



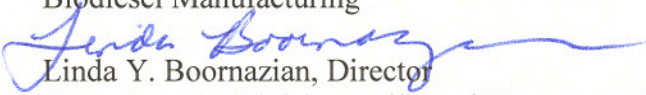
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

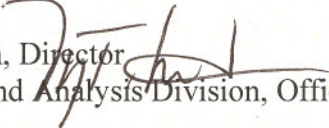
11 August 2008

OFFICE OF WATER

Memorandum

Subject: Applicability of Effluent Guidelines and Categorical Pretreatment Standards to Biodiesel Manufacturing

From: 
Linda Y. Boornazian, Director
Water Permits Division, Office of Wastewater Management


Mary T. Smith, Director
Engineering and Analysis Division, Office of Science and Technology

To: Water Division Directors, Regions 1 - 10

Biodiesel manufacturing has rapidly expanded in recent years in response to market conditions and new incentives in Federal tax policy. Permit writers and industry representatives have asked EPA to compile and summarize the current Clean Water Act (CWA) regulatory requirements, with regard to effluent limitations guidelines, new source performance standards, pretreatment standards, and/or NPDES stormwater permitting, for the manufacturing process wastewater discharge from this expanding biodiesel industry.

EPA's Assessment of Applicability

Currently there are no effluent limitations guidelines, new source performance standards, or categorical pretreatment standards¹ that regulate process wastewater discharges from the biodiesel manufacturing process. In the absence of applicable effluent limitations guidelines and standards, effluent limitations are determined by the permit writer on a best professional judgment basis, in accordance with the statutory requirements in the Clean Water Act.²

¹ Hereinafter these terms will be referred to as "effluent guidelines and standards" or "effluent guidelines."

² CWA sections 402(a)(1)(requirement for BPJ); 301(b)(1)(B), 301(b)(2)(A), and 301(b)(2)(E)(requirements for various levels of control), 304(b)(1)(B), 304(b)(2)(B) and 304(b)(4)(B)(factors for determining levels of control).

NPDES permit writers develop site-specific limits for discharges to surface waters (“direct discharges”). In so doing, the permit writer considers both technology-based effluent limits and water-quality based effluent limits. Where technology-based effluent limits are not stringent enough to meet applicable water quality standards, the permit authority develops water quality-based effluent limits. CWA section 301(b)(1)(C). Where national effluent guidelines do not exist, site-specific, technology-based effluent limitations are to reflect the best professional judgment (BPJ) of the permit writer taking into account the same statutory factors EPA would use in promulgating a national effluent guideline, but applied to the particular circumstances relating to the applicant. NPDES permit writers can develop BPJ controls using one of two methods: (1) transferring limits from an existing source with similar activities (*e.g.*, from other existing effluent guidelines or a similar NPDES permit); or (2) deriving new limits.³ The NPDES regulations (40 CFR 125.3) also require that permits developed on a case-by-case basis must consider: (1) the appropriate technology for the category of point sources for which the applicant is a member, based on all available information; and (2) any unique factors related to the applicant. The CWA also gives the NPDES permit writer the authority to consider process changes in order to evaluate technology-based controls of industrial pollutant direct discharges.

All non-domestic discharges to publicly owned treatment works (POTWs) (“indirect dischargers”), even those not subject to categorical pretreatment standards, are subject to general pretreatment standards, including a prohibition on discharges causing “pass through” or cause “interference.” See 40 CFR 403.5. All POTWs with approved pretreatment programs must develop local limits to implement the general pretreatment standards. All other POTWs must develop such local limits where pollutants have contributed (or will contribute) to “pass through” or “interference” and where violations are likely to recur. EPA guidance on establishing local limits is provided in the Local Limits Development Guidance, EPA-833-R-04-002A, July 2004.⁴

In situations where some or all of the wastewaters from a biodiesel manufacturing operation are combined or commingled with the wastewater streams from other regulated manufacturing operations (i.e., a co-located facility) prior to discharge, the permit writer should apply either the “building block approach”⁵ or Combined Wastestream Formula⁶ in cases of direct and indirect discharge, respectively.

Biodiesel manufacturing operations are subject to the NPDES stormwater regulations, consistent with the regulatory definition of stormwater discharges associated with industrial activity at 40 CFR 122.26(b)(14). While these operations have identified biodiesel manufacturing using a variety of SIC codes, in general, all manufacturing operations fall within the purview of the regulations. Thus, while there may be some question as to the applicable subcategory of paragraph (b)(14) of this regulation, there is no question that these activities are regulated under the stormwater program. Generally, EPA considers these facilities to fall under

³ EPA, 1996. “NPDES Permit Writer’s Manual,” EPA-833-B-96-003, Page 71, December. [Available at: http://cfpub.epa.gov/npdes/writermanual.cfm?program_id=45]

⁴ Available at: http://cfpub.epa.gov/npdes/home.cfm?program_id=3.

