place of employment.
APPENDIX A:
United States Environmental Protection Agency Regional Offices
APPENDIX B:
United States Environmental Protection Agency
Region 9 Organizational Structure
APPENDIX C:
United States Environmental Protection Agency Region 9 Waste Management Division
Organizational Structure

Region 9 Waste Management Division

Jeff Scott
Director

Steven Barhite
Deputy Director

Associate Director
Rich Vaille
Compliance
USTs
Tribes
CA & HI State Lead

Associate Director
Arlene Kabei
Corrective Action
Permits
Infra. Mgmt.
Brownfields

Associate Director
Dave Jones
P2
Solid Waste
Strategic Planning & Budget
NV & AZ State Lead
Mexico Border
EJ

RCRA
Enforcement
Office
Loren Henning
Underground Storage Tanks
Program Office
Steve Linder
RCRA Corrective Action Office
Steve Armann
RCRA Facilities Management Office
Bob Fitzgerald
RCRA Information Management Office
Kevin Wong
Pollution Prevention & Solid Waste
Eileen Sheehan
Strategic Planning & Partnership Office
Patricia Norton
### APPENDIX D:
Structure and Functions of the Strategic Planning and Partnerships Office

<table>
<thead>
<tr>
<th>Team</th>
<th>Resources &amp; Planning Team</th>
<th>State Programs Team</th>
<th>Partnerships Team</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Members</strong></td>
<td>Wenona, Martha, Jennifer, Maureen, Jeffrey</td>
<td>Rebecca, Marc, Jennifer, Zac</td>
<td>Lisa, Olof, Elise, Marc, Zac</td>
</tr>
<tr>
<td><strong>Meeting Time</strong></td>
<td>3rd Thursday 9-10 am</td>
<td>Every other Wednesday, 9:30-11 am</td>
<td>Tuesdays 10-10:30 am</td>
</tr>
<tr>
<td><strong>Functions</strong></td>
<td>Budget, Planning &amp; Accounting</td>
<td>Monthly Associate Director</td>
<td>Research and Develop New</td>
</tr>
<tr>
<td></td>
<td>Contracts, Approve Invoices, Monitor WAMs,</td>
<td>State Calls</td>
<td>Innovative Partnerships</td>
</tr>
<tr>
<td></td>
<td>New Assignments</td>
<td>Quarterly Division Director</td>
<td>(Waste Min, P2, Recycling)</td>
</tr>
<tr>
<td></td>
<td>DOP End of Year Report</td>
<td>Annual All States RCRA Forum</td>
<td>FY06 Major Partnerships:</td>
</tr>
<tr>
<td></td>
<td>Monthly DD Progress Reports</td>
<td>Lake Tahoe</td>
<td>Mercury (NV Gold Mines, Dental)</td>
</tr>
<tr>
<td></td>
<td>Managers Weekly Project Tracking</td>
<td>Annual Grant Awards - Division</td>
<td>Biodiesel from Waste Vegetable</td>
</tr>
<tr>
<td></td>
<td>Chart and Meeting Agenda</td>
<td>Planning Meeting, Issue Guidance,</td>
<td>Oil</td>
</tr>
<tr>
<td></td>
<td>Process HR Actions</td>
<td>Approve Workplan, FR/CN (2/yr)</td>
<td>Greening Large Venues</td>
</tr>
<tr>
<td></td>
<td>Track FTE Utilization</td>
<td>Post Award Monitoring, End of Year</td>
<td>Greening DOD (Biodiesel, Green</td>
</tr>
<tr>
<td></td>
<td>Travel Manager</td>
<td>Site Visits/Evaluations</td>
<td>Bullet, Energy Conservation)</td>
</tr>
<tr>
<td></td>
<td>Acquisitions/Credit Card</td>
<td>Liaison Coordination - Enforcement,</td>
<td>E-waste Recycling</td>
</tr>
<tr>
<td></td>
<td>New Employee Setup</td>
<td>Permits, P2, Corrective Action,</td>
<td>Beneficial Reuse of Coal Ash</td>
</tr>
<tr>
<td></td>
<td>Databases - Resources, Grants, HQ Commitments</td>
<td>Tanks, Brownfields, Data</td>
<td>and Foundry Sand</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Division GIG Representative</td>
<td>NPEP Priority Chemical Reductions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Monitor Compliance with EPA</td>
<td>(Lead, Solvents)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Grants Requirements</td>
<td>National Paint Recycling Project</td>
</tr>
<tr>
<td></td>
<td></td>
<td>and Audits</td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX E: Biodeisel Website Briefing

Briefing for Jeff Scott
Region 9 Biodiesel Website
August 14, 2006

Purpose
To inform the Division Director of past work, current progress and to get feedback on the EPA Region 9 biodiesel website.

Contact: Laurel Hricik (415) 972-3389

Summary of Biodiesel Website
The Region 9 biodiesel website is designed for the average person with little to no knowledge of biodiesel. It introduces the reader to biodiesel, its uses, production methods, benefits and concerns. The site highlights specific biodiesel activities and stories in all our region’s states including one tribal community. For a user who would like to become more familiar with biodiesel, the site offers additional resources and biodiesel funding information.

Outline of Website (linked from Region 9 homepage, waste homepage, and recycling and solid waste web pages under quick finder)
- Homepage
- Learn About Biodiesel
- Benefits and Concerns
- Biodiesel Activities
- Funding Information
- Biodiesel Resources

Why is the project important?
- The website will be linked to specific press releases of biodiesel grants in September.
- The website describes Region 9’s biodiesel activities.
- It creates the first EPA comprehensive portal to biodiesel information.
- It increases the visibility of the waste management division’s biodiesel activities.

What results do we expect and how will we measure them?
The overall goal of the website is to increase the general public’s knowledge of biodiesel. This can be measured by keeping track of:
- Website hits
- E-mails
- Phone calls
APPENDIX E: Biodeisel Website Briefing Continued

Past WMD biodiesel website activities
- In the fall 2005, ECO intern Betty Seto collaborated on the development of the Federal Network for Sustainability’s (FNS) website- the Biodiesel “Wizard” web manual.
- The Office of Strategic Planning and Partnerships proposed the creation of a biodiesel website (linking to the “Wizard”) to Office of Public Affairs in April 2006.
- We held ongoing meetings with the Office of Public Affairs to discuss website development.
- We researched biodiesel activities in Region 9 and made appropriate contacts to obtain current information on these biodiesel activities.
- We compiled numerous documents, graphs, figures, photos, and tables for use on the R9 biodiesel website.
- We wrote most of the website content.

What are the public relations opportunities for the project?
- Three West Coast Collaborative biodiesel grant announcements will come out in September, 2006. These announcements will generate the interest of the local media. The website launch will be tied to these events in an effort to provide more information on EPA R9 biodiesel activities to reporters and general public.
- We will continue to promote the website periodically in connection with press events related to other WMD projects such as the UN-R research project and the Santa Cruz waste to fuel project.
- The website will be used as an easy reference for recruiting and educating other potential waste to fuel partners.

Resources to date devoted to biodiesel website
Approximately 160 ECO intern hours have been devoted to developing the website. The Office of Public Affairs has two summer interns and one contractor working on the website.

