

**PART 240—GUIDELINES FOR THE THERMAL PROCESSING OF SOLID WASTES**

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**APPENDIX TO PART 240—RECOMMENDED BIBLIOGRAPHY**

**AUTHORITY:** Sec. 209(a), Solid Waste Disposal Act of 1965 (Pub. L. 89-272); as amended by the Resource Recovery Act of 1970 (Pub. L. 91-512).

**SOURCE:** 39 FR 29329, Aug. 14, 1974, unless otherwise noted.

**Subpart A—General Provisions**

**§ 240.100 Scope.**

(a) The prescribed guidelines are applicable to thermal processing facilities designed to process or which are processing 50 tons or more per day of municipal-type solid wastes. The application of this capacity criterion will be interpreted to mean any facility designed to process or actually processing 50/24 tons or more per hour. However, the guidelines do not apply to hazardous, agricultural, and mining wastes because of the lack of sufficient information upon which to base recommended procedures.

(b) The requirement sections contained herein delineate minimum levels of performance required of any solid waste thermal processing operation. The recommended procedures sections are presented to suggest preferred methods by which the objectives of the requirements can be realized. The recommended procedures are based on the practice of incineration at large facilities (50 tons per day or more) processing municipal solid waste. If techniques other than the recommended procedures are used or wastes other than municipal wastes are processed, it is the obligation of the facility's owner and operator to demonstrate to the responsible agency in advance by means of engineering calculations, pilot plant data, etc., that the techniques employed will satisfy the requirements.

(c) Thermal processing residue must be disposed of in an environmentally acceptable manner. Where a land disposal facility is employed, it must be in accordance with the Environmental

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Protection Agency's Guidelines for the Land Disposal of Solid Wastes for both residues from the thermal processing operation and those non-hazardous wastes which cannot be thermally processed for reasons of health, safety, or technological limitation.

(d) Pursuant to section 211 of the Solid Waste Disposal Act, as amended, these guidelines are mandatory for Federal agencies. In addition, they are recommended to State, interstate, regional, and local government agencies for use in their activities.

(e) The guidelines are intended to apply equally to all solid waste generated by Federal agencies, regardless of whether processed or disposed of on or off Federal property; and solid waste generated by non-Federal entities, but processed or disposed of on Federal property. However, in the case of many Federal facilities such as Post Offices, military recruiting stations, and other offices, local community solid waste processing and disposal facilities are utilized, and processing and disposal is not within the management control of the Federal agency. Thus, implementation of the guidelines can be expected only in those situations where the Federal agency is able to exercise direct management control over the processing and disposal operations. However, every effort must be made by the responsible agency, where offsite facilities are utilized, to attain processing and disposal facilities that are in compliance with the guidelines. Where non-Federal generated solid waste is processed and disposed of on Federal land and/or facilities, those facilities and/or sites must be in compliance with these guidelines. Determination of compliance to meet the requirements of the guidelines rests with the responsible agency, and they have the authority to determine how such compliance may occur.

**§ 240.101 Definitions.**

As used in these guidelines:

(a) *Air*: *Overfire air* means air, under control as to quantity and direction, introduced above or beyond a fuel bed by induced or forced draft. "Underfire air" means any forced or induced air, under control as to quantity and direction, that is supplied from beneath and

which passes through the solid wastes fuel bed.

(b) *Bottom ash* means the solid material that remains on a hearth or falls off the grate after thermal processing is complete.

(c) *Combustibles* means materials that can be ignited at a specific temperature in the presence of air to release heat energy.

(d) *Design capacity* means the weight of solid waste of a specified gross calorific value that a thermal processing facility is designed to process in 24 hours of continuous operation; usually expressed in tons per day.

(e) *Discharge* means water-borne pollutants released to a receiving stream directly or indirectly or to a sewerage system.

(f) *Emission* means gas-borne pollutants released to the atmosphere.

(g) *Facility* means all thermal processing equipment, buildings, and grounds at a specific site.

(h) *Fly ash* means suspended particles, charred paper, dust, soot, and other partially oxidized matter carried in the products of combustion.

(i) *Free moisture* means liquid that will drain freely by gravity from solid materials.