⁵ EPA, 1996. “NPDES Permit Writer’s Manual,” EPA-833-B-96-003, Page 61, December. [Available at: http://cfpub.epa.gov/npdes/writermanual.cfm?program_id=45]

⁶ EPA, 1985, “Guidance Manual for the Use of Production-Based Pretreatment Standards and the Combined Wastestream Formula, EPA 833-B-85-201, September, [Available at: <http://www.epa.gov/npdes/pubs/owm0260.pdf>]

SIC code 2800 (Chemicals and Allied Products) which is specifically included in the stormwater program at 122.26(b)(14)(ii).

Background

Biodiesel Composition

Biodiesel refers to a diesel-equivalent, processed fuel derived from biological sources (e.g., vegetable oils or animal fats), which can be used in unmodified diesel-engine vehicles. Biodiesel manufacturing's rapid expansion in recent years has been a response to price increases in petroleum-derived diesel and federal tax incentives and credits programs established through the American Jobs Creation Act of 2004, the Energy Policy Act of 2005, and the Energy Independence and Security Act of 2007. Production capacity in this sector is growing through the construction of new facilities and expansion of existing facilities.

Biodiesel is a renewable fuel that can be substituted for petroleum-derived diesel in conventional diesel engines either in pure form, which is called B100 (100 percent biodiesel), or the bio-fuel can be blended in any proportion with conventional diesel fuel. A common blend is B20 (20 percent biodiesel and 80 percent conventional diesel). Biodiesel (B100) is a fuel comprised of mono-alkyl esters of long chain fatty acids derived from vegetable oils or animal fats.⁷ Biodiesel can be made from several types of vegetable oils having various fatty acids including virgin and hydrogenated rapeseed, soybean, mustard seed, coconut, and palm oils; tallow and other animal fats. Additionally, waste grease and oils from restaurants or non-petroleum grease traps can be used in biodiesel manufacturing. Biodiesel, as defined in ASTM International's Standard Specification D-6751, *Specification for Biodiesel Fuel (B100) Blend Stock for Distillate Fuels*, is registered with EPA as a fuel and fuel additive under Section 211(b) of the Clean Air Act.

Biodiesel Manufacturing

Biodiesel manufacturing operations can range from small batch and micro-scale operations to larger continuous operations. The National Biodiesel Board⁸ estimates that as of January 25, 2008, there are 171 industrial facilities producing biodiesel. The production capacity of these 171 biodiesel manufacturing facilities ranges from 0.08 million gallons per year up to 100 million gallons per year. In 2007, the industry produced 500 million gallons of biodiesel. The current national aggregated production capacity is estimated at 2.24 billion gallons per year and there are approximately 60 new facilities under construction or expansion. Today, approximately 600 vehicle fleets nationwide use biodiesel blends in their diesel engines, and biodiesel is available in its various blends at approximately 800 locations across the United States.⁹

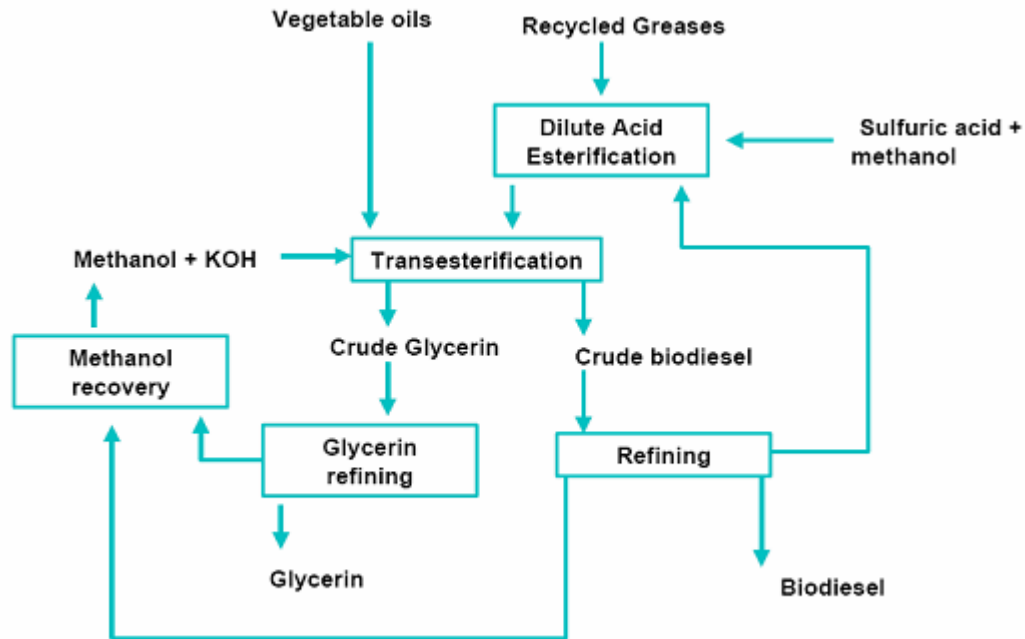
⁷ DOE, 2004. "Biodiesel Production Technology," NREL/SR-510-36244, July. [Available at: <http://www.nrel.gov/docs/fy04osti/36244.pdf>]