Future steps
- General maintenance twice/year
- Updating, creating and removing outdated stories
- Promoting website
- Linking other resources to the R9 biodiesel website
APPENDIX F: US EPA Region 9
Biodiesel Website: Homepage

http://www.epa.gov/region09/waste/biodiesel/
Learn About Biodiesel

On this page:

- What is biodiesel?
- Why is Region 9 interested in biodiesel?
- Are there any air quality benefits to using biodiesel?
- Is biodiesel toxic?
- How much waste cooking oil is out there?
- What are the current waste disposal methods for used cooking oil?
- Does biodiesel cost more than other fuels?
- Is biodiesel the same thing as straight vegetable oil?
- Can I put biodiesel in my diesel car?

What is biodiesel?

Biodiesel is an alternative fuel made from virgin vegetable oil or used vegetable oil. Even animal fats like beef tallow and fish oil can be used to make biodiesel fuel. Unlike fossil fuels, biodiesel is renewable and can be made domestically. Biodiesel may be blended with conventional diesel to get different blends such as B2 (2% biodiesel and 98% conventional diesel) or B20 (20% biodiesel) or it can be used as 100% biodiesel (B100).

Why is Region 9 interested in biodiesel?

Biodiesel is cleaner-burning than petroleum diesel. It reduces the emission of harmful air pollutants—in particular asthma-causing soot. Furthermore, when used cooking oil is recycled to produce biodiesel, billions of gallons of waste grease can be diverted from landfills and municipal water pipes, improving the quality of both air and water.

Are there any air quality benefits to using biodiesel?

Yes! When compared to conventional diesel, biodiesel significantly reduces air pollution emissions of sulfur dioxide, particulate matter (soot), and carbon dioxide.

<table>
<thead>
<tr>
<th>Emissions Type</th>
<th>100% biodiesel</th>
<th>20% biodiesel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfates (SOx)</td>
<td>-100%</td>
<td>-20%</td>
</tr>
<tr>
<td>Particulate Matter (PM)</td>
<td>-50%</td>
<td>-10%</td>
</tr>
<tr>
<td>Carbon Monoxide (CO)</td>
<td>-50%</td>
<td>-10%</td>
</tr>
<tr>
<td>Nitrogen oxides (NOx)</td>
<td>+10%</td>
<td>0%</td>
</tr>
</tbody>
</table>

http://www.epa.gov/region09/waste/biodiesel/questions.html
APPENDIX F: US EPA Region 9
Biodiesel Website: Learn About Biodiesel Continued

Is biodiesel toxic?
Biodiesel is non-toxic, biodegradable and creates less air pollution than petroleum diesel. It is less toxic than table salt and biodegrades as fast as sugar. See the full news release of July 22, 2004, which includes this statement.

Why use waste cooking oil and not virgin vegetable oil?
Although both virgin oils and used cooking oils are used to make biodiesel, used cooking oil diverts waste from landfills and sewer pipes and converts it into an energy source. In metropolitan areas where restaurants, cafes, and cafeterias are abundant, waste cooking oil can be harvested from restaurants as an “urban crop” instead of using virgin soybean oil.

How much waste cooking oil is out there?
Large amounts! Hotels and restaurants in the United States generate 3 billion gallons of waste cooking oil per year. This amount could fill tanker trucks arranged bumper-to-bumper from San Francisco to Washington D.C. and back!

What are the current waste disposal methods for used cooking oil?
Currently, some restaurants are required to collect the grease in traps and pay to have it hauled off by a renderer. Some of the grease is used to supplement feed for farms; however, a lot ends up in landfills. Where grease traps are not required, restaurants and cafes may dump their used cooking oil down the drain where it often causes build-ups and blockages in municipal sewer pipes.

http://www.epa.gov/region09/waste/biodiesel/questions.html
APPENDIX F: US EPA Region 9
Biodiesel Website: Learn About Biodiesel Continued

Does biodiesel cost more than other fuels?
Although biodiesel costs more than petroleum diesel in some places, the price gap continues to narrow. The price falls considerably when waste cooking oil is used, since 75% of the price of biodiesel comes from the oil feedstock. If waste cooking oil is used, this economic advantage can be moved to the price of the fuel at the pump.

Is biodiesel the same thing as straight vegetable oil?
No. Biodiesel is made through a process called transesterification where vegetable oil is combined with an alcohol and a catalyst (lye) to create biodiesel and glycerol.

Can I put biodiesel in my diesel-run car?
Yes! Any diesel car may be run on biodiesel with little to no modifications. Adjustments may include:

* Rubber hose and gasket replacement. In older cars (15 years or older) rubber gaskets and hoses will need to be replaced, as biodiesel has a tendency to degrade rubber.
* Replacement of fuel filters. When biodiesel is first used an increase in deposits within the engine system may occur, so more frequent replacement of fuel filters may be necessary.

Find an alternative fueling station location near you:
* U.S. Department of Energy's Alternative Fuel Station Locator
* National Biodiesel Board's Retail Fueling Site
* Biodiesel Hotline to find retail availability anywhere in the United States
  1-866-BIODIESEL (246-3437) — staffed 24 hours a day, 7 days a week

http://www.epa.gov/region09/waste/biodiesel/questions.html
APPENDIX F: US EPA Region 9
Biodiesel Website: Benefits of Biodiesel

http://www.epa.gov/region09/waste/biodiesel/benefits.html
APPENDIX F: US EPA Region 9
Biodiesel Website: Benefits of Biodiesel Continued

Economics

- Diesel fleets do not require costly conversion methods or technologies to switch from petroleum diesel to biodiesel unless the existing equipment is older than 15 years.
- The BRS runs a tax credit program with a subsidy of 50 cents to $1 per gallon of biodiesel produced.
- The Department of Agriculture and the Congressional Budget Office have stated that biodiesel is the cheapest alternative fuel for meeting the Energy Policy Act (EPAct) requirements.

“Biodiesel is one of our nation’s most promising alternative fuel sources. And by developing biodiesel, you’re making this country less dependent on foreign sources of oil.” - President George W. Bush remarks at Virginia Biodiesel Refinery May, 2005

Concerns

Quality and Performance

If biodiesel is to be sold in the US, it has to meet quality and performance standards of many agencies and organizations.

- EPA approved biodiesel as an alternative fuel and a fuel additive.
- Biodiesel meets most diesel standards established by the California Air Resources Board.
- Biodiesel offers increased lubricity, high cetane and high oxygen content, which helps with performance and extends the life of engines.
- The National Biodiesel Board established a quality assurance program entitled BQ-9000 to monitor the quality of biodiesel in response to differing fuel qualities offered on the market.

Nitrogen Oxide Emissions

Nitrogen oxides (NOx) are a group of gases that form when fuel is burned at high temperatures. These gases contribute to ground-level ozone, acid rain, and visibility impairment. Over half of human made NOx emissions come from fuel combustion in motor vehicles.

The trend of NOx emissions from use of biodiesel is still uncertain. Several studies show an increase in NOx emissions, while others show a decrease. Further research is still needed on NOx emissions from engines burning biodiesel.