(j) *Furnace* means the chambers of the combustion train where drying, ignition, and combustion of waste material and evolved gases occur.

(k) *Grate siftings* means the materials that fall from the solid waste fuel bed through the grate openings.

(l) *Gross calorific value* means heat liberated when waste is burned completely and the products of combustion are cooled to the initial temperature of the waste. Usually expressed in British thermal units per pound.

(m) *Hazardous waste* means any waste or combination of wastes which pose a substantial present or potential hazard to human health or living organisms because such wastes are nondegradable or persistent in nature or because they can be biologically magnified, or because they can be lethal, or because they may otherwise cause or tend to cause detrimental cumulative effects.

(n) *Incineration* means the controlled process which combustible solid, liquid, or gaseous wastes are burned and changed into noncombustible gases.

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(o) *Incinerator* means a facility consisting of one or more furnaces in which wastes are burned.

(p) *Infectious waste* means: (1) Equipment, instruments, utensils, and fomites of a disposable nature from the rooms of patients who are suspected to have or have been diagnosed as having a communicable disease and must, therefore, be isolated as required by public health agencies; (2) laboratory wastes such as pathological specimens (e.g., all tissues, specimens of blood elements, excreta, and secretions obtained from patients or laboratory animals) and disposable fomites (any substance that may harbor or transmit pathogenic organisms) attendant thereto; (3) surgical operating room pathologic specimens and disposable fomites attendant thereto and similar disposable materials from outpatient areas and emergency rooms.

(q) *Municipal solid wastes* means normally, residential and commercial solid wastes generated within a community.

(r) *Open burning* means burning of solid wastes in the open, such as in an open dump.

(s) *Open dump* means a land disposal site at which solid wastes are disposed of in a manner that does not protect the environment, are susceptible to open burning, and are exposed to the elements, vectors, and scavengers.

(t) *Plans* means reports and drawings, including a narrative operating description, prepared to describe the facility and its proposed operation.

(u) *Residue* means all the solids that remain after completion of thermal processing, including bottom ash, fly ash, and grate siftings.

(v) *Responsible agency* means the organizational element that has the legal duty to ensure that owners, operators, or users of facilities comply with these guidelines.

(w) *Sanitary landfill* means a land disposal site employing an engineered method of disposing of solid wastes on land in a manner that minimizes environmental hazards by spreading the solid wastes in thin layers, compacting the solid wastes to the smallest practical volume, and applying and compacting cover material at the end of each operating day.

(x) *Sludge* means the accumulated semiliquid suspension of settled solids deposited from wastewaters or other fluids in tanks or basins. It does not include solids or dissolved material in domestic sewage or other significant pollutants in water resources, such as silt, dissolved or suspended solids in industrial wastewater effluents, dissolved materials in irrigation return flows or other common water pollutants.

(y) *Solid wastes* means garbage, refuse, sludges, and other discarded solid materials resulting from industrial and commercial operations and from community activities. It does not include solids or dissolved material in domestic sewage or other significant pollutants in water resources, such as silt, dissolved or suspended solids in industrial wastewater effluents, dissolved materials in irrigation return flows or other common water pollutants.

(z) *Special wastes* means nonhazardous solid wastes requiring handling other than that normally used for municipal solid waste.

(aa) *Thermal processing* means processing of waste material by means of heat.

(bb) *Vector* means a carrier, usually an arthropod, that is capable of transmitting a pathogen from one organism to another.

### Subpart B—Requirements and Recommended Procedures

#### § 240.200 Solid wastes accepted.

#### § 240.200-1 Requirement.

In consultation with the responsible agencies, the owner/operator shall determine what wastes shall be accepted and shall identify any special handling required. In general, only wastes for which the facility has been specifically designed shall be accepted; however, other wastes may be accepted if it has been demonstrated to the responsible agency that they can be satisfactorily processed within the design capability of the facility or after appropriate facility modifications.

#### § 240.200-2 Recommended procedures: Design.

(a) In addition to the residential and commercial wastes normally processed

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at municipal-scale incinerators, certain special wastes might be considered for processing. These include: Certain bulky wastes (e.g., combustible demolition and construction debris, tree stumps, large timbers, furniture, and major appliances), digested and dewatered sludges from waste water treatment facilities, raw sewage sludges, and septic tank pumpings.