⁸ See <http://www.biodiesel.org/> and http://www.biodiesel.org/pdf_files/fuelfactsheets/Producers%20Map%20-%20existing.pdf

⁹ EPA, 2006. "Alternative Fuels: Biodiesel," EPA420-F-06-044, October. [Available at: www.epa.gov/otaq/smartway/growandgo/documents/420f06044.pdf]

There are three basic manufacturing processes for the production of biodiesel from oils and fats: (1) base catalyzed transesterification of oils or fats with alcohol; (2) direct acid catalyzed esterification of oils or fats with methanol; and (3) conversion of oils or fats to fatty acids, and then to alkyl esters with acid catalysis.¹⁰ Figure 1 provides a basic example of the transesterification technology process, which is the most common production method.

Figure 1. Overview of the Biodiesel Transesterification Manufacturing Processes



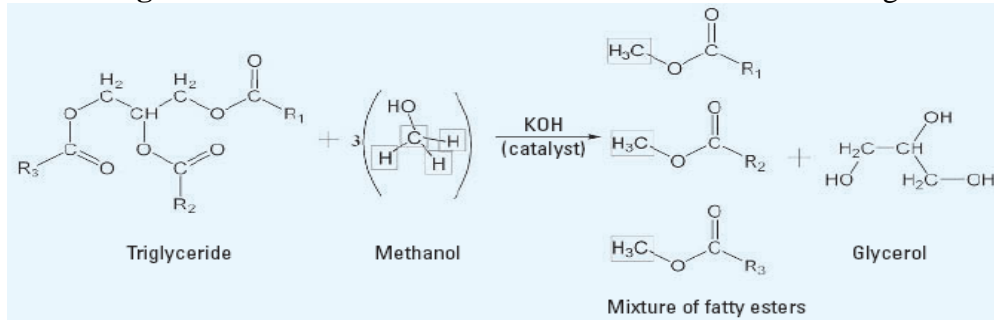
Source: Federal Network for Sustainability, 2005. “Biodiesel Technical Reference Guide,” Section 1.4, November 7. [Available at: <http://www.federalsustainability.org/initiatives/biodiesel/biodieseltrg.htm>]

Biodiesel manufacturing utilizes steam to control process temperatures, which vary from 50° to 120°C. In the transesterification process the general chemical reaction (Figure 2) involves the mixing of natural vegetable oils or animal fats with an alcohol such as methanol or ethanol in the presence of a catalyst (*e.g.*, sodium, potassium hydroxide, sodium methylate) in a heated reactor to produce a mixture of mono-alkyl esters (biodiesel) and glycerin. For example, about ten percent (by weight) of the input reactants are converted to glycerin in the base catalyzed transesterification reaction.¹¹

¹⁰ In organic chemistry, esterification is the general name for a chemical reaction in which two chemicals (typically an alcohol and an acid) form an ester as the reaction product. Transesterification is the process of exchanging the alkoxy (R-O) group of an ester compound by another alcohol. These reactions are often catalyzed by the addition of an acid or base.

¹¹ DOE, 2004. Page 75.