EPA has funded several projects to address the NOx emissions. In the "Fields to Fuel" San Joaquin Valley Biodiesel Project, the grantee will test a NOx reduction additive in real world applications on the farm. In another project, the University of Nevada at Reno (UNR) focuses on removing nitrogen before fuel production and will build a large-scale mobile continuous processing unit to lower costs of biodiesel.

http://www.epa.gov/region09/waste/biodiesel/benefits.html
APPENDIX F: US EPA Region 9
Biodiesel Website: Funding Information

Funding Information

On this page:

- Where are grants available?
- EPA grants
- Other grants
- Tips for writing grants

Where are Grants Available?

- Grants.gov
  A centralized site for all government grants. This comprehensive website offers information about finding and applying for all federal grant programs.

EPA Grants

- Innovations Workgroup
  The Office of Solid Waste and Emergency Response (OSWER) Innovations Workgroup (IWG) selects and funds environmentally innovative pilot projects.

- Pollution Prevention Grants
  These grants offer support to states for innovative pollution prevention (P2) approaches and methodologies.

- Source Reduction Assistance
  EPA grants that provide support to source reduction/pollution prevention (P2) projects.

- Resource Conservation Fund
  Programs associated with recycling, solid waste reduction, and energy conservation are eligible for these grants.

- National Clean Diesel Campaign
  Aims to reduce the pollution emitted from diesel engines across the country.

- Clean School Bus USA
  Reduces children’s exposure to diesel exhaust and other air pollution created by diesel school buses.

- SmartWay Transport
  A voluntary partnership between EPA and the freight industry that aims to increase energy efficiency while significantly reducing air pollution and greenhouse gases.

- EPA’s Voluntary Diesel Retrofit Program
  This program reduces pollution from existing diesel vehicles and equipment by encouraging cleaner burning fuel and pollution-reducing devices.

Other Grants

- Department of Energy – Clean Cities & All Fuels
  The purpose of these grants is to decrease the nation’s dependence on petroleum in the transportation sector.

- Ludwig Family Foundation
  The Foundation supports a wide variety of organizations. Grants are provided for tangible items such as new vehicles or equipment, equipment replacement and modernization, improvements to facilities, and educational materials.

- DOE Commercial Demonstration of an Integrated Biorefinery System Grant
  The Department of Energy (DOE), Office of Energy Efficiency and Renewable Energy (EERE) announces a funding opportunity for cooperative agreements from the Office of the Biomass Program.

Tips for Writing Grants

- EPA Grant Writing Tutorial
  This site is a tutorial that walks the user through the grant writing process to produce effective more competitive grants.

- US EPA and Purdue University Grant Writing Tutorial
  This website provides examples of grants and offers a practice exercise in grant writing.

http://www.epa.gov/region09/waste/biodiesel/funding.html
APPENDIX F: US EPA Region 9
Biodiesel Website: Regional Activities

Regional Activities

Region 9 biodiesel activities range from using waste grease from casinos to powering diesel buses, fueling San Francisco fire trucks, and a Hawaiian biodiesel-fueled car rental company.

In addition, Region 9 has presented Environmental Awards for biodiesel projects.

- Arizona
- California
- Hawaii
- Nevada

Environmental Award Recipients

EPA’s Pacific Southwest Region holds an annual Environmental Awards ceremony to honor outside individuals and organizations for their commitment to the environment and public health. The ceremony is in its eighth year and is held at regional headquarters in San Francisco. Recent award winners working on biodiesel included Willie Nelson, Michael Brown and Jacques Simonelli.

- Green Technologies
  Michael Brown and Jacques Simonelli of Greengate Industries LLC (San Rafael, CA) were recognized for the company’s groundbreaking biodiesel technology that helps reduce harmful air emissions. The company currently has six plants either completed, under construction or in the planning stages for a total of nearly 25 million gallons of biodiesel produced a year.

- Willie Nelson Makes Music and Biodiesel
  Willie Nelson received the Environmental Outstanding Achievement award for opening a biodiesel (B20) retail outlet in San Diego. BioWillie premiered his fuel at Carl’s Corner truck stop in Texas and has expanded to include several nationwide pumps.

- Neil Young Tours with Biodiesel
  At the 2003 ceremony, Neil Young was recognized for using B30 in his trucks and buses on a month-long concert tour promoting his theatrical release of “Greendale.” In addition to the tour, Young helps support American farmers by running 17 other diesel vehicles on vegetable oil.

http://www.epa.gov/region09/waste/biodiesel/regactivity.html
APPENDIX F: US EPA Region 9
Biodiesel Website: Regional Activities – Arizona

Activity in Arizona

On this page:
* Gila River: From Frybread to Fuel Tank
* City of Scottsdale: On the Right Track
* Deer Valley School District: Using Biodiesel Since 1999

Gila River: From Frybread to the Fuel Tank
From Frybread to the Fuel Tank
The Gila River Indian Community in Maricopa County, AZ worked on a post consumer recycling demonstration project promoting the conversion of waste cooking oil to biodiesel from local casinos and restaurants for use on the reservation.
This project was well received by the community, local utilities, and Tribal agencies. The Tribe hopes to continue using biodiesel to fuel their fleets as a means to reduce air pollution, reduce incidences of illegal dumping, and to find a way to recycle hard-to-manage wastes.

City of Scottsdale: On the Right Track
The City of Scottsdale is a member of both the Arizona and EPA Performance Track Programs, the first municipality to join from Arizona. Both programs, which are closely coordinated, require members to commit to continuous environmental improvement. Scottsdale is demonstrating their commitment through the use of biodiesel and several other initiatives.
The City of Scottsdale began using biodiesel in 2003. One year later, the entire city fleet switched over to B20 (20% biodiesel 80% petroleum diesel). The fleet currently consists of nearly 350 diesel vehicles used by the fire, police, water, and parks and recreation departments.

More Information:
EPA Performance Track
Arizona Performance Track

Deer Valley School District: Using Biodiesel Since 1999
The Deer Valley School District in Phoenix, Arizona, began using biodiesel in 1999 following a state mandate that school districts use alternative fuel vehicles to curb air pollution. In a total fleet of 259 vehicles, 140 school buses and 5 maintenance trucks run on biodiesel. These vehicles travel 2.5 million miles annually in Deer Valley.
The buses use a B20 blend of biodiesel mixed on-site by school district staff; the other vehicles run on B100. Vehicles run on both reused oil and virgin biodiesel, depending on suppliers and availability, with no apparent differences in performance. The district also encourages surrounding school districts to use biodiesel so they can order bulk quantities at a reduced price.

