Definitions:

- **Acceptable entry conditions** - the conditions that must exist in a permit-required confined space to allow entry and to ensure that employees involved with a permit-required confined space entry can safely enter into and work within the space.
- **Attendant** - an individual stationed outside one or more permit spaces who monitors the authorized entrants and who performs all attendant's duties assigned.
- **Authorized entrant** – an employee who is authorized by the employer to enter a confined space.
- **Blanking or blinding** – the absolute closure of a pipe, line, or duct by the fastening of a solid plate that completely covers the bore and is capable of withstanding the maximum pressure of the pipe, line, or duct with no leakage beyond the plate.
- **Confined Space** - A confined space has one or more of the following characteristics:
  - Contains, or has the potential to contain, a hazardous atmosphere;
  - Contains a material that has the potential for engulfing an entrant;
  - Has an internal layout such that someone entering could be trapped or asphyxiated by inwardly converging walls or a floor that slopes downward and tapers to a smaller cross section;
  - Contains any other recognized serious safety or health hazard.
- **Double block and bleed** – the closure of a line, duct, or pipe by closing and locking, or tagging two in-line valves and by opening and locking or tagging a drain or vent valve in the line between the two closed valves.
- **Emergency** – any occurrence (including any failure of hazard control or monitoring equipment) or event internal or external to the permit space that could endanger entrants.
- **Engulfment** – the surrounding and effective capture of a person by a liquid or finely divided (flowable) solid substance that can be aspirated to cause death by filling or plugging the respiratory system or that can exert enough force on the body to cause death by strangulation, constriction, or crushing.
- **Entry permit** – the written or printed document that is provided by the employer to allow and control entry into a permit-required confined space.
- **Entry supervisor** – the person (such as the employer, foreman, or crew chief) responsible for determining if acceptable entry conditions are present at a permit space where entry is planned, for authorizing entry and overseeing entry operations, and for terminating entry as required.
- **Entrants and attendants** – Employees whose work requires them to enter a confined space or be an attendant must be designated as confined space qualified.
- **Permit-required confined space** – is a confined space that has one or more of the following characteristics:
  - Contains or has the potential to contain a hazardous atmosphere
  - Contains a material that has the potential for engulfing an entrant
  - Has an internal configuration such that an entrant could become trapped or asphyxiated; or
  - Contains any other serious safety or health hazard
- **Responsible person** – the person directly responsible for the work being performed in the confined space. They can be the supervisor, team leader, journeyman, or other qualified by training and experience.
- **Non-permit required confined space** – A confined space which is completely free of hazards and can be so proven without entering the space. The entrant must be a qualified person and would be able to work alone with no safety attendant required.

**IMMEDIATELY DANGEROUS TO LIFE OR HEALTH (IDLH)**
- Any condition which poses an immediate threat to the health or life on an entrant, or;
- Would cause irreversible adverse health effects, or;
- Would interfere with an individual's ability to escape unaided from a permit required confined space.

**Permit-Required Confined Space Procedure**
- Isolate the space – close valves, LO/TO, vent & drain, clean residue from space
- Ventilate the space – use mechanical ventilation
- Conduct tailboard briefing – entire crew MUST attend, review hazards, entry, PPE, and work procedures
- Complete permit - permit MUST be correctly and completely filled out prior to entry
- Test the atmosphere – Check for oxygen, combustibles, and toxic gasses
- Enter the space – attendant posted at entrance, entrants sign log

**Examples of Confined Space**
- Tanks
- Manholes
- Boilers
- Furnaces
Entry
- The act by which a person intentionally passes through an opening into a permit required confined space.
- Any part of the body passing through the opening is considered entry.

❖ Four Major Hazards of a Permit Required Confined Space

❖ Oxygen Deficiency and Enrichment
  - Less than 19.5%
  - Ex. Methane - simple asphyxiant which means that it replaces oxygen in the confined space.
  - Ex. Fire, rusting, reactions that consume the oxygen
  - Greater than 23.5%
  - Ex. Leaking oxygen cylinder

❖ Physical Hazards
  - Engulfment, Entrapment, Mechanical, Other
  - Sinking in loose material
  - Corrosive chemicals
  - Electrical hazards
  - Noise

❖ Fires and Explosion
  - Flammable, Lower Explosive Limit
  - Concentrations of vapors, gases, or explosive levels of dust which reach LEL
  - Fire consumes the oxygen

