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Octank Chemical – Safety Operations and Hazard Control Manual

Purpose: This manual provides comprehensive work instructions for safe operations at Octank Chemical, a manufacturing plant with 30 years of industrial experience. It covers essential safety procedures and hazard controls for various scenarios encountered in chemical plant settings. All personnel (operators, maintenance, supervisors, and safety officers) must understand and follow these instructions to maintain a safe workplace. The guidelines herein align with OSHA regulations and industry best practices, and they assign clear role-specific responsibilities (e.g., tasks for Operators vs. Safety Officers) for each scenario.

Scope: This manual addresses key safety operations including fire emergencies, chemical spills, personal protective equipment (PPE) usage, hazardous substance handling (with Safety Data Sheets), confined space entry, electrical lockout/tagout, working at heights, forklift operations, emergency evacuations, and protocols for handling AI camera images/data securely. It applies to all Octank Chemical employees and contractors. Managers and Safety Officers are responsible for enforcement and for keeping these procedures up to date with any regulatory changes.

Note: Safety is everyone's responsibility. Employees must be proactive in recognizing hazards and complying with these procedures. **Warnings** are included for particularly hazardous actions to avoid. All incidents, near-misses, and safety concerns should be reported to the Safety Officer for investigation and continuous improvement.

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1. Fire and Smoke Response

Fires can escalate rapidly in a chemical plant due to flammable materials and processes. All employees must be prepared to respond immediately and appropriately to any sign of fire or smoke. The acronym **R.A.C.E.** (Rescue, Alarm, Confine, Extinguish) outlines the general priorities in a fire emergency [1] [2] :

1.1 Immediate Actions (R.A.C.E.):

1. **Rescue:** If safe to do so, quickly remove or assist any persons in immediate danger from the fire area [1] . Do not put yourself at risk – only attempt a rescue if you are not endangering yourself. (Operator role:) help co-workers evacuate if they need assistance, then evacuate yourself. (Safety Officer role:) ensure any disabled or injured personnel are being aided per the emergency plan.
2. **Alarm:** Activate the nearest fire alarm **pull-station** and shout "Fire!" to alert others [3] . Call 9-1-1 (or local emergency number) **from a safe location** to notify fire department, even if the alarm is already ringing [3] . Time is critical – do not delay. If you hear a fire alarm, **stop work immediately** and proceed to evacuate (as detailed in the Evacuation section) [4] . (Operator: trigger the alarm; call for help once safe outside.) (Safety Officer: verify the alarm has been raised and 911 called; assume the role of incident commander until firefighters arrive.)*
3. **Confine:** If possible, close doors or windows around the fire to **contain smoke and flames** [2] . This helps slow the fire's spread. Shut down any nearby processes or fuel sources if you can safely do so (for example, turn off gas valves or electrical equipment) to avoid feeding the fire. (Operator: close the lab fume hood sash, shut a door, hit emergency shutdown if trained.) (Safety Officer:

ensure critical utilities (gas, power) to the affected area are cut off if appropriate; activate any fixed fire suppression systems if available.)*

4. **Extinguish/Evacuate:** If the fire is small (e.g., a wastebasket fire) **and you have been trained** in using fire extinguishers, you may attempt to extinguish it **after** completing the above steps (alarm and confine) [5] . Use the appropriate extinguisher for the fire class (e.g., **Class B** for flammable liquids, **Class C** for electrical fires, etc.). Employ the **P.A.S.S.** method when using a fire extinguisher [6] : **Pull** the pin; **Aim** low at the base of the fire; **Squeeze** the handle; **Sweep** side to side at the base of the flames until extinguished. Always keep a clear exit path behind you and stay between the fire and your exit in case you need to retreat [5] . If the fire grows despite your effort, evacuate immediately. If you are not trained or the fire is spreading, **do not attempt to fight it – evacuate at once**. (Operator: only fight incipient fires within your training and capability; otherwise evacuate.) (Safety Officer: coordinate any trained fire brigade members if available; ensure untrained personnel evacuate instead of fighting fire.)*

