Appendix B: List of Some of the Standards Applicable to Ethanol Manufacturing Facilities

Applicable Standards	**Relevancy to Ethanol Manufacturing Facilities**	**Example Requirements in Applicable Standards**
29 CFR 1926.1101- Asbestos	If construction, repairs or modification of an ethanol processing facility involves the demolition or renovation of structures, the asbestos standard or National Emission Standards for Hazardous Air Pollutants (NESHAP) regulation (40 CFR 61 Subpart M) may apply.	Regulates asbestos exposure in all construction work including but not limited to construction, alteration, repair, maintenance, or renovation of structures, substrates, or portions thereof, that contain asbestos. Construction work means work for construction, alteration, and/or repair, including painting and decorating (29 CFR 1910.12(b)).
29 CFR 1910.1020 - Access to Employee Exposure and Medical Records	Some ethanol manufacturing facilities are expected to keep medical records of their employees.	Requires employers to provide workers and their representatives with the right to access any relevant exposure and medical records.
29 CFR 1910.1028 – Benzene 29 CFR 1926.1128 - Benzene	Benzene is a component of gasoline. Gasoline is used as a denaturant in ethanol manufacturing facilities. Applicability will depend on the benzene content in the gasoline used and other possible exemptions.	Includes requirements for monitoring, engineering controls, respiratory protection, hazard communication, recordkeeping, medical surveillance, work practices, permissible exposure limit, and short-term exposure limit.
29 CFR 1910.1026 – Chromium VI 29 CFR 1926.1126 – Chromium VI	Hexavalent chromium may be produced from the welding or torch cutting of piping and vessels made of steel.	Includes requirements for the permissible exposure limit (PEL), action level, employee monitoring, exposure determination and more.
Combustible Dust National Emphasis Program	All types of ethanol manufacturing facilities will have combustible dusts, with the types of dust present dependent upon the feedstock used.	OSHA has issued an Advance Notice of Proposed Rulemaking for combustible dust (Combustible Dust; Advance notice of

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	The chief concerns for combustible dusts are the increased risk for major fires and explosions.	proposed rulemaking, 74:54333-54347 (10/21/2009)) NFPA has published consensus standards (e.g., NFPA 61) that outline administrative and engineering controls for preventing grain dust fires and explosions.
29 CFR 1910.101 - Compressed Gases	Some ethanol manufacturing facilities use compressed gases. Some facilities capture carbon dioxide formed during fermentation and may compress the gas on site.	Requires employers to manage hazards by ensuring that gas cylinders are stored and handled safely and by equipping certain compressed gas containers with pressure relief devices. Several other requirements also apply.
29 CFR 1910.147 - The Control of Hazardous Energy (lockout/tagout)	This standard covers the servicing and maintenance of machines and equipment in which the unexpected energization or startup of the machines or equipment, or release of stored energy, could harm employees. Ethanol manufacturing facilities use several equipment and machines that must be maintained/repaired to ensure that they function properly.	Specifies that employers must establish a program consisting of energy control procedures, worker training, and periodic inspections to ensure that before any worker performs any servicing or maintenance on a machine or equipment where the unexpected energizing, startup, or release of stored energy could occur and cause injury, the machine or equipment must be isolated from the energy source and rendered inoperative.
29 CFR 1910 Subpart L - Fire Protection 29 CFR 1926 Subpart F – Fire Protection and Prevention	Standards pertain to fire detection, fire suppression, and employee alarm systems—all of which are relevant to ethanol manufacturing facilities given the presence of flammable chemicals.	Outlines requirements for fire brigades, automatic sprinkler systems, portable and fixed fire extinguishing systems, fire detection systems, and alarm systems.
29 CFR 1910. Subpart S - Electrical	Electrical equipment always has the potential for presenting a fire hazard. This is particularly important in production areas with ethanol vapors and grain dusts.	Includes four types of requirements to ensure the use of safe electrical installations: (1) design safety standards, (2) safety-related work practices, (3) safety-related maintenance requirements, and (4) requirements for special equipment.