(b) If the facility is designed to handle special wastes, special areas should be provided where appropriate for storage while they await processing.

**§ 240.200-3 Recommended procedures: Operations.**

(a) Storage areas for special wastes should be clearly marked.

(b) Facility personnel should be thoroughly trained in any unusual handling required by acceptance of Special Wastes.

**§ 240.201 Solid wastes excluded.****§ 240.201-1 Requirement.**

Using information provided to them by the waste generator/owner, the responsible agency and the facility owner/operator shall jointly determine specific wastes to be excluded and shall identify them in the plans. The generator/owner of excluded wastes shall consult with the responsible agency in determining an alternative method of disposal for excluded wastes. The criteria used in considering whether a waste is unacceptable shall include the facility's capabilities, alternative methods available, the chemical and biological characteristics of the waste, environmental and health effects, and the safety of personnel. Disposal of pesticides and pesticide containers shall be consistent with the Federal Environmental Pesticides Control Act of 1972 (Pub. L. 92-516) and recommended procedures promulgated thereunder.

**§ 240.201-2 Recommended procedures: Design.**

(a) Provision for storing, handling, and removing hazardous or excluded wastes inadvertently left at the facility should be considered in design.

(b) Examples of wastes which should be considered for exclusion from the facility include: Hazardous wastes, very

large carcasses, automobile bodies, dewatered sludges from water treatment plants, and industrial process wastes.

**§ 240.201-3 Recommended procedures: Operations.**

(a) Regular users of the facility should be given a list of excluded materials. The list should also be displayed prominently at the facility entrance. If a regular user persists in making unacceptable deliveries, he should be barred from the installation and reported to the responsible agency.

(b) The operating plan should specify the procedures and precautions to be taken if unacceptable wastes are delivered to the facility or are improperly left there. Operating personnel should be thoroughly trained in such procedures.

**§ 240.202 Site selection.****§ 240.202-1 Requirement.**

Site selection and utilization shall be consistent with public health and welfare, and air and water quality standards and adaptable to appropriate land-use plans.

**§ 240.202-2 Recommended procedures: Design.**

(a) Whenever possible, thermal processing facilities should be located in areas zoned for industrial use and having adequate utilities to serve the facility.

(b) The site should be accessible by permanent roads leading from the public road system.

(c) Environmental factors, climatological conditions, and socioeconomic factors should be given full consideration as selection criteria.

**§ 240.202-3 Recommended procedures: Operations.**

Not applicable.

**§ 240.203 General design.****§ 240.203-1 Requirement.**

A plan for the design of new facilities or modifications to existing facilities shall be prepared or approved by a professional engineer. A list of major considerations and the rationale for the

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decision on each consideration shall be approved by the responsible agency prior to authorization for construction. This information shall remain available for review.

**§ 240.203-2 Recommended procedures: Design.**

(a) The types, amounts (by weight and volume), and characteristics of all solid wastes expected to be processed should be determined by survey and analysis. The gross calorific value of the solid wastes to be processed should be determined to serve as a basis for design.

(b) Resource recovery in the form of heat utilization or direct recovery of materials should be considered in the design.

(c) The facility should be designed to be compatible with the surrounding area, easy to maintain, and consistent with the land use of the area.

(d) Employee convenience facilities and plant maintenance facilities should be provided. Adequate lighting should be provided throughout the facility.

(e) The corrosive and erosive action of once-through and recirculated process waters should be controlled either by treating them or by using materials capable of withstanding the adverse effects of the waters.

(f) Facility design capacity should consider such items as waste quantity and characteristics, variations in waste generation, equipment downtime, and availability of alternate storage, processing, or disposal capability.

(g) Facility systems and subsystems should be designed to assure standby capability in the event of breakdown. Provision for standby water and power should also be considered.

(h) Instrumentation should be provided to determine such factors as: The weight of incoming and outgoing materials (the same scale system may be used for both); total combustion airflow rates; underfire and overfire airflows and the quantitative distribution of each; selected temperatures and pressures in the furnace, along gas passages, in the particulate collection device, and in the stack; electrical power and water consumption of critical units; and rate of operation. The smoke

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density, the concentration of carbon monoxide, or the concentration of hydrocarbons in the stack gases should be monitored. Measurement of the pH should be considered for effluent waters. Continuously recording instrumentation should be used as much as possible.