Figure 2. Chemical reaction used in Biodiesel Manufacturing

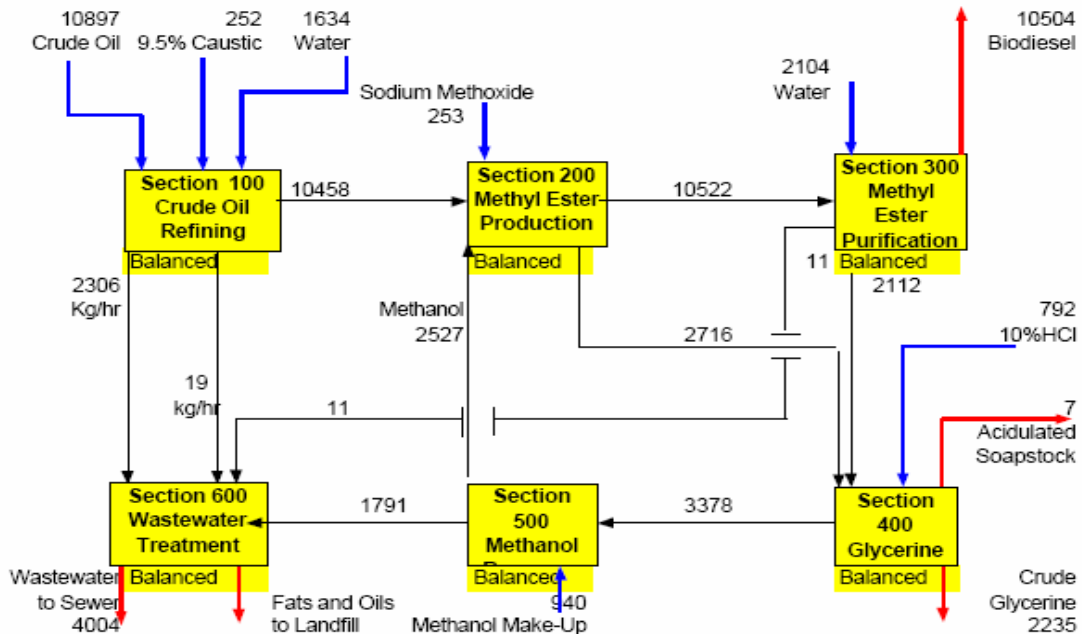


Source: J Braz Chem Soc 9(3):199–212, 1998. “Transesterification of vegetable oils: a review.” Schuchardt U, Sercheli R, Vargas RM.

The biodiesel refining process continues with the removal of the glycerin from the mono-alkyl esters through simple phase separation (settling), which can be enhanced using a centrifuge. The use of gravity separating techniques is possible because glycerin is insoluble in and has a different specific gravity than biodiesel.

The National Biodiesel Board finds that large scale biodiesel production facilities typically employ base catalyzed transesterification due to the processing efficiencies and economic advantages. Figure 3 provides an example of the conversion of soybean oil into biodiesel through the transesterification process.

Figure 3. Overview of Process for Conversion of Soybean Oil to Biodiesel (Flows in kg/h)



Source: U.S. Department of Agriculture and U.S. Department of Energy, 1998. “Life Cycle Inventory of Biodiesel and Petroleum Diesel for Use in an Urban Bus,” NREL/SR-580-24089, May. [Available at: http://www.biodiesel.org/resources/reportsdatabase/reports/gen/19980501_gen-339.pdf]

Biodiesel Industry Classifications

Information from a small sample of existing biodiesel manufacturing facilities indicates that these facilities are identified by a variety of standard industrial classification (SIC) codes.¹² See Table 1.

Table 1. Example SIC Codes Used to Identify Biodiesel Manufacturing Facilities

SIC code	Description
2047	Dog and cat food
2048	Prepared feed and feed ingredients for animals, except dogs and cats
2075	Soybean oil mills
2077	Animal and marine fats and oils
2079	Shortening, table oils, margarine, and other edible fats and oils, not elsewhere classified
2869	Industrial organic chemicals, not elsewhere classified

The wide range of SIC codes used to identify industrial activities in biodiesel manufacturing is, to some extent, the result of the rapid expansion of the industry by integrating biodiesel production into traditional vegetable oil and animal feed production facilities as an additional output commodity.¹³

Biodiesel Manufacturing Wastewater

Biodiesel manufacturing process wastewater characterization, treatment, and practices vary with the size, type, and location of the biodiesel manufacturing processes and unit operations. Process wastewater disposal practices include direct (to waters of the United States) and indirect discharges (to POTWs), septic tanks, land application, recycling, and contract hauling.

In the biodiesel transesterification manufacturing process, unreacted methanol and crude glycerin (80% glycerin) are generated as byproducts. The crude glycerin may be refined on-site and sold as a commodity. On a weight or volume basis, partially refined glycerin is worth more than the biodiesel product.¹⁴ However, depending on the size of the manufacturing facility, the capitalization of the firm which would allow for the investment in glycerin refining, the location of the biodiesel facility in relation to glycerin consumers, and the general demand for and price of the commodity, some manufacturers may be unable to profitably sell their glycerin byproduct. These firms may seek to discharge the glycerin generated to a POTW. Due to the density and viscosity properties of glycerin, POTWs may experience interference if this disposal option is chosen, manifesting as sanitary sewer overflows or damage to the pumping system and other capital equipment. Given these concerns, some State pretreatment programs have banned the

¹² Fax memorandum to Mr. Elwood Forsht, U.S. EPA, Office of Science and Technology, from Mr. Randy Dunnette, Pretreatment Coordinator, Minnesota Pollution Control Agency, 11 May 2006.

¹³ Email from Mr. Steve Williams, Iowa Department of Natural Resources to Mr. Elwood Forsht, U.S. EPA, Office of Science and Technology, 11 April 2006.