Applicable Standards	Relevancy to Ethanol Manufacturing Facilities	Example Requirements in Applicable Standards
29 CFR 1910.307 – Electrical Hazardous (Classified) Locations	Electric equipment and wiring pose an ignition source for areas known or suspected to contain flammable vapors or combustible dusts.	Defines the classification scheme for hazardous locations and requires electrical equipment, wiring, and installations to be of the type approved for the hazardous location classification.
29 CFR 1926 Subpart M – Fall protection 29 CFR 1926 Subpart X – Stairways and Ladders 29 CFR 1910 Subpart D – Walking-Working Surfaces	Requirements to protect workers from slips, trips and falls hazards on working and walking surfaces and safety requirements on ladders and stairways.	Includes provisions for fall protection, such as guard rails and covers.
29 CFR 1910.106 - Flammable and Combustible Liquids 29 CFR 1926.152- Flammable Liquids	Ethanol and several other liquids used in these processes are flammable. The flammable liquids are stored, formed, and transferred between ethanol manufacturing facilities.	Provides requirements for storage containers, ventilation near flammable liquids, control of ignition sources, and housekeeping and maintenance.
29 CFR 1910.272 - Grain Handling Facilities	Ethanol manufacturing facilities that process grain feedstock (e.g., corn) receive, handle, and store large quantities of grain on a daily basis. This material poses dust fire, explosion, and engulfment hazards.	Requires administrative and engineering controls to prevent engulfment hazards and fire and explosion hazards from combustible dusts. Controls include training, hot work permits, housekeeping, proper design and installation of equipment, preventive equipment maintenance and inspections, emergency escape plans, and various engulfment prevention measures.
29 CFR 1910 Subpart P - Hand and Portable Powered Tools and Other Hand-Held Equipment	Many workers at ethanol manufacturing facilities, especially maintenance personnel, use a variety of hand and portable power tools, which present physical hazards.	Requires tools be in safe condition, properly used and fit for the task, equipped with guards (as necessary), and equipped with automatic power shutoffs.
29 CFR 1910.1200 - Hazard Communication	The Hazard Communication Standard (HCS) requires chemical manufacturers or importers to classify the hazards of chemicals which they produce or import, and *all* employers to provide information to their workers about the hazardous chemicals they are exposed to.	Requires employers to provide information to their workers about the hazardous chemicals they are exposed to by means of a hazard communication program, labels, safety data sheets, and information and training.

Applicable Standards	Relevancy to Ethanol Manufacturing Facilities	Example Requirements in Applicable Standards
29 CFR 1910.120 - Hazardous Waste Operations and Emergency Response (HAZWOPER)	Specifies OSHA's requirements for emergency response operations involving releases of hazardous substances.	Provides requirements on decontamination, training, emergency response plans, PPE, an incident command system, and site safety and control plans.
International Code Council Codes and Standards (Ethanol Fixed Facilities: Assessment and Guide, 1st Edition, IAFC, 2008)	ICC makes every effort to provide current, accurate code adoption information, but in some cases jurisdictions do not notify ICC of adoptions, amendments, or changes to their codes. To ensure you have accurate information, please contact the jurisdiction directly. The International Code State and Jurisdiction Adoption Charts are works in progress. The information contained herewith has been provided by individuals involved in local jurisdictions and state legislatures.	Chapter 9 Fire Protection Systems: Section 903 Automatic Sprinkler Systems Section 907 Alarm and Detection System Chapter 10 Means of Egress and Exits Chapter 13 Combustible Dust-Producing Operations Chapter 27 Hazardous Materials: Section 2703 General Section 2704 Storage Section 2705 Use, Dispensing, and Handling Chapter 31 Corrosive Materials: Section 3103 General Requirements Section 3104 Storage Section 3105 Use Chapter 34 Flammable Liquids: Section 3403 General Requirements