(i) Audible signals should be provided to alert operating personnel of critical operating unit malfunctions.

(j) Sampling capability should be designed into the facility so that each process stream can be sampled, and the utilities required to do so should be close at hand. The sampling sites should be so designed that personnel can sample safely without interfering with normal plant operations.

(k) A laboratory should be included in the design, or provision should be made for laboratory analyses to be performed by an outside source acceptable to the responsible agency.

**§ 240.203-3 Recommended procedures: Operations.**

Not applicable.

**§ 240.204 Water quality.****§ 240.204-1 Requirement.**

All waters discharged from the facility shall be sufficiently treated to meet the most stringent of applicable water quality standards, established in accordance with or effective under the provisions of the Federal Water Pollution Control Act, as amended.

**§ 240.204-2 Recommended procedures: Design.**

(a) Effluent waters should not be discharged indiscriminately. Consideration should be given to onsite treatment of process and waste waters before discharge.

(b) Recirculation of process waters should be considered.

**§ 240.204-3 Recommended procedures: Operations.**

(a) When monitoring instrumentation indicates excessive discharge contamination, appropriate adjustments should be made to lower the concentrations to acceptable levels.

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(b) In the event of an accidental spill, the local regulatory agency should be notified immediately.

### **§ 240.205 Air quality.**

#### **§ 240.205-1 Requirement.**

Emissions shall not exceed applicable existing emission standards established by the U.S. Environmental Protection Agency (as published in parts 52, 60, 61 and 76 of this chapter) under the authority of the Clean Air Act, as amended, or State or local emission standards effective under that Act, if the latter are more stringent.

#### **§ 240.205-2 Recommended procedures: Design.**

(a) These requirements should be met by using appropriate air pollution control technology.

(b) All emissions, including dust from vents, should be controlled.

#### **§ 240.205-3 Recommended procedures: Operations.**

When monitoring instrumentation indicates excessive emissions, appropriate adjustments should be made to lower the emission to acceptable levels.

### **§ 240.206 Vectors.**

#### **§ 240.206-1 Requirement.**

Conditions shall be maintained that are unfavorable for the harboring, feeding, and breeding of vectors.

#### **§ 240.206-2 Recommended procedures: Design.**

Thermal processing facilities should be designed for ease of cleaning. Areas favorable for breeding of vectors should be avoided.

#### **§ 240.206-3 Recommended procedures: Operations.**

(a) A housekeeping schedule should be established and maintained. As a minimum the schedule should provide for cleaning the tipping and residue areas as spillages occur, emptying the solid waste storage area at least weekly, and routinely cleaning the remainder of the facility.

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(b) Solid waste and residue should not be allowed to accumulate at the facility for more than one week.

### **§ 240.207 Aesthetics.**

#### **§ 240.207-1 Requirement.**

The incinerator facility shall be designed and operated at all times in an aesthetically acceptable manner.

#### **§ 240.207-2 Recommended procedures: Design.**

The facility should be designed so that it is physically attractive. The tipping, residue discharge, and waste salvage areas should be screened from public view, and the grounds should be landscaped.

#### **§ 240.207-3 Recommended procedures: Operations.**

(a) A routine housekeeping and litter removal schedule should be established and implemented so that the facility regularly presents a neat and clean appearance.

(b) Solid wastes that cannot be processed by the facility should be removed from the facility at least weekly. Open burning or open dumping of this material should be prohibited.

### **§ 240.208 Residue.**

#### **§ 240.208-1 Requirement.**

Residue and other solid waste products resulting from a thermal process shall be disposed of in an environmentally acceptable manner. Where land disposal is employed, practices must be in conformance with the U.S. Environmental Protection Agency's Guidelines for the Land Disposal of Solid Wastes. Unwanted residue materials remaining after the recovery operation shall be disposed of in a manner which protects the environment. Where land disposal is employed, practices must be in conformance with the U.S. Environmental Protection Agency's Guidelines for the Land Disposal of Solid Wastes.