A blend pilot study in Deer Valley revealed that school bus drivers noticed performance increases with biodiesel. They were baffled, however, by what they perceived as the smell of hot dogs throughout the day—apparently from biodiesel made from used cooking grease.

http://www.epa.gov/region09/waste/biodiesel/arizona.html
APPENDIX F: US EPA Region 9
Biodiesel Website: Regional Activities – California

Activity in California

On this page:
- City College of San Francisco’s Alternative Transportation Technology Initiative
- San Francisco Opens First Biodiesel Fueling Station
- First Biodiesel Pump Opens Along California’s Central Coast
- City of Berkeley: A Biodiesel Pioneer
- Port Hueneme Naval Base: Fat to Fuel on the Front Lines
- NASA Buses Run on Biodiesel
- San Joaquin Valley Biodiesel Project: Fields to Fuel
- San Francisco Sets Goals for Diesel-fueled Vehicles
- Santa Cruz: A Community Taking Action
- West Oakland Facility to Produce and Test Biodiesel

City College of San Francisco’s Alternative Transportation Technology Initiative to Promote Study of Biodiesel

On March 9, 2007, EPA awarded a $200,000 grant to City College of San Francisco to develop training programs for biodiesel producers and users. The biodiesel project will be administered as part of City College’s Alternative Transportation Technology initiative (ATTI) based at the Evans Campus. CCSF will share the new training curriculum with other ATTI centers throughout the state. San Francisco’s Department of the Environment will also be involved and will focus on improving air quality in the Southeast sector of the city.

Ultimately, the project will transform biodiesel from a “boutique” fuel into a mainstream fuel option, making it readily available throughout the Bay Area, and eventually, throughout the West Coast.

“This grant gives City College of San Francisco a unique opportunity to help jump start the use of biodiesel in the Bay Area,” said Wayne Nestri the EPA’s Administrator for the Pacific Southwest region. “Bringing biodiesel into mainstream use provides a homegrown fuel source that improves air quality and reduces the impact of waste oil to our waterways.”

Nestri joined Dr. Philip R. Day, Jr., City College Chancellor, Phyllis McGuire, Associate Vice Chancellor and Jared Blumenfeld, San Francisco Department of Environmental Services Director on a tour of City College of San Francisco’s Alternative Transportation Technology Institute automotive shop where students manufacture and test biodiesel on engines, trucks and cars.

“CCSF has a long history of developing technical skill training for existing and emerging industries” said CCSF Chancellor Dr. Philip R. Day Jr. “This ‘Bridging the Biodiesel Gap’ initiative will facilitate the introduction of biodiesel fuel to users throughout the Bay Area. Beyond this training, however, will be emission reductions, improved air quality and improved health here in Bayview-Hunters Point and other parts of the City.”

According to ATTI Director Gerald Bernstein, “Biodiesel is not merely a rural issue. The use, emissions and health impacts of petroleum-based diesel exhaust make the need for biodiesel a serious urban need. This also fits well with the initiatives by the City of San Francisco to promote the use of renewable fuels in municipal fleets.”

This project, part of the larger, West Coast Collaborative, brings in Bay Area environmental leaders and projects, including: Community Fuels, Peoples’ Fuel, BioSolar, and CytoCulture International, Inc. The team also includes the City’s environmental justice program, which focuses on the air pollution and energy concerns in Bayview-Hunters Point. City College will establish two distribution services and use biodiesel blends on eight Bay Area fleets. Additionally, City College will share the biodiesel training curriculum with other Alternative Transportation Technology Institutes state-wide. Though not a distributor, City College uses waste oil to produce and test biodiesel.

http://www.epa.gov/region09/waste/biodiesel/california.html
APPENDIX F: US EPA Region 9
Biodiesel Website: Regional Activities – California Continued

San Francisco Opens First Biodiesel Fueling Station - Trucks Running on Waste Oil from City Restaurants

On Tuesday, April 22, the U.S. EPA recognized the city of San Francisco for its biofuels initiative at the city’s first biodiesel fueling station in the Bayview-Hunter’s Point neighborhood. The station will supply commercially licensed diesel vehicles with “B20” made from converting restaurant waste grease to biodiesel.

Read full story

First Biodiesel Plant Opens along California’s Central Coast

Energy Alternative Solutions, Inc., or EASI opened a $1.3 million biodiesel production plant — the first along the Central Coast — on Dec. 1st. The 10,000 square foot plant in Gonzales will produce 2.5 million gallons of biodiesel each year. The plant was designed by industry pioneers, Bob and Kelly King of Pacific Biodiesel from Maui, HI.

"We want to create a community-based, closed-loop system in which we draw upon local renewable resources such as crops and restaurant oil to produce biofuel for the local community," said Richard Gillis, President and Chief Executive Officer of EASI.

The biodiesel industry is growing at an explosive rate. Currently, there are only three biodiesel plants in the state of California. EASI plans to open a total of seven plants within a few years, bringing production up to 25 million gallons annually.

City of Berkeley: A Biodiesel Pioneer

The city of Berkeley has long been a pioneer in environmental issues. Twenty-seven years ago the city was one of the first in the country to introduce curbside recycling. In 2003, Berkeley began paving the way for alternative fuel use by using 100% biodiesel in all city diesel vehicles. Being one of the first cities to use biodiesel, the city experienced minor quality control issues and switched to using a mixture of 20% biodiesel and 80% petroleum-based diesel (B20). The city currently runs 329 diesel vehicles on B20.

More Information:
San Francisco Chronicle article

http://www.epa.gov/region09/waste/biodiesel/california.html
APPENDIX F: US EPA Region 9
Biodiesel Website: Regional Activities – California Continued

Port Hueneme Naval Base: Fat to Fuel on the Front Lines

In 2003, the Naval Facilities Engineering Service Center of Port Hueneme in Ventura County, California partnered with Biodiesel Industries, Inc. to convert waste cooking oil generated on-site into biodiesel. The waste grease is collected from six food service facilities located on base and is processed through a 140-gallon per day biodiesel reactor, which is housed in a standard-sized truck container.

The second phase of the agreement, expected to launch in the winter of 2006, aims at replacing the pilot reactor with a portable modular unit with the capability of processing up to 3 million gallons of biodiesel per year. This innovative technology could set the model for other military facilities to follow, with the eventual goal of taking the portable unit on marine vessels overseas to aid in fuel supply.

More information:
Naval to Produce Biodiesel from Rendered Fat [ENVI DISCLAIMER]

NASA Buses Run on Biodiesel

Local city governments and military bases are not the only organizations in California using biodiesel. The National Aeronautics and Space Administration (NASA) also uses this alternative fuel. Over the span of two years, the NASA Ames Research Center located in Moffett Field has purchased over 63,000 gallons of B20 (20% biodiesel plus 80% petroleum-based diesel #2). The fuel is used in diesel-powered equipment such as generators and pumps and all diesel #2 vehicles. No changes to the engines were required for the switch from petroleum diesel to biodiesel.

More information:
Biodiesel: Fueling NASA’s Future - The Technological and Environmental Benefits of Biodiesel [ENVI DISCLAIMER]

San Joaquin Valley Biodiesel Project: Fields to Fuel

Sustainable Conservation, an independent non-profit organization, received a $100,000 grant from the EPA via the West Coast Collaborative to produce biodiesel from locally grown seed crops and test a NOx reduction additive in real world applications on the farm.