1.2 Evacuation and Follow-Up:

- **Evacuate to Safe Assembly:** All personnel must evacuate the area if the fire cannot be immediately controlled. Use the nearest safe exit route; crawl low under smoke if present (smoke rises, and cleaner air will be near the floor) [7] . Do not use elevators. Move well clear of the building to the designated assembly point and do not re-enter until authorized by the fire department. (See Section 9: Emergency Evacuation Protocol for detailed evacuation steps.) Account for coworkers if possible by doing a headcount at the assembly area.
- **Emergency Response Coordination:** The **Safety Officer or Emergency Coordinator** will meet the fire department responders and provide details (location of fire, any hazardous materials involved, and any persons unaccounted for). They ensure nobody re-enters the building until it is declared safe. Octank's emergency plan requires that the fire department be notified **regardless of fire size** before any attempt at extensive firefighting [8] . Firefighters have specialized training and equipment; once on scene, follow their instructions.
- **Aftermath – Incident Reporting:** Once the situation is under control and you are safely evacuated, notify your supervisor or safety office that you are safe, and **complete an incident report** as soon as possible [9] . The report should detail what happened, how the fire started (if known), and the response actions taken. This helps with investigation and prevention of future incidents.
- **Re-entry:** Do **not** re-enter the affected building or area until authorities give clearance. Even after the fire is out, there may be structural damage or lingering smoke/toxic fumes. Wait for the Safety Officer and fire officials to declare the area safe. Warning: stay out of fire-damaged structures; only return when emergency officials say it is safe [10] .

Roles and Responsibilities – Fire Emergency:

- **Operator/Employee:** Upon discovering fire or smoke, immediately activate the alarm and begin evacuation. If trained and the fire is very small, use the nearest extinguisher with the P.A.S.S. method (after raising alarm) [6] . Assist any person in danger if it is safe for you. Evacuate via the nearest exit, closing doors behind you to contain fire [2] . Once safe, call 911 (if not already done) and report to the assembly area for headcount. Do not re-enter for any reason (personal belongings can be replaced – lives cannot). Provide first responders or Safety Officer any information (e.g., people missing, what chemicals are in the area).
- **Safety Officer/Incident Commander:** Take charge of the emergency once aware. Ensure 911 has been called and guide the fire response team to the incident location. Coordinate the evacuation – make sure alarm is heard and assist in sweeping the area if it can be done without risk. If on-site fire suppression systems (sprinklers, fire pumps) exist, verify they activate or trigger them

manually if needed and if safe. Prevent re-entry by anyone until fire officials declare all-clear. Account for personnel at the assembly point and relay any missing persons' last known location to firefighters [11] . After the incident, lead the investigation, document the incident, and implement any corrective actions (e.g., improved procedures or training).

Important: Monthly fire drills will be conducted to ensure all staff are familiar with evacuation routes and alarm signals. Fire extinguishers are inspected regularly – **know the locations** of extinguishers and alarms in your work area [12] . **No employee is expected to fight a fire if they are not comfortable or trained; evacuation is always an acceptable response.** Safety of personnel is the top priority.

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2. Chemical Spill and Leak Management

Chemical spills, leaks, or releases can pose serious hazards such as toxic exposure, fire, or environmental damage. Octank Chemical handles various hazardous substances, so **immediate and correct response** to any spill is critical. The approach to a spill can be summarized in four steps: **Communicate, Control, Contain, Clean up** [13] [14] . Always refer to the specific chemical's Safety Data Sheet (SDS) for emergency spill response guidance, and use appropriate PPE (Personal Protective Equipment) during any spill response.

2.1 Initial Response and Communication:

1. **Ensure Personal Safety:** If you discover a chemical spill or leak, **keep a safe distance** and assess from upwind if possible. Do **not rush in** if you are not equipped – some chemicals release toxic fumes or pose fire/explosion risk. Warning: Do not inhale vapors; if the substance is unknown, assume it is hazardous.
2. **Communicate the Hazard: Alert others in the area immediately** about the spill. Shout for help and instruct colleagues to stay clear. Notify your supervisor and the Safety Officer at once. If the situation is an emergency (large spill, highly toxic or flammable release, or anyone injured/contaminated), activate the emergency alarm or call the emergency response number. **Evacuate** personnel from the immediate area if needed [15] . For large or dangerous releases, pull the fire alarm (this will initiate an evacuation) and call external emergency services (911) per our Emergency Response Plan. Provide responders with details: what material spilled, approximate quantity, and location [15] .
3. **Attend to Injuries/Exposure:** If a co-worker has been splashed or exposed to a chemical, help them reach an emergency shower or eyewash station **immediately**. Flush the affected area with water for at least 15 minutes or as recommended by the SDS. Remove contaminated clothing while under the shower. Operator role: assist only if you can do so without becoming contaminated yourself (wear appropriate gloves/apron if available). Safety Officer role: ensure first aid is provided and medical help is called for anyone injured. Contaminated individuals should receive medical evaluation after initial decontamination.