¹⁴ DOE, 2004. Page 75.

discharge of this byproduct to POTW systems.¹⁵ If the glycerin cannot be sold or discharged to a POTW, the biodiesel manufacturer may have to transport it to a centralized waste treatment facility, or if the glycerin does not contain any free liquids, it may be approved for disposal at a permitted landfill. Unreacted methanol may be recovered, to the extent possible, and reused in the manufacturing process, reducing the generation of wastewater pollutants.

Most biodiesel manufacturing processes result in the generation of process wastewaters with free fatty acids and glycerin (i.e. soapy water). Other constituents in the biodiesel manufacturing process wastewater include organic residues such as esters, soaps, inorganic acids and salts, traces of methanol, and residuals from process water softening and treatment.¹⁶ Sources of wastewater include wash water which is used to remove any soaps formed during the transesterification reaction; steam condensate; process water softening and treatment to eliminate calcium and magnesium salts, iron, and copper; and wastewaters from the glycerin refining process.¹⁷

The typical biodiesel manufacturing wastewater has high concentrations of conventional pollutants [biochemical oxygen demand (BOD), total suspended solids (TSS), oil and grease] and will also contain a variety of non-conventional pollutants. Data from a small sample of pretreatment programs show a range of BOD₅ concentrations from 4,500 up to 37,000 mg/l. One facility reported TSS concentrations at 2130 mg/l.¹⁸ Levels of conventional pollutants in the raw wastewater are likely to be affected by the manufacturing efficiencies (*e.g.*, poor recovery of glycerin and methanol will result in high BOD₅ concentrations in the raw wastewater). In contrast, the BOD₅ and TSS concentrations for typical domestic wastewaters range from 110 to 400 mg/l and 100 to 350 mg/l, respectively.¹⁹

As a proactive step, some biodiesel manufacturers have chosen to use an ion exchange resin approach instead of solvents to refine the biodiesel product, which can reduce or eliminate the production wastewater. These ion exchange resins are typically used to bind and remove trace impurities from the biodiesel process stream after the phase separation of the glycerin. The biodiesel is passed through a column or columns of the dried ion exchange resin to bind and remove ionic salts, catalysts, soaps, water, and glycerin. The resin may be washed on site with methanol to release bound glycerin (the methanol being recycled back into the process stream) prolonging the resins active lifespan. The resin will after several washes eventually exhaust and at that time the spent resins maybe regenerated by the offsite resin manufacturer and reused.

¹⁵ New Hampshire Department of Environmental Services, 2006. "Environmental Permitting, Regulations and Other Requirements Related to the Manufacture of Biodiesel," Environmental Fact Sheet, CO-16. [Available at: <http://www.des.state.nh.us/factsheets/co/inc/16.html>].

¹⁶ A Case Study: Interference and Pass Through of Biodiesel Wash Water at the Arlington, Nebraska, Wastewater Works.

¹⁷ DOE, 2004. Page 68.

¹⁸ Email regarding Wastewater Characterization for the West Central Facility Cooperative, to Erik Helm and Erika Felix, Office of Water, Washington D.C, from Mr. John Dunn, EPA Region 7, Kansas City, KN, 06 June 2007.

¹⁹ Tchobanoglous, George, Franklin L. Burton, 1991. Wastewater Engineering: Treatment, Disposal, and Reuse, 3rd Edition, Metcalf and Eddy Inc., McGraw-Hill Inc.

Regulatory Applicability

EPA reviewed its existing regulations in order to compile any current effluent limitations guidelines, new source performance standards, and/or categorical pretreatment standards requirements that may apply to process wastewater discharges from the biodiesel manufacturing process. Specifically, EPA reviewed the following categories that apply to SIC codes reported by biodiesel manufacturing facilities (see Table 1) or are similar in process operations to the biodiesel manufacturing process.

- Grain Mills – 40 CFR Part 406;
- Organic Chemicals, Plastics, and Synthetic Fibers (OCPSF) – 40 CFR Part 414;
- Soap and Detergent Manufacturing – 40 CFR Part 417;
- Meat and Poultry Products – 40 CFR Part 432; and
- Centralized Waste Treatment – 40 CFR Part 437.

EPA reviewed the applicability sections in the effluent guidelines and standards and their supporting Technical Development Documents. The Agency looked at whether the biodiesel manufacturing sector was considered in data collection, technical, and economic analyses supporting these effluent guidelines rulemakings. EPA also reviewed whether facilities identified by SIC codes 2075 and 2079 (see Table 1²⁰) are currently regulated by effluent guidelines or standards in any other effluent guidelines and standards identified in 40 CFR Subchapter N (i.e., 40 CFR Parts 405-471). EPA did not perform a detailed analysis of 40 CFR Parts 419 (Petroleum Refining) or 435 (Oil and Gas Extraction) as these categories clearly regulate the handling and processing of subsurface crude oil. Similarly, EPA's review showed that 40 CFR Part 454 (Gum and Wood Chemicals) does not apply to biodiesel manufacturing because the raw material inputs, production processes, and final output products are substantially different from those of the biodiesel manufacturing process.