More information:
Field sheet and project announcement [PDF] (3 pages, 120 K)

Santa Cruz: A Community Taking Action

Ecology Action, a nonprofit organization based in Santa Cruz, is in the midst of piloting the first community-based biodiesel production program in the United States. This pilot will “harvest the urban crop” – restaurant grease to make biodiesel rather than using virgin oils. Ecology Action has partnered with local restaurants, biodiesel manufacturers and distributors, hauling companies, and the City of Santa Cruz’s Public Works Department to produce and use biodiesel in the City’s Fleet. Overall, the project aims to divert 100,000 gallons of waste cooking oil from landfills and benefit the local economy.

In the fall of 2005, EPA awarded Ecology Action a $75,000 Innovation Workgroup (IWG) grant. IWG grants fund creative approaches to waste minimization, energy recovery, recycling, and land revitalization that may be replicated across industries, communities, and regions.

More information:
EPA Press Release about the Santa Cruz project

San Francisco Sets Goals for Diesel-fueled Vehicles

San Francisco Mayor Gavin Newsom issued an executive directive to accelerate the rate of city-wide biodiesel use in May of 2006. The directive urges city and county departments with diesel fuel needs to begin using biodiesel as soon as possible. The mayor set an overall goal of 25% B20 use (10% biodiesel, 90% diesel) by March 2007, and 100% B20 use by the end of 2009. San Francisco has long been committed to improving air quality with its City’s Healthy Air and Smog Prevention ordinance of 1999, which instituted requirements for city fleets to purchase alternative fuel or low emissions vehicles.

The city presently uses over 8 million gallons of diesel a year. The switch to B20 translates to a 2 million gallon biodiesel demand that ultimately means cleaner air and less energy dependence for the city.

City agencies currently using biodiesel include the Department of Public Works, MUNI buses, and the San Francisco Airport and Zoo; however, leading the way is the San Francisco Fire Department. The department is embarking upon a six-month pilot project to incorporate B20 into two fire trucks, one ambulance and six engines. If the pilot project proves to be successful, the fire department has plans to expand the program to other vehicles.

With over 800 alternative fuel vehicles in the City’s Fleet and plans to further increase biodiesel use, San Francisco will become the largest U.S. city to implement such a widespread biodiesel initiative.

More information:
Environmental and Energy Study Institute [ENVI DISCLAIMER]

http://www.epa.gov/region09/waste/biodiesel/california.html
West Oakland Facility to Produce and Test Biodiesel

The East Bay Municipal Utility District (EBMUD) is currently working on a pilot biodiesel production project. Fat, oil, and grease (FOG) accumulates in the pipes and pumps of all public sewer systems. This FOG will be collected from the main wastewater treatment plant and used to produce high quality biodiesel meeting American Standard for Testing Material (ASTM) standards.

The biodiesel will power two EBMUD vehicles. The vehicles' performance and emissions will be compared to vehicles operated using California Air Resources Board (CARB) approved low sulfur diesel. During the year-long pilot, emission reductions are estimated to be 800 lbs. of hydrocarbon, 35 lbs. of particulate matter, and 32 lbs. of carbon monoxide.

If the project proves to be a success, it is likely that the pilot will lay the foundation for large-scale production of biodiesel to meet the entire EBMUD diesel demand. Increased biodiesel use could prove to be environmentally beneficial for the East Bay service area. The project is expected to be completed by March 2009.

http://www.epa.gov/region09/waste/biodiesel/california.html
APPENDIX F: US EPA Region 9
Biodiesel Website: Regional Activities – Hawaii

Activity in Hawaii

On this page:
- $100K grant awarded to Honolulu Clean Cities for biodiesel project
- Bio-Beetle
- Biodiesel Crops for a Tropical Climate
- EPA Administrator Visits

$100K grant awarded to Honolulu Clean Cities for biodiesel project

On March 13, 2007, the U.S. EPA Pacific Southwest Regional Air Division granted $100,000 in federal funding to Honolulu Clean Cities for a biodiesel project, "Biodiesel from Fuel Crops in Hawaii."

The project will explore and evaluate a number of crop materials currently grown in Hawaii to determine their suitability for producing biodiesel. The project will evaluate crop properties, feasibility of oil extraction, oil properties, biodiesel manufacturing byproducts and biodiesel manufacturing limitations.

Crop materials to be evaluated may include avocado, kukui nuts, palm oil, coconut, and castor beans. The project’s main goals are:

- Determine which crop oils are acceptable for use in locally produced biodiesel and identification of a possible useful byproduct
- Comparative analysis of the quantity and quality of biodiesel obtained from various crop oils as opposed to waste cooking oil, as well as the evaluation of byproducts
- Generate emission test data

The overall project goal is to provide data for an economic model that can be used to encourage Hawaii farmers to grow oilseed crops and demonstrate the feasibility of a complete biodiesel manufacturing facility, complete with byproduct processing.

The project is part of the West Coast Collaborative and is led by Honolulu Clean Cities with partners Pacific Biodiesel, Aloha Green, University of Hawaii – Hilo, College of Agriculture, Forestry, and Natural Resource Management, Oceanic Institute, Hawaii Agricultural Research Center, and Grace Pacific.

"The information gathered from the project will be valuable for identifying which crops have the greatest potential to support biodiesel production in Hawaii," said Jordan. "The ultimate goal is reducing Hawaii’s dependence on imported petroleum fuels and reducing diesel emissions throughout the state."

Contact Information: Clean Hawaii, 808-541-2711

More information about biodiesel and reducing diesel emissions
- West Coast Collaborative
- Biodiesel

http://www.epa.gov/region09/waste/biodiesel/hawaii.html
APPENDIX F: US EPA Region 9
Biodiesel Website: Regional Activities – Hawaii Continued

Biodiesel-powered rental cars: Bio-Beetle

Bio-Beetle Eco Rental Car claims to be the first and only car rental company in the world to offer cars powered solely on 100% biodiesel. The company was founded in 2003 on the island of Maui, Hawaii. It has expanded from its rental car fleet in Maui to also include a car fleet at the Honolulu and Los Angeles (LAX) airports. The company has plans to expand further to include more U.S. locations.

Jatropha and Palm Oil-Biodiesel Feedstocks for Tropical Climates

In a tropical climate such as Hawaii, oil from the palm tree or jatropha plant may be a more suitable crop for biodiesel production than soybean oil. Using these plants as feedstock can improve the local economy by providing jobs and an energy source. Both jatropha and palm oil have a higher oil yield than most other biodiesel feedstocks. For example, the jatropha plants yield 202 gallons of oil per acre, while soybeans yield 48 gallons of oil per acre.

EPA Administrator Visits Biodiesel Production Plant

In February 2006, EPA Administrator Stephen Johnson visited the United States’ oldest continuously operating biodiesel refinery, Pacific Biodiesel. The administrator toured the Maui-based plant which produces approximately 200,000 gallons of biodiesel annually and diverts 5,000 tons of waste grease from the municipal landfill. Johnson discussed the growing nation-wide biodiesel trend and the future of the fuel with plant owner Robert King. The biodiesel processing plant was the first to open in the Pacific Rim and continues to operate nearly a decade later.

http://www.epa.gov/region09/waste/biodiesel/hawaii.html
APPENDIX F: US EPA Region 9
Biodiesel Website: Regional Activities – Nevada

Activity in Nevada

On this page:
* Used Cooking Oil from Casinos
* University of Nevada at Reno

Used Cooking Oil—Harvesting an Urban Crop from Casinos

The state of Nevada is well-known for its casinos. What may not be known is that casinos produce large amounts of used cooking oil. This waste cooking oil is either hauled away to landfills or drops sewer pipes. Now, under a new collaborative effort, the casino’s waste grease is being used to make biodiesel to run Clark County School District’s buses.