#### **§ 240.208-2 Recommended procedures: Design.**

Thermal processing facilities should be so designed as to allow for removal from the site of residue or other solids

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in a manner that protects the environment.

### § 240.208-3 Recommended procedures: Operations.

(a) The furnace operator should visually observe the quality of the bottom ash at least twice per shift and record in the operating log the estimated percentage of unburned combustibles.

(b) If residue or fly ash is collected in a wet condition, it should be drained of free moisture. Transportation of residue and fly ash should be by means that prevent the loads from shifting, falling, leaking, or blowing from the container.

## § 240.209 Safety.

### § 240.209-1 Requirement.

Incinerators shall be designed, operated, and maintained in a manner to protect the health and safety of personnel associated with the operation of the facility. Pertinent provisions of the Occupational Safety and Health Act of 1970 (Pub. L. 91-596) and regulations promulgated thereunder shall apply.

### § 240.209-2 Recommended procedures: Design.

(a) Attention should be given to the safety of operators and vehicles through the provision of safety devices.

(b) Fire control equipment should be provided.

(c) Methods and/or equipment for removal of an injured person from the storage pit should be available.

### § 240.209-3 Recommended procedures: Operations.

(a) Detailed procedures should be developed for operation during such emergency situations as power failure, air or water supply failure, equipment breakdowns, and fire. These procedures should be posted in prominent locations, implemented by the staff as required, and upgraded and revised periodically.

(b) Approved respirators or self-contained breathing apparatus should be available at convenient locations. Their use should be reviewed periodically with facility personnel. Information on this type equipment can be obtained from the Appalachian Labora-

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tory for Occupational Respiratory Disease, National Institute for Occupational Safety and Health, Morgantown, W. Va.

(c) Training in first aid practices and emergency procedures should be given all personnel.

(d) Personal safety devices such as hard hats, gloves, safety glasses, and footwear should be provided for facility employees.

(e) If a regular user or employee persistently poses a safety hazard he should be barred from the facility and reported to the responsible agency.

## § 240.210 General operations.

### § 240.210-1 Requirement.

The thermal processing facility shall be operated and maintained in a manner that assures it will meet the design requirements. An operations manual describing the various tasks to be performed, operating procedures, and safety precautions for various areas of the facility shall be developed and shall be readily available for reference by plant personnel.

### § 240.210-2 Recommended procedures: Design.

Not applicable.

### § 240.210-3 Recommended procedures: Operations.

(a) The facility supervisor should be experienced in the operation of the type of facility designed or, in the case of an innovated design, be adequately trained by responsible personnel in the operation of the facility.

(b) Alternate and standby disposal and operating procedures should be established for implementation during emergencies, air pollution episodes, and shutdown periods.

(c) Upon completion of facility construction, provision should be made for instruction of the staff in proper operation and maintenance procedures.

(d) A routine maintenance schedule should be established and followed.

(e) As-built engineering drawings of the facility should be provided at the conclusion of construction of the facility. These should be updated to show modifications by the owner as changes

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are made and should be readily available. A schematic showing the relationships of the various subsystems should also be available.

(f) Key operational procedures should be prominently posted.

(g) Equipment manuals, catalogs, spare parts lists, and spare parts should be readily available at the facility.

(h) Training opportunities for facility operating personnel should be provided.

### **§ 240.211 Records.**

#### **§ 240.211-1 Requirement.**

The owner/operator of the thermal processing facility shall provide records and monitoring data as required by the responsible agency.

#### **§ 240.211-2 Recommended procedures: Design.**

Continuously recording instrumentation should be used as much as possible.

#### **§ 240.211-3 Recommended procedures: Operations.**

(a) Extensive monitoring and record keeping should be practiced during the first 12 to 18 months of operation of a new or renovated facility, during periods of high air pollution, and during periods of upset conditions at the facility.

(b) During other periods of more normal operation of the facility, less extensive monitoring and record keeping may be practiced if approved by the responsible agency.

(c) Operating records should be kept in a daily log and should include as a minimum:

(1) The total weight and volume (truck capacities may be used for volume determination) of solid waste received during each shift, including the number of loads received, the ownership or specific identity of delivery vehicles, the source and nature of the solid wastes accepted.