Grain Mills – Part 406

The effluent guidelines and standards in the Grain Mills point source category are not directly applicable to the biodiesel manufacturing process.

The Grain Mills effluent guidelines and standards are applicable to process wastewater discharges from facilities that process raw grain materials into various food grade products. The SIC codes used to identify these raw grain processors include:

- Flour and Other Grain Mill Products (2041);
- Cereal Breakfast Foods (2043);
- Rice Milling (2044);
- Prepared Flour Mixes and Doughs (2045);
- Wet Corn Milling (2046)

²⁰ The additional SIC codes in Table 1 are covered in this memorandum by the discussions of the applicability of the Meat and Poultry Products and OCPSF effluent guidelines.

Biodiesel manufacturing is not a food grade product and is not included in the Grain Mills point source category applicability criteria or in the related Technical Development Document.²¹ Additionally, the data collection and analyses supporting these effluent guidelines and standards did not include any information on biodiesel manufacturing.

Organic Chemicals, Plastics, and Synthetic Fibers (OCPSF) – Part 414

The effluent guidelines and pretreatment standards in the Organic Chemicals, Plastics, and Synthetic Fibers (OCPSF) point source category are not directly applicable to the biodiesel manufacturing process.

The OCPSF effluent guidelines are applicable to process wastewater discharges from all establishments or portions of establishments that manufacture organic chemicals, plastics, and synthetic fibers (OCPSF) products. The SIC codes used to identify these OCPSF facilities include:

- Plastic Materials, Synthetic Resins, and Nonvulcanizable Elastomers (2821);
- Cellulosic Man-Made Fibers (2823);
- Synthetic Organic Fibers, Except Cellulosic (2824);
- Cyclic Crudes and Intermediates, Dyes, and Organic Pigments (2865); and
- Industrial Organic Chemicals, Not Elsewhere Classified (2869).

The SIC code 2869 is also sometimes used to identify biodiesel manufacturing facilities. However, the data collection and engineering or economic impact analyses of the 1987 and 1993 OCPSF effluent guidelines rulemakings do not reflect the relatively recent growth and expansion of the biodiesel industry (manufacture of alkyl esters from vegetable oils and animal fats). This is important as the Agency did not use these rulemakings to identify available and affordable technology for controlling wastewater pollutants from the biodiesel manufacturing process.

Additionally, biodiesel manufacturing does not utilize the same raw materials as OCPSF process chemistry, which uses petroleum derived materials as raw materials. In particular, the OCPSF effluent guidelines regulate alkyl ester production by the chemical synthesis of petroleum based raw materials. However, biodiesel manufacturing utilizes natural raw materials such as vegetable and animal fats that are not regulated by the OCPSF effluent guidelines. The chemical composition of vegetable and animal based raw materials is generally more homogeneous than petroleum based materials. In addition, petroleum based materials typically contain more complex compounds (e.g. aromatic and polycyclic). This is important in the identification of available and affordable technology as the biodiesel chemical reactions and manufacturing processes are not expected, based on chemical reaction processes of uncontaminated raw materials, to produce and discharge any of the 62 toxic compounds regulated under the OCPSF rule (see 40 CFR 414.91, 414.101, and 414.111).

²¹ EPA, 1974. "Development Document for Effluent Limitations Guidelines and New Source Performance Standards for the Animal Feed, Breakfast Cereal, and Wheat Starch Segment of the Grain Mills Point Source Category," EPA-440-1-74-039A.

Soap and Detergent Manufacturing – Part 417

The effluent guidelines and standards in the Soap and Detergent Manufacturing point source category are not directly applicable to the biodiesel manufacturing process.

The Soap and Detergent Manufacturing effluent guidelines are applicable to process wastewater discharges from facilities that produce soaps and detergents. The SIC codes used to identify these soap and detergent manufacturers include:

- Soap and Other Detergents, Except Specialty Cleaners (2841); and
- Surface Active Agents, Finishing Agents, Sulfonated Oils, and Assistants (2843).