With over 1300 buses, Clark County has the largest biodiesel school bus fleet in the world! The district serves over 246,000 students in 266 schools. At the start of the 2002-03 school year, the district’s school bus fleet began operating entirely on #20 (a blend of 20% biodiesel and 80% petroleum based diesel).

The Clark County School District was recognized at the 2003 National Clean Cities Conference for their commitment to improving air quality and energy independence. The National Clean Cities Conference is apart of the Clean Cities Program, established by the US Department of Energy. The Clean Cities program helps transportation systems become more environmentally friendly and less dependent on imported oil.

University of Nevada Aims at Reducing NOx and Price of Biodiesel

The University of Nevada at Reno (UNR) has partnered with Region 9 and various other organizations and agencies to tackle the issue of possible increases in nitrogen oxide (NOx) emissions as well as the high price of biodiesel. To lower costs, the university’s biodiesel processing unit will be mobile, computer-operated and will run continuously to offset start-up and maintenance costs. Nitrogen will be removed before fuel production begins in an effort to reduce nitrogen oxide emissions when the fuel is burned.

Nitrogen oxides are air pollutants that contribute to smog and ground-level ozone. While all biodiesel research studies show a reduction in emissions of carbon monoxide, carbon dioxide, particulate matter, and sulfur dioxide, NOx emissions have been shown to increase in some studies and decrease in others.

This research is a part of the university’s sustainability program. To help green the campus, UNR plans to substitute all diesel fuel with biodiesel. Additionally, the mobile processing unit will allow for the transportation of biodiesel technology to rural and tribal areas in Nevada.

More Information
National Biodiesel Board
Reducing Production Costs and Nitrogen Oxide Emissions from Biodiesel (PDF) (1 pp., 72k)
EPA Press release - UNR, of Nevada project
Nevada News: EPA Administrator to visit campus

http://www.epa.gov/region09/waste/biodiesel/nevada.html
APPENDIX F: US EPA Region 9
Biodiesel Website: Regional Activities – Resources

Biodiesel Resources

On this page:

* Biodiesel Web Sites
* Biodiesel Reports and Manuals
* Biodiesel Statutes and Regulations
* Biodiesel Books

The following list contains some resources about biodiesel, its properties, who is using it, legal benefits, case studies, and challenges.

**Biodiesel Web Sites**

**Federal Network for Sustainability (FNS)** [External Link]
Federal Network for Sustainability helps federal agencies in the Western United States incorporate environmentally sustainable programs into government activities.

**National Biodiesel Board** [External Link]
The National Biodiesel Board is the national trade association representing the biodiesel industry.

**West Coast Collaborative** [External Link]
The West Coast Collaborative is the EPA’s pilot project for the National Clean Diesel Campaign. The collaborative creates partnerships focused on improving the air quality along the west coast.

**Biodiesel Council of California** [External Link]
This website offers information to 8,100 (100% biodiesel) producers, distributors, and users.

**Department of Energy’s Clean Cities and Biodiesel** [External Link]
The Department of Energy’s Clean Cities Program is a coalition of nation-wide community groups to promote the use of alternative fuels and reduce our dependence on foreign fuel.

**Department of Energy’s Alternative Fuels Data Center (AFDC)** [External Link]
This website is a collection of data, documents and outreach materials concerning alternative transportation fuels.

**Diesel Technology Forum** [External Link]
The forum strives to educate public about environmental and energy progress in diesel technologies.

**Biodiesel Reports and Manuals**

**EPA Draft Report**
This draft report analyzes pre-existing data of the effect of biodiesel exhaust emissions.


(120 pp., 1 MB)

**NREL Urban Waste Grease Resource Assessment**
This report assesses urban waste grease from 30 randomly chosen United States metropolitan areas.

[Urban Waste Grease Assessment, National Renewable Energy Laboratory, November 1999](https://www.epa.gov/region09/waste/biodiesel/resources.html)

(71 pp., 472 KB)

**Biodiesel Handling and Use Guidelines**
This guide is useful for blenders, producers and users of biodiesel. It is intended to help users of biodiesel understand the proper procedures for handling and using the fuel.

[Biodiesel Handling and Use Guidelines (PDF), 66 pages, 1.6 MB, United States Department of Energy, DOE/GO 102004-1999, October 2004](https://www.epa.gov/region09/waste/biodiesel/resources.html)

**Biodiesel Technical Reference Guide** [External Link]
The Biodiesel Technical Reference Guide is a reference for biodiesel users and producers.

**NREL Study (PDF)** [8 MB, 1.4 MB]
This recently published NREL study reviewed various engine studies and concluded that B20 has no net impact on NOx emissions.

**U.S. Department of Energy’s Tribal Energy Development Guide**
Guidance to Native American Tribes in the area of energy usage and development. It outlines the energy development process and provides a resource library and case studies.

**Technical Handbook for Marine Biodiesel in Recreational Boats** [External Link]
This handbook is a practical guide for biodiesel interested owners of diesel-powered recreational boats.

http://www.epa.gov/region09/waste/biodiesel/resources.html
APPENDIX F: US EPA Region 9
Biodiesel Website: Regional Activities – Resources Continued

Biodiesel Statutes and Regulations

40 CFR 70
Regulates the registration of fuels and fuel additives in accordance with section 211 of the Clean Air Act. Fuel Manufacturer Notification Instructions - EPA Form 3520-12 (4 pages, 46 KB)

IRS Biodiesel Tax Credit Exit Disclaimer
In 2005, the Internal Revenue Service issued a tax credit for the use of biodiesel. The credit amounts to $1.00 per gallon of agri-based biodiesel (produced from virgin vegetable oil) and $0.50 per gallon for biodiesel made from recycled cooking oil.

Passed into law in August 2005, EPAct intends to establish a long-term energy policy. The statute provides incentives, such as allowing federal, state and public utility fleets to gain one alternative fuel credit for every 450 gallons of 100% biodiesel fuel purchased and used in vehicles as 20% biodiesel blend or higher.

California Senate Bill 975
This bill allows for the use of a B20 biodiesel blend in public agency, utility, and trash hauling fleets in California. This bill covers retro-fitted vehicles as well as off-road engines until 2009.

Executive Order 13101
This order aims to green the federal government by incorporating waste prevention, recycling, and the acquisition of environmentally preferable products into federal activities and programs.

Executive Order 13134
This order focuses on developing and promoting bio-based products and bio-energy.

Executive Order 13219
This order's purpose is to green the federal government's fleet by using alternative fuels and transportation technologies.

ASTM D-6751
The United States standard for biodiesel Exit Disclaimer as used as a blend with petroleum-based diesel fuel. The standard was specified by the American Society for Testing and Materials (ASTM).

