Petrochemical Safety, Health, and Environment

Subject: Career and Technical Education
Grade: 11
Expectations: 28
Breakouts: 92

(a) Introduction.

1. Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

2. The Energy Career Cluster focuses on Texas's diverse economic landscape, geography and natural resources, including renewable energy potential, transportation system, labor force, and leadership in environmental research.

3. Petrochemical Safety, Health, and Environment addresses the shortage of process technology operators/technicians by educating students on the safety rules, regulations, and operations of the petrochemical process technology operator. Students enrolled in this course will learn about the knowledge and skills required in occupational safety, health, and environment as well as the governing regulatory authorities and the legal aspects of the industry in order to maintain a safe work environment.

4. Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.

5. Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.

(b) Knowledge and Skills Statements

(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:

(A) research the three major roles of safety, health, and environment as it pertains to process technology operators/technicians;

(i) research the three major roles of safety as it pertains to process technology operators/technicians

(ii) research the three major roles of health as it pertains to process technology operators/technicians

(iii) research the three major roles of environment as it pertains to process technology operators/technicians

(B) describe the role of process technicians in relation to safety, health, and environmental issues;

(i) describe the role of process technicians in relation to safety

(ii) describe the role of process technicians in relation to health

(iii) describe the role of process technicians in relation to environmental issues

(C) identify the importance of safety, health, and environment as they relate to the performance of all job tasks and regulatory compliance issues within the industries, including, but not limited to, petrochemical plants, refineries, oil and gas production, and power generation; and

(i) identify the importance of safety as [it] relates to the performance of all job tasks

(ii) identify the importance of health as [it] relates to the performance of all job tasks

(iii) identify the importance of environment as [it] relates to the performance of all job tasks

(iv) identify regulatory compliance issues within the industries, including, but not limited to, petrochemical plants

(v) identify regulatory compliance issues within the industries, including, but not limited to, refineries

(vi) identify regulatory compliance issues within the industries, including, but not limited to, oil and gas production

(vii) identify regulatory compliance issues within the industries, including, but not limited to, power generation

(D) explain the importance of interpreting the safety, health, and environmental procedures standards, requirements, and regulations as a process technology operator/technician.

(i) explain the importance of interpreting the safety procedures standards, requirements, and regulations as a process technology operator/technician

(ii) explain the importance of interpreting the health procedures standards, requirements, and regulations as a process technology operator/technician.

(iii) explain the importance of interpreting the environmental procedures standards, requirements, and regulations as a process technology operator/technician.

(2) The student examines compliance standards to ensure safe work practices as they relate to safety, health, and environmental regulations. The student is expected to:

(A) identify the legal governing agencies and describe regulatory requirements as they apply to the petrochemical industry, its employees, and the community;

(i) identify the legal governing agencies

(ii) describe regulatory requirements as they apply to the petrochemical industry

(iii) describe regulatory requirements as they apply to its [the petrochemical industry] employees

(iv) describe regulatory requirements as they apply to the community

(B) identify specific state and federal regulations and the related specific tasks performed by process technology operators/technicians;

(i) identify specific state regulations and the related specific tasks performed by process technology operators/technicians

(ii) identify specific federal regulations and the related specific tasks performed by process technology operators/technicians

(C) identify safety programs used in the gulf coast area;

(i) identify safety programs used in the gulf coast area

(D) determine types of administrative controls and permitting systems to ensure safe work practices, especially as the controls relate to confined spaces and log-out and tag-out (LOTO);

(i) determine types of administrative controls to ensure safe work practices, especially as the controls relate to confined spaces and log-out and tag-out (LOTO)

(ii) determine types of permitting systems to ensure safe work practices, especially as the controls relate to confined spaces and log-out and tag-out (LOTO)

(E) demonstrate the proper usage of typical safety equipment and systems used in local plants;

(i) demonstrate the proper usage of typical safety equipment used in local plants

(ii) demonstrate the proper usage of typical safety systems used in local plants

(F) describe how engineering controls are designed to allow process technology operators/technicians to operate equipment with system safeguards;