(2) Furnace and combustion chamber temperatures recorded at least every 60 minutes and as changes are made, including explanations for prolonged, abnormally high and low temperatures.

(3) Rate of operation, such as grate speed.

(4) Overfire and underfire air volumes and pressure and distribution recorded at least every 60 minutes and as changes are made.

(5) Weights of bottom ash, grate siftings, and fly ash, individually or combined, recorded at intervals appropriate to normal facility operation.

(6) Estimated percentages of unburned material in the bottom ash.

(7) Water used on each shift for bottom ash quenching and scrubber operation. Representative samples of process waters should be collected and analyzed as recommended by the responsible agency.

(8) Power produced and utilized each shift. If steam is produced, quality, production totals and consumption rates should be recorded.

(9) Auxiliary fuel used each shift.

(10) Gross calorific value of daily representative samples of bottom ash, grate siftings, and fly ash. (Sampling time should be varied so that all shifts are monitored on a weekly basis.)

(11) Emission measurements and laboratory analyses required by the responsible agency.

(12) Complete records of monitoring instruments.

(13) Problems encountered and methods of solution.

(d) An annual report should be prepared which includes at least the following information:

(1) Minimum, average, and maximum daily volume and weight of waste received and processed, summarized on a monthly basis.

(2) A summary of the laboratory analyses including at least monthly averages.

(3) Number and qualifications of personnel in each job category; total manhours per week; number of State certified or licensed personnel; staffing deficiencies; and serious injuries, their cause and preventive measures instituted.

(4) An identification and brief discussion of major operational problems and solutions.

(5) Adequacy of operation and performance with regard to environmental requirements, the general level of housekeeping and maintenance, testing and reporting proficiency, and recommendations for corrective actions.

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(6) A copy of all significant correspondence, reports, inspection reports, and any other communications from enforcement agencies.

(e) Methodology for evaluating the facility's performance should be developed. Evaluation procedures recommended by the U.S. Environmental Protection Agency should be used whenever possible (see bibliography).

### APPENDIX TO PART 240—RECOMMENDED BIBLIOGRAPHY

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## PART 241—SOLID WASTES USED AS FUELS OR INGREDIENTS IN COMBUSTION UNITS

### Subpart A—General

Sec.

241.1 Purpose.

## 40 CFR Ch. I (7-1-24 Edition)

241.2 Definitions.

### Subpart B—Identification of Non-Hazardous Secondary Materials That Are Solid Wastes When Used as Fuels or Ingredients in Combustion Units

241.3 Standards and procedures for identification of non-hazardous secondary materials that are solid wastes when used as fuels or ingredients in combustion units.

241.4 Non-Waste Determinations for Specific Non-Hazardous Secondary Materials When Used as a Fuel.

AUTHORITY: 42 U.S.C. 6903, 6912, 7429.

SOURCE: 76 FR 15549, Mar. 21, 2011, unless otherwise noted.

### Subpart A—General

#### § 241.1 Purpose.

This part identifies the requirements and procedures for the identification of solid wastes used as fuels or ingredients in combustion units under section 1004 of the Resource Conservation and Recovery Act and section 129 of the Clean Air Act.

#### § 241.2 Definitions.

For the purposes of this subpart:

*Clean cellulosic biomass* means those residuals that are akin to traditional cellulosic biomass, including, but not limited to: Agricultural and forest-derived biomass (e.g., green wood, forest thinnings, clean and unadulterated bark, sawdust, trim, tree harvesting residuals from logging and sawmill materials, hogged fuel, wood pellets, untreated wood pallets); urban wood (e.g., tree trimmings, stumps, and related forest-derived biomass from urban settings); corn stover and other biomass crops used specifically for the production of cellulosic biofuels (e.g., energy cane, other fast growing grasses, by-products of ethanol natural fermentation processes); bagasse and other crop residues (e.g., peanut shells, vines, orchard trees, hulls, seeds, spent grains, cotton byproducts, corn and peanut production residues, rice milling and grain elevator operation residues); wood collected from forest fire clearance activities, trees and clean wood found in disaster debris, clean biomass from land clearing operations, and clean construction and demolition wood. These fuels are not secondary