2.2 Spill Control and Containment:

1. **Stop the Source (if safe):** After raising the alarm and donning appropriate PPE, attempt to **stop the leak at its source only if it is safe to do so** [16] . This may involve closing a valve, uprighting a tipped container, or shutting off a pump. **Never touch or approach a spill without proper PPE** – determine what protective equipment is needed from the SDS or chemical label (e.g., acid-resistant gloves for acid spill, SCBA for toxic gas release). Put on the required PPE before intervening [17] . For flammable liquid spills, **eliminate ignition sources** immediately in the vicinity: shut down motors, extinguish open flames, and prohibit smoking. If a spilled material is

volatile and flammable, ventilate the area if you can do so safely (e.g., activate exhaust fans) unless the ventilation could spread toxic vapors to other areas – use judgment or consult Safety Officer [18] . Conversely, if vapors are highly toxic, it may be better to isolate and evacuate the area rather than disperse the fumes [18] .

2. **Contain the Spread:** Use available spill control materials (spill kits) to **contain the spill from spreading** [14] . Surround the edges of the liquid with absorbent socks or pads; for powders, gently cover with suitable neutralizer or wet the powder if appropriate to minimize dust (only if chemical won't react with water). **Protect drains**: quickly block any floor drains or sumps to prevent the chemical from entering drainage systems and causing broader contamination [19] . You may use absorbent snakes, mats, or even dirt/sand to build a dike around the spill [20] . Work from the outside inward – encircle the spill then cover/absorb the center. For reactive spills (e.g., acid, caustic), use neutralizers from the spill kit if available (acid neutralizer, base neutralizer) per training. Maintain a safe distance and avoid direct contact with the material.

3. **Ventilation and Isolation:** Ensure the area is isolated. Keep bystanders away by roping off or marking the hazard zone (use caution tape or barricades) [19] . If indoors, and if fumes are a hazard, increasing ventilation can help disperse vapors once the area is evacuated. However, if the spill is releasing toxic gas, **do not re-enter without proper respiratory protection**; wait for emergency responders. The Safety Officer should decide if outside HAZMAT team assistance is required based on the chemical's hazard and quantity. If the spill might threaten the outside environment (e.g., large quantity reaching outside soil or water), the Safety Officer must also activate environmental emergency protocols (such as notifying environmental authorities as required by law).

2.3 Cleanup and Disposal:

1. **Clean-Up (Trained Personnel):** Once the spill is contained and the immediate hazards controlled, the spill can be cleaned up by **trained personnel** with proper PPE. Use appropriate absorbent materials to soak up liquids. For example, use inert absorbents (pads, vermiculite, sand) for organic solvents; use compatible neutralizers for acids or bases (confirm via SDS). Collect the absorbed material using non-sparking tools (for flammables) or appropriate shovels/brooms. Place the waste into proper disposal containers (plastic buckets or bags) that can be sealed [21] . Label these containers with the chemical name and "Hazardous Waste – spill cleanup debris." Do not mix incompatible wastes in one container.

2. **Disposal:** Dispose of all cleanup materials according to environmental regulations and the chemical's SDS instructions. The Safety Officer will coordinate with the environmental department or waste contractor for removal of hazardous waste. All used PPE, absorbents, and contaminated materials must be treated as hazardous waste unless verified otherwise. Decontaminate any affected equipment or surfaces (use appropriate cleaning agents recommended for that chemical, e.g., soap and water for many, or specific decontaminant solutions for others). Ventilate the area until air monitoring (if applicable) confirms it's safe.

3. **Incident Reporting and Investigation:** After handling the spill, **report the incident** in detail. The first responder (operator) should document what happened and immediate actions, and the Safety Officer will complete an incident investigation report. Determine the cause of the spill (equipment failure, human error, etc.) and implement corrective actions (improved container, repair leaking equipment, retraining, etc.). **Learn from the incident** to prevent recurrence. If required, report the spill to external authorities (e.g., regulatory agencies) per Octank's emergency notification procedures.