(i) describe how engineering controls are designed to allow process technology operators/technicians to operate equipment with system safeguards

(G) describe the different types of personal protective equipment (PPE), including fire resistant clothing (FRC), hard hats, safety shoes, hearing protection, safety glasses, and acid suits;

(i) describe the different types of personal protective equipment (PPE), including fire resistant clothing (FRC)

(ii) describe the different types of personal protective equipment (PPE), including hard hats

(iii) describe the different types of personal protective equipment (PPE), including safety shoes

(iv) describe the different types of personal protective equipment (PPE), including hearing protection

(v) describe the different types of personal protective equipment (PPE), including safety glasses

(vi) describe the different types of personal protective equipment (PPE), including acid suits

(H) evaluate the types of monitors that measure exposure ratings for noise, heat, and radiation;

(i) evaluate the types of monitors that measure exposure ratings for noise

(ii) evaluate the types of monitors that measure exposure ratings for heat

(iii) evaluate the types of monitors that measure exposure ratings for radiation

(I) describe the different types of respiratory protection according to their levels of protection, including air purifying, air supply, escape packs, and self-contained breathing apparatus (SCBA); and

(i) describe the different types of respiratory protection according to their levels of protection, including air purifying

(ii) describe the different types of respiratory protection according to their levels of protection, including air supply

(iii) describe the different types of respiratory protection according to their levels of protection, including escape packs

(iv) describe the different types of respiratory protection according to their levels of protection, including self-contained breathing apparatus (SCBA)

(J) identify the types of monitoring instruments that process operators/technicians use to monitor the atmosphere, oxygen content, explosive atmosphere, and toxicity.

(i) identify the types of monitoring instruments that process operators/technicians use to monitor the atmosphere

(ii) identify the types of monitoring instruments that process operators/technicians use to monitor oxygen content

(iii) identify the types of monitoring instruments that process operators/technicians use to monitor explosive atmosphere

(iv) identify the types of monitoring instruments that process operators/technicians use to monitor toxicity

(3) The student summarizes the environmental requirements that are designed to safeguard society. The student is expected to:

(A) describe the types of spills and releases and the environmental factors that can impact them;

(i) describe the types of spills and the environmental factors that can impact them

(ii) describe the types of releases and the environmental factors that can impact them

(B) identify specific systems that are in place to mitigate or prevent hazards to the environment and to individuals, including safe disposal of hazardous materials;

(i) identify specific systems that are in place to mitigate or prevent hazards to the environment, including safe disposal of hazardous materials

(ii) identify specific systems that are in place to mitigate or prevent hazards to individuals, including safe disposal of hazardous materials

(C) identify the regulatory governmental agencies, including Occupational Safety and Health Administration (OSHA), Mining Safety and Health Administration (MSHA), Texas Commission on Environmental Quality (TCEQ), and the Environmental Protection Agency (EPA), that protect our safety, health, and environment;

(i) identify the regulatory governmental agencies, including Occupational Safety and Health Administration (OSHA), Mining Safety and Health Administration (MSHA), Texas Commission on Environmental Quality (TCEQ), and the Environmental Protection Agency (EPA), that protect our safety, health, and environment

(ii) identify the regulatory governmental agencies, including Occupational Safety and Health Administration (OSHA), that protect our safety, health, and environment

(iii) identify the regulatory governmental agencies, including Mining Safety and Health Administration (MSHA), that protect our safety, health, and environment

(iv) identify the regulatory governmental agencies, including Texas Commission on Environmental Quality (TCEQ), that protect our safety, health, and environment

(v) identify the regulatory governmental agencies, including the Environmental Protection Agency (EPA), that protect our safety, health, and environment

(D) identify the Hazard Communication (HAZCOM) program and its components, including written Emergency Response Plans (ERPs), labeling containers that contain hazardous chemicals, and Safety Data Sheets (SDS) for hazardous chemicals produced or imported;