Applicable Standards	Relevancy to Ethanol Manufacturing Facilities	Example Requirements in Applicable Standards
		Section 3404 Storage Section 3405 Dispensing, Mixing, and Handling Section 3406 Special Operations. Bulk Plants, Terminals, and Transfers Appendix B Fire Flow Requirements Appendix C Fire Hydrant Location and Distribution
29 CFR 1910.212 – Machinery and Machine Guarding	Some machines used in ethanol processing facilities require point of operation guarding, e.g., milling machine.	Specifies that one or more methods of machine guarding must be provided to protect operators and other workers in the machine area from hazards such as those created by the point of operation, ingoing nip points, rotating parts, flying chips and sparks. Examples of guarding methods are: barrier guards, two-hand tripping devices, and electronic safety devices.
Managing Your Environmental Responsibilities: A Planning Guide for Construction and Development A Planning Guide for Construction and Development, EPA/305-B-04-003, EPA, 2005	General planning guide for construction and development.	Provides information on environmental obligations for: *Pre-bid*. Requirements to be factored into cost estimates. *Pre-Construction.* Assignment of environmental responsibility to all parties before breaking ground. *During Construction.* Answers to ongoing environmental questions and how to conduct comprehensive self-audits.

Applicable Standards	Relevancy to Ethanol Manufacturing Facilities	Example Requirements in Applicable Standards
29 CFR 1910 Subpart E - Means of Egress 29 CFR 1910 Subpart L - Fire Protection	These standards address hazards arising from the possibility of fires and explosions in ethanol manufacturing and grain handling facilities,	Includes various requirements to ensure that all workers have a safe means of egress from facilities during fires, explosions, and other emergencies. Specific requirements address fire prevention plans, emergency action plans, safe exit routes, alarm systems, and employee training.
29 CFR 1910.151- Medical Services and First Aid	Employees can be injured while handling hazardous materials, working with process equipment, and performing other job duties.	Requires employers to ensure that medical personnel are available to discuss facility health-related issues. Includes requirements for individuals trained in first aid, eyewash stations, and first-aid supplies.
National Fire Protection Association (NFPA) Codes, Standards, Recommended Practices, and Guides	NFPA codes, standards, recommended practices, and guides are developed through a consensus standards development process approved by the American National Standards Institute (ANSI).	NFPA 10 Standard for Portable Fire Extinguishers NFPA 11 Standard for Low-, Medium-, and High-Expansion Foam NFPA 13 Standard for the Installation of Sprinkler Systems NFPA 14 Standard for the Installation of Standpipe and Hose Systems NFPA 30 Flammable and Combustible Liquids Code NFPA 61 Standard for the Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities NFPA 69 Standard on Explosion Prevention Systems NFPA 70E Standard for Electrical Safety in the Workplace

Applicable Standards	Relevancy to Ethanol Manufacturing Facilities	Example Requirements in Applicable Standards
		NFPA 77 Recommended Practice on Static Electricity NFPA 472 Standard for Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents NFPA 704 Standard System for the Identification of the Hazards of Materials for Emergency Response NFPA 1620 Recommended Practice for Pre-Incident Planning NFPA 1670 Standard on Operations and Training for Technical Search and Rescue Incidents
29 CFR 1910.95 – Occupational Noise Exposure 29 CFR 1926.52 – Occupational Noise Exposure	Protect workers from the effects of noise exposure, e.g., in grain processing areas, from noisy equipment.	Includes permissible noise exposure levels, preventive, and protective measures, e.g., hearing protection devices.
OSHA Construction Resource Manual	This publication gives employers and workers information, in a single source, on all OSHA requirements for the construction industry. This and other OSHA material are available on OSHA's Web site, on compact disk through GPO, as well as from OSHA field offices, and state consultation offices.	Contains relevant/mandatory standards for construction work that have been codified in Title 29 Code of Federal Regulations, including Parts 1903, 1904, 1910, and 1926.
29 CFR 1910.146 - Permit-Required Confined Spaces	Ethanol manufacturing facilities have numerous unit operations that employees must enter for cleaning, inspection, and maintenance purposes. These include, but are not limited to, distillation columns, tanks, and large fermentation vessels.	Requires a workplace assessment to determine whether spaces are permit-required. Further requires atmospheric testing and monitoring, ventilation, barriers to prevent external hazards, PPE, and an observer placed outside if assistance is needed.
29 CFR 1910 Subpart I - Personal Protective Equipment	Workers at ethanol manufacturing facilities potentially come into contact with various	Specifies circumstances in which PPE is required to prevent or reduce exposure to