EN 14214
The European Norm (EN) standard Exit Disclaimer that sets test methods and minimum requirements for biodiesel fuel. It has been in effect in the European Union since October 30, 2004.

Biodiesel Books

Editors Knothe, Gerhard, Jon Van Gerpen, and Jurgen Krahé. (2005)

Building a Successful Biodiesel Business
This book addresses the basic technologies, processes and business development options associated with the biodiesel industry. Authors: Van Gerpen, Rudy Pruszkó, Davis Clements, Brent Shanks, and Gerhard Knothe. (2006).

http://www.epa.gov/region09/waste/biodiesel/resources.html
PRESS RELEASE

FOR IMMEDIATE RELEASE
Date: December 1, 2006
Contact: Olof Hansen
US EPA Region 9
(415) 972-3328
Hansen.Olof@epa.gov

Fat to Fuel: EPA Announces New Biodiesel Webpage at Opening of First Biodiesel Plant along California’s Central Coast

Gonzales, CA- The Waste Management Division of the U.S. Environmental Protection Agency’s Pacific Southwest Regional office in San Francisco is pleased to announce EPA’s first biodiesel website: http://www.epa.gov/region09/waste/biodiesel/. The website is part of the Waste Management Division’s effort to promote waste derived biodiesel.

The new site highlights regional and EPA biodiesel activities, and provides information on the benefits and challenges of using waste derived biodiesel. The Web site tells stories of Regional biodiesel projects ranging from using waste grease from casinos to powering diesel buses, fueling San Francisco fire trucks, and a Hawaiian biodiesel-fueled car rental company. The site also offers information on funding sources, and contains links to websites, reports, and current statutes and regulations.

Under an EPA funded grant, Ecology Action, a nonprofit organization based in Santa Cruz, CA is developing the nation’s first community-based biodiesel production initiative. Community partners include local restaurants, hauling companies, distributors, Santa Cruz’s Department of Public Works, and biofuel producer Energy Alternative Solutions, Inc. (EAS, Inc.). This initiative will divert hundreds of thousands of gallons of waste cooking oil from landfills and create a locally sustainable biodiesel market.

“We hope this community-based project will be a model ultimately replicated across the country,” said Jeff Scott, Waste Management Division Director, EPA Region 9. “We are excited to be simultaneously encouraging alternative fuel use, reduced air pollution, and increased diversion of wastes from landfills.”

Community partner, EAS, Inc. will open the $1.5 million biofuel production plant — the first along the Central Coast — on Dec. 1st. EAS, Inc. will begin producing biodiesel off Alta Street in downtown Gonzales, with a second plant in Watsonville to follow in 2007. The plant was designed by industry pioneers, Bob and Kelly King of Pacific Biodiesel from Maui, HI.
APPENDIX G: Biodiesel Website Press Release Continued

Biodiesel is made through a chemical process called transesterification, and can be made from used cooking oil, vegetable oils, or animals fats. This plant’s feedstock will be primarily recycled cooking oils known as yellow grease as well as other vegetable oils.

“We want to create a closed-loop in the community,” says Richard Gillis, president of EAS, Inc. “Eventually we want to work with the renderers to collect all the yellow grease from local restaurants. Then we’re going to buy that processed oil and sell it back to the community it came from.”
## APPENDIX H: Fiscal Year 2007 Biodiesel Project Priority Matrix

<table>
<thead>
<tr>
<th>Potential Biodiesel Plants</th>
<th>Approved</th>
<th>$1M+ Projects</th>
<th>Approved $1M+ Projects</th>
<th>RTO/State Committee</th>
<th>Approved RTO/State Committee</th>
<th>Approved Projects</th>
<th>Approved RTO/State Committee Projects</th>
<th>Approved RTO/State Committee Projects</th>
<th>Approved RTO/State Committee Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plant A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plant B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plant C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Slide 1

Contents
- US EPA Pacific Southwest Office
- Introduction to biodiesel
- Why use waste cooking oil to produce biodiesel?
- Why is EPA Region 9 interested?
- Overview of EPA R9 biodiesel projects
- Resources
- Summary
- Questions

Slide 2

U.S. EPA Pacific Southwest (Region 9)

Slide 3

Slide 4

Why Biodiesel?
- “Foreign oil will go the way of typewriter and walkman…
  Restaurant grease which would normally be thrown away will be turned into fuel…
  Biodiesel is making the black puff of diesel smoke a thing of the past.”

Slide 5

What is Biodiesel?
- Biodiesel is a domestic, renewable fuel for diesel engines derived from feedstocks such as recycled cooking oils, vegetable oils, and animal fats.

Slide 6

APPENDIX I: Western Region Pollution Prevention Conference October 11, 2006

U.S. EPA Region 9
- Main Office in San Francisco w/ 800 employees
- Field Offices in L.A., San Diego, & Honolulu
- Offices: Regional Administrator, Public Affairs, Regional Counsel, Air, Superfund, Waste Management, Water, Communities and Ecosystems, Policy and Management
How Do You Make Biodiesel?

By a process called transesterification

\[
\text{Waste oil} + \text{Alcohol} + \text{Catalyst} \rightarrow \text{Biodiesel} + \text{Glycerol}
\]

Biodiesel can be splash-blended with petroleum diesel to get B20, B5, B2 ...
Economic Benefits

- The Department of Agriculture and the Congressional Budget Office have stated that biodiesel is the cheapest alternative fuel for meeting the Energy Policy Act (EPAct) requirements.

Cost Breakdown for Biodiesel Production

- Waste cooking oil may reduce biodiesel production costs by 75% when compared to virgin oil.

Economic Benefits to Federal Fleets

- Federal Fleets
- Biodiesel Use Credits
  - 1 credit = 450 gallons of B100
  - 1 credit = 2,250 gallons of B20
- Example
  - Need to purchase 80 new vehicles, 60 AFVs
  - Purchase 30 AFVs, 30 biodiesel credits
  - Need to purchase and use
    - 13,500 gallons of B100
    - 67,500 gallons of B20

Quality

- Biodiesel offers increased lubricity, high cetane and high oxygen content, which helps with performance and extends the life of engines.
- EPA approved biodiesel as an alternative fuel and a fuel additive.
- The National Biodiesel Board established a quality assurance program entitled BQ-9000 to monitor the quality of biodiesel in response to differing fuel qualities offered on the market.

Challenges

- Lack of familiarity
- Quality Control
- Lack of availability
- Potential increase of NOx emissions
  - Depends on engine type and test settings

Economic Benefits to Fleet Managers

- Diesel fleets do not require costly conversion methods or technologies to switch from diesel #2 to biodiesel unless the existing equipment is older than 15 years.

Possible problems
- Rubber hoses and gaskets
- High g踅ssor content
- Bacterial contamination

Quality

- Biodiesel offers increased lubricity, high cetane and high oxygen content, which helps with performance and extends the life of engines.
- EPA approved biodiesel as an alternative fuel and a fuel additive.
- The National Biodiesel Board established a quality assurance program entitled BQ-9000 to monitor the quality of biodiesel in response to differing fuel qualities offered on the market.