The main purpose of biodiesel manufacturing is for fuel production. However, inefficiencies in the biodiesel manufacturing process will produce soap. For example, if an oil or fat containing a free fatty acid such as oleic acid is used to produce biodiesel, the alkali catalyst typically used to encourage the biodiesel reaction will also react with this acid to form soap.²² This reaction is undesirable because it binds the catalyst into a form that does not contribute to accelerating the transesterification process. Excessive soap in the products can also inhibit later processing of the biodiesel, including glycerin separation and water washing. Water in the oil or fat can also be a problem. When water is present, particularly at high temperatures, it can hydrolyze the triglycerides to diglycerides and form a free fatty acid.²³ These free fatty acids will then react to form soap in the presence of an alkali catalyst. Thus, when water is present in the reaction it generally manifests itself through excessive soap production. The soaps of saturated fatty acids tend to solidify at ambient temperatures so a reaction mixture with excessive soap may gel and form a semi-solid mass that is very difficult to recover. Any soap production in biodiesel manufacturing is not a useful byproduct and operators take steps to minimize its production as it inhibits efficiency in the biodiesel manufacturing process. Additionally, the data collection and analyses supporting these effluent guidelines and pretreatment standards did not include any information on biodiesel manufacturing.

Glycerin is produced in the biodiesel manufacturing process and is sometimes refined to higher grades for sale. Soap and Detergent Manufacturing effluent guidelines (Subpart E – Glycerin Distillation Subcategory) do regulate pollutant discharges resulting from the production of finished glycerin of various grades (e.g., USP²⁴) through concentration of the crude glycerin by means of distillation (see §417.50). However, as previously stated, the data collection and analyses supporting these effluent guidelines and pretreatment standards did not include any information on biodiesel manufacturing. Consequently, the Agency did not identify available and affordable technology for controlling wastewater pollutants from the glycerin production and refinement unit operations in the biodiesel manufacturing process.

²² DOE, 2004. Page 6.

²³ *Ibid.*

²⁴ The United States Pharmacopeia (USP) is a compendium of quality control tests for drugs and excipients to be introduced into a medicinal formulation. It is published every year by the United States Pharmacopoeial Convention (www.usp.org).

Meat and Poultry Products – Part 432

The effluent guidelines in the Meat and Poultry Products point source category are not directly applicable to the biodiesel manufacturing process.

The Meat and Poultry Products effluent guidelines are applicable to facilities “engaged in the slaughtering, dressing and packing of meat and poultry products for human consumption and/or animal food and feeds. Meat and poultry products for human consumption include meat and poultry from cattle, hogs, sheep, chickens, turkeys, ducks and other fowl as well as sausages, luncheon meats and cured, smoked or canned or other prepared meat and poultry products from purchased carcasses and other materials. Meat and poultry products for animal food and feeds include animal oils, meat meal and facilities that render grease and tallow from animal fat, bones and meat scraps.” See 40 CFR 432.1. The SIC codes used to identify these facilities include:

- Livestock Services, Except Veterinary (0751);
- Meat Packing Plants (2011);
- Sausages and Other Prepared Meat Products (2013);
- Poultry Slaughtering and Processing (2015);
- Dog and Cat Food (2047);
- Prepared Feed and Feed Ingredients for Animals and Fowls, Except Dogs and Cats (2048); and
- Animal and Marine Fats and Oils (2077).

Some biodiesel manufacturers have categorized their activities under SIC codes 2047, 2048, and 2077; however, these categorizations are likely the result of the relatively recent growth and expansion of the biodiesel industry (manufacture of alkyl esters from vegetable oils and animal fats), which was not included in the data collection or engineering or economic impact analyses of the 1974 or 2004 Meat and Poultry Products effluent guidelines rulemakings. This is important as the Agency did not use these rulemakings to identify available and affordable technology for controlling wastewater pollutants from the biodiesel manufacturing process. Biodiesel manufacturing is not included in the Meat and Poultry Products point source category applicability criteria or in the related Technical Development Document.²⁵

Centralized Waste Treatment – Part 437

The Centralized Waste Treatment point source category effluent guidelines and pretreatment standards do not apply to discharges from the biodiesel manufacturing process. However, wastewater from the treatment of biodiesel manufacturing processes at a CWT facility must comply with appropriate requirements of 40 CFR 437 for CWT.

Centralized waste treatment (CWT) facilities accept waste, wastewater, or used materials from off-site industrial applications for treatment and/or recovery. CWT facilities receive a wide variety of hazardous and non-hazardous industrial wastes for treatment or recovery. Examples of

²⁵ EPA, 2004. “Technical Development Document for the Final Effluent Limitations Guidelines and Standards for the Meat and Poultry Products Point Source Category,” EPA-821-R-04-011.

facilities regulated by the CWT effluent guidelines are provided in Table V.A-1 in the preamble to the final rule (see 22 December 2000; 65 FR 81254).