Roles and Responsibilities – Chemical Spills:

- **Operator/First Observer:** Immediately alert others and call for help [15] . Keep yourself safe – do not wade into a spill without PPE. If trained and properly equipped, take initial steps to stop the source (close valves, shut off equipment) and contain the spill from spreading [16] [14] . Use the nearest spill kit appropriate for the material. For small spills you are trained to handle, you may proceed with cleanup using proper PPE and following SDS guidelines. For large or highly hazardous spills, evacuate and await the Emergency Response Team. If anyone is contaminated, help them to a safety shower/eyewash and call for medical aid. After the event, participate in incident debrief and suggest improvements.
- **Safety Officer/Emergency Response Team:** Upon notification of a spill, assess the situation (type of chemical, quantity, location, potential impacts). Don the required PPE and lead the spill response. Deploy the plant's Emergency Response Team (if available) for hazardous spills. Decide if outside emergency HAZMAT responders are needed (consider evacuation of facility or surrounding area if a major release occurs). Ensure all personnel stay clear of the hazard zone except trained responders. Oversee containment and cleanup operations, ensuring responders follow proper procedures and use appropriate equipment. Communicate with management and, if applicable, regulatory authorities about the incident. After cleanup, verify that the area is fully decontaminated and safe for normal work to resume. Conduct the incident investigation, document findings, and enforce any changes in procedures or training to prevent future spills.

Important Notes:

- **Spill Kits:** Spill control kits are strategically placed in production and storage areas. They contain absorbents, neutralizers, tools, and PPE. Familiarize yourself with their contents and location. Use them only for their intended chemicals (e.g., use the mercury spill kit only for mercury, etc.).
- **SDS Access:** Always have access to the Safety Data Sheet for any chemical you handle. The SDS provides specific emergency measures for spills (firefighting measures, accidental release measures, PPE, first aid, etc.) [22] . Octank maintains an SDS library accessible in each department and digitally on the company intranet. **Before using a chemical, read its label and SDS so you know its hazards and proper handling** [23] .
- **Minor vs. Major Spills:** Octank's emergency plan classifies spills by size/hazard. Minor spills (small quantity, not highly hazardous) can be handled by trained employees on the spot. Major spills (large volume or high danger) require evacuation and specialized response. When in doubt, treat a spill as major and get help.
- **Preventive Measures:** Store chemicals properly (with secondary containment for liquids, segregate incompatibles like acids and bases) and handle them carefully to prevent spills. Keep work areas uncluttered to avoid knocking over containers [24] . Ensure container lids are secure and always labeled with contents [25] . Transport chemicals in approved carriers. By maintaining good practices, the likelihood of spills is greatly reduced [26] .

3. Personal Protective Equipment (PPE) Requirements and Compliance

Personal Protective Equipment (PPE) is the **last line of defense** in protecting employees from workplace hazards [27] . At Octank Chemical, PPE use is mandatory in designated areas and for specific tasks to guard against chemical, physical, and thermal hazards. This section outlines the types of PPE required, proper use and maintenance, and how compliance is enforced. Management will perform hazard

assessments to determine necessary PPE for each job, in accordance with OSHA's PPE standards. All PPE provided must meet relevant ANSI/OSHA standards, be in good condition, and fit the user correctly [28] .

3.1 PPE Standards and Types:

Common PPE used in our chemical plant includes (but is not limited to):

- **Head Protection:** Hard hats are required in all production and construction areas to protect against impact from falling objects or overhead obstructions.
- **Eye and Face Protection:** Safety glasses with side shields are the minimum in the plant; chemical splash goggles are required when handling hazardous liquids that could splash, and full-face shields are added for high-risk splashes or when pouring corrosives. (Thousands of eye injuries occur yearly in industry; proper eye/face PPE can prevent virtually all of them [29] .)
- **Hand Protection:** Gloves must be worn whenever handling chemicals or performing work that could cut or burn hands. The type of glove must be suited to the hazard – e.g., nitrile or neoprene gloves for chemicals (resistant to the specific solvent or acid as per its SDS), cut-resistant gloves when handling sharp objects or performing maintenance, heat-resistant gloves when touching hot surfaces, and electrically insulated gloves for electrical work.
- **Body Protection:** Depending on the task, this may include flame-resistant (FR) coveralls when working with flammable materials or near high heat, chemical-resistant aprons or suits when handling corrosive or toxic liquids, and high-visibility vests when around moving equipment (like forklifts or trucks). Laboratory coats are required in labs. Ensure clothing covers the body fully (no shorts or short-sleeves in process areas without approval).
- **Foot Protection:** Steel-toe (safety) boots are required in all operational areas to protect against crush injuries and chemical spills (boots should be chemical resistant where needed). Slip-resistant soles are recommended to prevent falls.
- **Respiratory Protection:** When engineering controls (like ventilation) are insufficient to control inhalation hazards, respirators will be used. This can range from N95 dust masks for nuisance dust, to half-face or full-face air-purifying respirators with appropriate cartridges for organic vapors or acid gases, up to Self-Contained Breathing Apparatus (SCBA) for high concentrations or emergency rescue. Respirator use requires a separate training and fit-testing program per OSHA 1910.134.
- **Hearing Protection:** In areas where noise levels exceed 85 dB (such as near compressors or loud pumps), ear plugs or ear muffs are mandated to prevent hearing loss. These areas are posted with "Hearing Protection Required" signs.
- **Fall Protection Gear:** As detailed in Section 7 (Working at Height), employees working above 4 feet without guardrails must use fall protection harnesses and lanyards [30] . The harness, lifeline, and anchor points are considered PPE against fall hazards.
- **Other PPE:** This includes any specialty equipment like insulating rubber gloves and mats for electrical work, face shields or welding helmets for welding/grinding (to protect against sparks, UV light, debris), and any required PPE per specific Standard Operating Procedures.