Challenges

- Lack of familiarity
- Quality Control
- Lack of availability
- Potential increase of NOx emissions
  - Depends on engine type and test settings
Retail Fueling Sites

Why Focus on Waste Cooking Oil?
In the U.S. alone restaurants and hotels generate over 3 billion gallons of waste cooking oil per year

3 billion gallons = 5,700 miles
of tanker trucks end-to-end

San Francisco
Beijing

Why is Region 9 Interested in Biodiesel?

Challenges
- Lack of familiarity
- Quality of fuel
- Lack of availability
- Potential increase of NOx emissions
  - Depends on engine type and test settings

Why Focus on Waste Cooking Oil?
- Diverts large waste stream from:
  - Landfills or illegal dumping
  - Publicly Owned Treatment Works (POTWs)
- Prevents spills and sewer blockages:
  - 80% of sewer spills in the USA are caused by FOG (Fat – Oil – Grease)
  - In 2001, EPA sued Los Angeles for 800 sewer spills due to pipes clogged by FOG

EPA Region 9 Biodiesel Projects
- Innovations Workgroup Grant (IWG) to University of Nevada, Reno
- IWG to Ecology Action in Santa Cruz, CA
- Web-based Biodiesel Guide
- Region 9 Biodiesel Website
- Potential Partners
IWG to University of Nevada, Reno

UNR Chemical engineering department’s goals:
- Lower NOx emissions pre-production (w/o additives)
- Decrease costs by using continuous production unit vs. batch process
- Several promising results:
  - Biodiesel production takes far less time and energy than found in previous studies
  - Nitrogen content of biodiesel is over 40% lower than previous research has shown

Region 9 Biodiesel Website
- First EPA biodiesel website
- Focuses on biodiesel derived from waste cooking oil
- Also provides information on benefits, challenges, regional biodiesel activities, funding information and biodiesel resources

Region 9 Biodiesel Targets
- Closed-loop cycle
- Target facilities that generate lots of waste grease and have a large diesel demand
- Waste Water Treatment Plants
- Casinos
- Universities

Biodiesel Technical Reference Guide
- Developed by
  - FNS with help from EPA Region 9
  - West Coast Diesel Emissions Reduction Collaborative
  - Far West Regional Laboratory Consortium
  - For use by federal facilities
- Provides
  - Links to technical information
  - Case studies from federal agencies using biodiesel
  - Info on how and where federal agencies can purchase biodiesel
  - Biodiesel Wizard
  - Directs user through guide

Potential Partnerships – WWTP
- FOG (Fat-Oil-Grease) causes sewer overflows, operators pay fines
- Converting FOG to fuel creates a revenue income for POTWs
- Legislative requirements may be issued in the future for FOG management in California
- Potential Partners
  - State-wide associations
  - CA FOG
  - Individual WWTP
    - East Bay Municipal Utility District
    - City of Pacifica
    - And many others!
Potential Partnerships - Casinos

- Casinos/gaming hotels produce large amounts of restaurant grease (6 gallons/visitor/yr)
- Learn from existing casinos that use grease to fuel furnace/boiler as well as in their fleet
- Potential Partners
  - Tribal Casinos
  - Commercial Casinos

Resources

- EPA Region 9's Biodiesel Website
  - www.epa.gov/region9/waste/biodiesel
- National Biodiesel Board
  - www.biodiesel.org
- West Coast Collaborative
  - http://www.westcoastcollaborative.org/
- Biodiesel Council of California
  - http://californiabiodiesel.net/?q=/node/3

Potential Partnerships - Universities

- University of California Office of the President
  - In September 2005, incorporate sustainable transportation practices into existing Policy on Green Building Design and Clean Energy Standards
  - In June 2006, met with fleet managers at UCSB Turning the Tide Sustainability Conference
  - Planned meeting Fall 2006
    - Will discuss possibility of formal partnership

Summary

- Benefits
  - Environmental
  - Economic
- Why Waste Grease?
  - Waste → Energy
- EPA Activities
  - IWG UNR
  - IWG Ecology Action
  - Biodiesel Wizard
  - Biodiesel Webpage

Government Grant Programs

- Grants.gov
  - www.grants.gov
- Innovations Workgroup Grant
  - www.epa.gov/io/innovations

Slide 31

Slide 34

Slide 32

Slide 35

Slide 33

Slide 36

Little Known Fact

Rudolph Diesel designed the diesel engine to run on peanut oil.
### APPENDIX J: Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASTM</td>
<td>American Society for Testing Materials</td>
</tr>
<tr>
<td>B5</td>
<td>Biodiesel 5 (5% biodiesel)</td>
</tr>
<tr>
<td>B20</td>
<td>Biodiesel 20 (20% biodiesel)</td>
</tr>
<tr>
<td>B100</td>
<td>Biodiesel 100 (100% biodiesel)</td>
</tr>
<tr>
<td>C$^2$P$^2$</td>
<td>Coal Combustion Products Partnership</td>
</tr>
<tr>
<td>DoD</td>
<td>Department of Defense</td>
</tr>
<tr>
<td>DOP</td>
<td>Division Operating Plan</td>
</tr>
<tr>
<td>ECO</td>
<td>Environmental Careers Organization</td>
</tr>
<tr>
<td>EPA</td>
<td>Environmental Protection Agency</td>
</tr>
<tr>
<td>EPAct</td>
<td>Energy Policy Act</td>
</tr>
<tr>
<td>FEC</td>
<td>Federal Electronics Challenge</td>
</tr>
<tr>
<td>GRPA</td>
<td>Government Results and Performance Act</td>
</tr>
<tr>
<td>IES</td>
<td>Institute of Environmental Sciences</td>
</tr>
<tr>
<td>IWG</td>
<td>Innovations Workgroup</td>
</tr>
<tr>
<td>LEED</td>
<td>Leadership in Energy and Environmental Design</td>
</tr>
<tr>
<td>MoA</td>
<td>Memorandum of Agreement</td>
</tr>
<tr>
<td>NO$_x$</td>
<td>Nitrogen Oxide</td>
</tr>
<tr>
<td>NPEP</td>
<td>National Partnership for Environmental Priorities</td>
</tr>
<tr>
<td>OPA</td>
<td>Office of Public Affairs</td>
</tr>
<tr>
<td>OSWER</td>
<td>Office of Solid Waste and Emergency Response</td>
</tr>
<tr>
<td>P3</td>
<td>People Prosperity and the Planet</td>
</tr>
<tr>
<td>POTW</td>
<td>Publicly Owned Treatment Works</td>
</tr>
<tr>
<td>SPPO</td>
<td>Strategic Planning and Partnerships Office</td>
</tr>
<tr>
<td>RCRA</td>
<td>Resource Conservation and Recovery Act</td>
</tr>
<tr>
<td>UC</td>
<td>University of California</td>
</tr>
<tr>
<td>UNR</td>
<td>University of Nevada at Reno</td>
</tr>
<tr>
<td>WMD</td>
<td>Waste Management Division</td>
</tr>
<tr>
<td>WRPPN</td>
<td>Western Regional Pollution Prevention Network</td>
</tr>
<tr>
<td>WWTP</td>
<td>Waste Water Treatment Plant</td>
</tr>
</tbody>
</table>