Applicable Standards	Relevancy to Ethanol Manufacturing Facilities	Example Requirements in Applicable Standards
	hazardous materials and can be exposed through inhalation, absorption, or direct contact.	hazards of chemical liquids, gases, and vapors. Requirements apply to protecting eyes, face, head, feet, and hands. Respirator requirements are also covered.
29 CFR 1910.178 - Powered Industrial Trucks	Powered industrial trucks pose various safety hazards. Collisions can result in injuries and damage process equipment. Vehicles can also be ignition sources when used in the presence of flammable liquids and combustible dust.	Outlines safety requirements for powered industrial trucks, including their use, design, maintenance, and fire protection. Equipment should be rated for the specific environments in which they are used.
29 CFR 1910.119 – Process Safety Management of Highly Hazardous Chemicals 29 CFR 1910.119 App A - List of Highly Hazardous Chemicals, Toxics and Reactives (Mandatory) 1910.119 App B - Block Flow Diagram and Simplified Process Flow Diagram (Nonmandatory). 1910.119 App C - Compliance Guidelines and Recommendations for Process Safety Management (Nonmandatory). 1910.119 App D - Sources of Further Information (Nonmandatory).	Preventive measures in OSHA's PSM standard (29 CFR 1910.119) apply when a process involves a chemical at or above the specified threshold quantities, listed in Appendix A of the PSM standard and/or involves 10,000 pounds or more of a flammable gas or liquid, if the exemption discussed in Section I does not apply.	Contains numerous requirements to help facilities avoid catastrophic incidents. Examples include: gathering process safety information, conducting process hazard analyses, implementing operating practices and procedures, managing change, and assessing mechanical integrity of process equipment.
29 CFR 1910.111 - Storage and Handling of Anhydrous Ammonia	Some ethanol manufacturing facilities use ammonia in corn dry and wet milling processes. It can also be used to pretreat cellulosic feedstocks.	Outlines safety requirements for containers and components for ammonia handling and storage. Permissible exposure limit for ammonia is 50 ppm (35 mg/m^3 TWA).
29 CFR 1910 Subpart Z – Toxic and Hazardous Substances 29 CFR 1910.1000 - Air Contaminants 29 CFR 1926 Subpart Z – Toxic and Hazardous Substances	Workers at ethanol manufacturing facilities are potentially exposed to various air contaminants, depending on the processes with which they are involved.	Contains tables with substance-specific exposure limits that must not be exceeded in an 8-hour work shift over a 40-hour work week; also includes substances with ceiling values.

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U.S. Environmental Protection Agency: Environmental Laws Applicable to Construction and Operation of Ethanol Plants, November 2007 (EPA-907-B-07-001), EPA, 2007a	This compliance assistance manual serves as a road map of information on federal environmental programs and federal and state agency roles. Air, water, hazardous waste, accident prevention and release reporting are examples of requirements that might apply. This manual, like a road map, does not contain all the details of the federal and state statutes and regulations. Ethanol facility operators need to review the applicable statutes and regulations.	Includes information on environmental laws that apply when constructing or modifying an ethanol plant.
29 CFR 1910 Subpart D- Walking-Working Surfaces 29 CFR 1910.22 – General Requirements	Applies to virtually every workplace. Thorough and effective housekeeping programs are an effective administrative control for preventing hazardous combustible dust accumulations.	Requires all places of employment to be clean, orderly, and in a sanitary condition. Requires employers to maintain walking and working surfaces free of hazards, including accumulations of combustible dust.
29 CFR 1910 Subpart Q - Welding, Cutting, and Brazing	Welding, cutting, brazing, and other heating (i.e., "hot work") activities occur throughout ethanol manufacturing facilities, which increases fire risks when performed in the presence of flammable liquids (ethanol) and combustible dusts.	Addresses fire prevention and protection, worker protection, health protection and ventilation, and industrial applications. Covers specific aspects of these processes: oxygen-fuel gas welding and cutting, arc welding and cutting, and resistance welding.
Additional standards are listed throughout this technical manual in appropriate sections (e.g., VI.A.1; VI.A.2).		