All PPE **must be of safe design and construction**, and kept clean and reliable [28] . Defective or damaged PPE must not be used – report it and get a replacement. Comfortable, well-fitting PPE is important for effectiveness and compliance, so adjustments and proper sizing are provided.

3.2 PPE Requirements by Hazard/Area: (Examples in table form)

Work Area / Task	Required PPE
Process/ Production Floor	Hard hat, safety glasses, safety boots. If handling chemicals: add chemical-resistant gloves and apron as needed. If loud equipment running: hearing protection. High-visibility vest near vehicle traffic.
Chemical Batch Mixing or Sampling	Chemical splash goggles **and** face shield, chemical-resistant gloves (appropriate type per chemical's SDS), apron or chemical suit, safety boots. Respirator if handling volatile toxic substances (per hazard assessment) [22] .
Maintenance (Mechanical)	Hard hat, safety glasses (or face shield for grinding), gloves suited to task (cut-resistant for sharp objects; insulated for hot pipes), safety boots. For welding: welding helmet + fire-resistant clothing. LOTO procedures also require electrical PPE for certain tasks.
Confined Space Entry (Tank etc.)	As a minimum: Hard hat, safety glasses, gloves, safety boots. Likely also: full-body harness with lifeline, gas detector on person, and possibly an SCBA or supplied-air respirator if air quality is questionable [31] . (See Section 5 for details.)
Working at Height (no railings)	Personal fall arrest system: body harness and shock-absorbing lanyard tied to an approved anchor ($\geq$5000 lb rating) [32] . Hard hat (with chin strap if on scaffolds), safety boots. No loose items (use tool lanyards to prevent dropped objects).
Forklift Operation & Traffic	Safety boots, high-visibility vest, hard hat (if overhead hazards). Seat belt must be worn by driver [33] . Pedestrians in area must also wear high-visibility apparel.
Laboratory (chemical handling)	Lab coat, safety glasses or goggles, gloves appropriate to chemicals, closed-toe shoes. Additional face shield for any splash risks.
Emergency Response (Spill team)	As specified by emergency plan and SDS: could include chemical splash suit, SCBA, special gloves, boots, etc., depending on chemical.

Table: Common PPE requirements for various activities. Always follow posted signs at area entrances indicating required PPE. When in doubt, **wear the higher level of protection** or consult the Safety Officer.

3.3 PPE Use and Compliance Enforcement:

Octank Chemical has a **zero-tolerance policy** for required PPE non-compliance, due to the high risk nature of our operations. Management is committed to ensuring PPE is not just available, but consistently used and used properly. To achieve this:

- **Policy and Training:** Clear policies mandate the use of suitable PPE for each task. Every employee is trained on **when and what PPE** to use, and how to wear and care for it properly [34] . Initial training is given at hiring and job-specific training whenever new hazards or PPE are introduced. Refresher training is conducted at least annually. For example, employees learn how to inspect their gloves for degradation before use, how to fit-test their respirator, and the limitations of PPE (e.g., chemical breakthrough times for gloves).