While some biodiesel operations may fall within the definition of a CWT, particularly CWTs that use waste animal and vegetable oils and greases received as feedstock for the manufacturing of biodiesel as part of their reuse and recycling production output, the applicability criteria for the Centralized Waste Treatment effluent guidelines make clear that these effluent guidelines do not apply to discharges from all CWT facilities. In particular, the applicability section specifically excludes “wastewater from the treatment of, or recovery of material from, (1) animal or vegetable fats/oils from grease traps or interceptors generated by facilities engaged in food service activities” (40CFR 437.1(b)(8)); and (2) any “offsite wastes generated by facilities engaged only in food processing” (40 CFR 437.1(b)(9)). Also see Section V.X and V.W of the preamble to the final rule. Consequently, the Centralized Waste Treatment effluent guidelines and standards are not directly applicable to the biodiesel manufacturing process operations. However, wastewater from biodiesel manufacturing processes taken to a CWT facility for treatment does not affect the receiving CWT’s need to comply with appropriate requirements of 40 CFR 437.

Miscellaneous Foods and Beverages Industry

During EPA’s 2005 annual review of its effluent guidelines, the Agency identified 26 four-digit SIC codes related to the manufacture of a variety of food and beverage products that were not covered by any existing effluent guidelines. EPA found that industries in these 26 SIC codes were properly considered a potential new stand-alone category based on the similarity of products produced as well as the similarity of their operations and wastewater characteristics. EPA’s finding is supported by the fact that EPA had previously considered many of these industries to be part of a stand-alone category – the Miscellaneous Foods and Beverages Point Source Category – when it began effluent guidelines rulemaking for this industry in the 1970s.²⁶

The Miscellaneous Foods and Beverages point source category includes the following sectors: vegetable oil processing and refining; beverages; bakery and confectionary products; pet foods; and miscellaneous and specialty products. Two of the SIC codes used to identify these facilities can overlap with the SIC codes used to identify biodiesel manufacturing facilities.

- Soybean Oil Mills (2075); and
- Shortening, Table Oils, Margarine, and Other Edible Fats and Oils, Not Elsewhere Classified (2079).

This overlap may be explained, to some extent, by the integration of biodiesel as an additional production output from traditional vegetable oil and animal feed manufacturing facilities.

²⁶ EPA, 2006. “Technical Support Document for the 2006 Effluent Guidelines Program Plan,” EPA-821R-06-018, Page 20-21, December. [Available at: <http://www.epa.gov/guide/304m/2006-TSD-whole.pdf>]

EPA has not established effluent guidelines or standards for this category. Consequently, there are no limitations or standards from this category to potentially apply to the biodiesel manufacturing process.

Summary

Currently there are no effluent limitations guidelines, new source performance standards, or categorical pretreatment standards that regulate process wastewater discharges from the biodiesel manufacturing process. As no national effluent guidelines exist, site-specific, technology-based effluent limitations are to reflect the best professional judgment (BPJ) of the permit writer, taking into account the same statutory factors EPA would use in promulgating a national effluent guideline, but applied to the particular circumstances relating to the applicant.

Promoting use of resin refining technology in lieu of the more common solvent-based process would substantially reduce or eliminate biodiesel production wastewater and disposal concerns generated by the transesterification production process.

Pretreatment control authorities should consider the prohibition of biodiesel manufacturing process wastewaters which contain glycerin, solvents, and/or residual biodiesel product to POTWs. If the indirect discharge of this wastewater is permitted, the pretreatment control authority should exercise a high degree of caution. Control authorities should cite their authority per the specific prohibitions in 40 CFR 403.5(b)(3) and 40 CFR 403.5(b)(1), or more stringent local requirements for sewer discharges, when composing specific narratives to control these pollutants in industrial user permits or other control mechanisms.

Where process wastewater is of sufficient quality, and free of biodiesel product and solvent, its acceptance as a hauled waste at a POTW may be possible if the control authority determines that it is not a risk for pass-through of, or interference with, its treatment processes. If glycerin-containing wastewater can not be marketed or discharged to a POTW by a manufacturer, then the permitting authority should recommend that the manufacturer transport it to a permitted centralized waste treatment facility for disposal or consider switching to a resin refining process. If a glycerin byproduct does not contain any free liquids and can not be marketed by the manufacturer, then obtaining approval for disposal at a permitted landfill is preferred over sewer disposal.

Where residual biodiesel product or refining solvents such as unreacted methanol are present in the process wastewater, the risk of explosions in the collection, transmission, or treatment systems of a POTW may exist. Permits or other control mechanisms should require manufacturers to recover these pollutants to the greatest extent possible before discharge.

This memorandum deals only with NPDES wastewater discharge requirements under the Clean Water Act and does not address other Federal, state, and local requirements that may apply. Questions on this memorandum should be directed to Ms. Karrie-Jo Shell, U.S. EPA-Region 4, Water Management Division, or Mr. Carey Johnston, U.S. EPA, Office of Science and Technology: (404) 562-9308, and (202) 566-1014, respectively.