(i) identify the Hazard Communication (HAZCOM) program

(ii) identify [HAZCOM's] components, including written Emergency Response Plans (ERPs)

(iii) identify [HAZCOM's] components, including labeling containers that contain hazardous chemicals

(iv) identify [HAZCOM's] components, including Safety Data Sheets (SDS) for hazardous chemicals produced or imported

(E) describe the different types of hazards, including fire and explosions, ergonomic, biological, and blood borne pathogens; and

(i) describe the different types of hazards, including fire and explosions

(ii) describe the different types of hazards, including ergonomic

(iii) describe the different types of hazards, including biological

(iv) describe the different types of hazards, including blood borne pathogens

(F) describe the Maritime Security Act (MARSEC), which protects against terroristic threats.

(i) describe the Maritime Security Act (MARSEC), which protects against terroristic threats

(4) The student describes equipment and energy and work surface hazards. The student is expected to:

(A) define the types of equipment and energy and work surface hazards, including electrical, rotating equipment, thermal, elevation/heights/fall protection, chemical, slip and trips, and machine guarding;

(i) define the types of equipment, including electrical equipment

(ii) define the types of equipment, including rotating equipment

(iii) define the types of energy, including thermal

(iv) define the types of work surface hazards, including elevation protection

(v) define the types of work surface hazards, including heights protection

(vi) define the types of work surface hazards, including fall protection

(vii) define the types of work surface hazards, including chemical

(viii) define the types of work surface hazards, including slip

(ix) define the types of work surface hazards, including trips

(x) define the types of work surface hazards, including machine guarding

(B) identify hazards as they pertain to construction, vehicles, weather, and security, and describe how to protect the point of access and the site, including contractors who might have limited safety knowledge, new equipment installation, traffic control, and training on heavy machinery; and

(i) identify hazards as they pertain to construction

(ii) identify hazards as they pertain to vehicles

(iii) identify hazards as they pertain to weather

(iv) identify hazards as they pertain to security

(v) describe how to protect the point of access and the site, including contractors who might have limited safety knowledge

(vi) describe how to protect the point of access and the site, including new equipment installation

(vii) describe how to protect the point of access and the site, including traffic control

(viii) describe how to protect the point of access and the site, including training on heavy machinery

(C) determine how weather conditions can adversely impact safety at a petrochemical plant or other process industry, including heat stress, hurricanes, freeze precautions, adverse weather conditions, lightning, and wind.

(i) determine how weather conditions can adversely impact safety at a petrochemical plant or other process industry, including heat stress

(ii) determine how weather conditions can adversely impact safety at a petrochemical plant or other process industry, including hurricanes

(iii) determine how weather conditions can adversely impact safety at a petrochemical plant or other process industry, including freeze precautions

(iv) determine how weather conditions can adversely impact safety at a petrochemical plant or other process industry, including adverse weather conditions

(v) determine how weather conditions can adversely impact safety at a petrochemical plant or other process industry, including lightning

(vi) determine how weather conditions can adversely impact safety at a petrochemical plant or other process industry, including wind

(5) The student identifies environmental pollutants as well as regulations to protect the environment. The student is expected to:

(A) describe environmental pollutants, including toxic chemicals;

(i) describe environmental pollutants, including toxic chemicals

(B) identify the Material Safety Data Sheet (MSDS) manual list of the hazardous and toxic chemicals for process control sites;

(i) identify the Material Safety Data Sheet (MSDS) manual list of the hazardous and toxic chemicals for process control sites

(C) summarize the EPA petition process for approval of chemicals created by a plant;

(i) summarize the EPA petition process for approval of chemicals created by a plant

(D) determine the permissions that must be acquired before site production begins, including a toxicology report such as a Chemical Inventory Management System (CIMS) for a local plant; and

(i) determine the permissions that must be acquired before site production begins, including a toxicology report

(E) describe the types of environmental controls that are in place to protect the environment such as monitoring and air and water permits.

(i) describe the types of environmental controls that are in place to protect the environment