❖ Toxics in the Air
  - Carbon Monoxide (odorless, colorless)
■ Ex. gas powered internal combustion engines, welding with carbon dioxide as inert gas, fires
■ TLV = 25ppm           IDLH = 1500 ppm
  ▪ Hydrogen Sulfide
  ■ Ex. Sewer gases, rotten egg smell
  ■ Perceive Odor=0.13ppm TLV = 10 ppm  IDLH = 300 ppm

■ **Other Important Policies**
  ▪ **Lockout/Tagout**
    Unexpected start up of equipment
  ▪ **Welding/Cutting**
    Welding fumes- ventilation required
    Fumes vary depending on type of weld, type of material being welded, gas used in process, etc.

**Key People:** Supervisor, Entrants, Attendants, EH&S and EH&S Rescue Team

**Entry Supervisor Responsibilities**

■ Provide all required information on permit
■ Contact the EH&S for authorization and review.
■ Provide a copy of the permit to EH&S at the start of job. Return permit at completion of job.
■ Review entry requirements with entrants and attendants.
■ Ensure that the permit requirements (ex. controls, special requirements) are accomplished.
■ Post permit nearby confined space.
■ Supervise the confined space operations to ensure that conditions remain consistent with requirements.

**Qualified Entrant**

■ Must be trained and familiar with components of the training.
■ Be able to ensure that “Special Requirements” are met.
■ Understand environmental testing acceptable results.
■ Know the hazards associated with the space and their effects.
■ Properly use the required PPE and other equipment required for entry.
■ Maintain a continuous means of communication with the attendant.
■ Alert the attendant in the event of an emergency
■ Evacuate the space if an emergency occurs.

**Qualified Attendant**

A confined space qualified attendant must be in position at all times, outside of the confined space, while workers are in the confined space.
“Under no circumstances is the attendant to enter the confined space unless they are equipped for emergency rescue and there is a qualified person to take their place as attendant.”

- Must be trained to know the hazards associated with the confined space and their effects.
- Maintain an accurate count of all persons in the space.
- Remain at their assigned station until relieved by another attendant or until all entrants leave.
- Know how, and have the means, to summon emergency assistance.
- Be able to order the workers out of a confined space if:
  - Hazardous conditions exceed those set by the permit.
  - An unexpected hazard presents itself.
- Be able to order the workers out of a confined space if:
  - Workers in the confined space show signs of toxic reaction.
  - A situation occurs outside the confined space that could pose a hazard to the workers.
  - If the attendant must leave the area.
- Perform non-entry rescue procedures.

**The Confined Space Permit**

- Location, Purpose, Target Dates
- Hazard Identification
- Department
- Persons in Crew
- Attendants
- Special Requirements

**Special Requirements**

- Lockout/Tagout
- Lifelines
- Forced Air Ventilation
- Lighting
- Fire extinguishers
- Breathing apparatus
- Respirator
- Other
- Escape harness
- Tripod emergency escape unit
- Purge, flush or vent lines
- Cap or blank lines
- Secure area
- Protective clothing
Continuous Air Monitoring

Environmental Monitoring is required
  - Prior to entry at the beginning of the shift,
  - When shift goes beyond 8 hours, and/or
  - When conditions change that warrant additional monitoring.

Recording Testing

Signatures

Confined Space Atmospheric Monitoring/Entry Log

- Record continuous air monitoring as needed
- Attendant to record entrants entry/exit.

Hot Work Permit

- Employee, contractor, welder, and fire watch information.
- Location/description of work
- Fire Safety
- Confined space work
- General safety
- Approvals/Authorizations
Before-Entry Testing
- Atmosphere in the space must be tested for oxygen levels, flammable gases and vapors, contaminants that could be found in that confined space.

Ongoing Activities in Confined Space
- Entry supervisor must monitor operations to ensure conditions remain consistent with entry requirements.
  - Prevent unauthorized entrants
  - Terminate entry, cancel permit, remove entrants if conditions change
  - Re-evaluate the hazards and controls and re-initiate permit with EH&S

Completion of Work
- Restore space to operating conditions
- Attendant accounts for all entrants
- Attendant returns permit to supervisor
- Supervisor returns permit/entry log to EH&S

Emergencies (911)
- Call University Police to notify Confined Space Rescue Team.
- Give exact location of confined space.
- Do NOT enter the confined space.