- **Supervision and Signage:** Supervisors are responsible for daily monitoring of PPE compliance in their areas [34] . They lead by example by wearing required PPE themselves at all times. Signs are posted at entry points ("**PPE Required Beyond This Point**") listing minimum gear [35] . Specific hazard areas have additional signage (e.g., "Respirator Required – Chlorine Area"). These serve as constant reminders.
- **Pre-Job Hazard Assessment:** Before starting any non-routine job, a Job Safety Analysis (JSA) or toolbox talk is done to review hazards and confirm the needed PPE is identified and available. For instance, maintenance on a pump containing caustic soda will be planned with chemical-resistant suit and face protection ready.
- **Enforcement and Discipline:** Compliance is **regularly enforced**. If an employee is observed entering an area or performing a task without the mandated PPE, the supervisor will stop the work immediately and direct them to don the proper gear. Repeated failure to wear PPE will result in **progressive disciplinary action**, which may include verbal warnings, written warnings, retraining, and potentially suspension or termination for willful violations [36] . Our goal is never punishment for its own sake, but to underline the life-saving importance of PPE. However, OSHA regulations hold the employer responsible for PPE compliance, and the company can face fines and liability if standards are not met [37] [38] .
- **Maintenance and Supply:** The company provides all required PPE at no cost to employees. We maintain ample stock of PPE in various sizes. Damaged or worn-out PPE must be taken out of service and replaced immediately – employees should report any PPE that is not in good condition. For example, if your goggles are scratched or respirator cartridge expired, request replacements. PPE must be kept clean – reusable PPE like face shields or hard hats should be regularly cleaned (per manufacturer instructions) to ensure proper visibility and hygiene. We also have cleaning stations and storage for PPE (lockers, racks) to avoid contamination (e.g., keeping chemical suits separate from street clothes).
- **Recordkeeping:** Hazard assessments and PPE training records are documented as per OSHA requirements. Employees sign off that they understand the PPE requirements of their job. Supervisors do routine audits (e.g., weekly walk-throughs) to check PPE compliance and document findings, which the Safety Officer reviews to identify trends or needs for additional training.

Roles and Responsibilities – PPE:

- **All Employees/Operators:** Wear the required PPE for your job and specific task **without exception**. Before each use, **inspect your PPE** for any damage (cracks in hard hat, tears in gloves, etc.). If any PPE is defective or ill-fitting, inform your supervisor and obtain proper replacements before exposure to hazards. Use PPE correctly – e.g., wear goggles over your eyes (not on forehead), zip up your coveralls, and ensure respirators are sealed to your face. Do not modify PPE (such as drilling holes in hard hat or cutting gloves). Keep your assigned PPE clean; if it becomes contaminated, follow decontamination procedures or dispose of it if single-use. Participate actively in PPE training and fit-testing sessions. Finally, encourage your peers: if you see a coworker without required PPE, politely remind them or inform a supervisor – everyone's safety is interconnected.
- **Supervisors/Managers:** Lead by example by scrupulously wearing all required PPE. Conduct daily checks that your team is in compliance. Before work begins, verify that appropriate PPE is available and worn. If anyone is missing gear or using it improperly, correct them on the spot and explain the hazard. Enforce the PPE policy consistently – do not overlook violations. If necessary, pause the job until compliance is achieved. Ensure new employees or visitors in your area also have necessary PPE (visitors must at least have safety glasses, etc., and be briefed on rules). Coordinate with Safety Officer to obtain any special PPE needed for non-routine tasks. Additionally, you are responsible for ensuring your team's PPE is stored and maintained properly

(for example, hearing protectors aren't defective, respirators get cleaned and stored in bags, etc.). Report to Safety Officer any issues (such as persistent fogging of goggles or discomfort) so solutions can be found (like anti-fog coatings or different models) – comfort issues can often be solved to improve compliance.

- **Safety Officer/PPE Program Administrator:** Oversee the overall PPE program. This includes performing hazard assessments for each department to specify PPE needs, selecting appropriate PPE that meets standards, and periodically re-evaluating as processes change. Provide training to all employees on PPE use and limitations [39] . Ensure supply and quality of PPE – work with procurement to stock approved brands and types. Manage the respirator program (medical evaluations, fit tests, cartridge change schedules, etc.). Conduct regular audits and safety observations, logging any PPE violations or issues, and report findings to management. If patterns of non-compliance emerge, arrange additional training or improved supervision. The Safety Officer also investigates any injury where PPE was a factor (either not worn or failed) to determine root cause and corrective action (e.g., if a chemical burn occurred because the wrong glove type was used, update the glove selection and training). Finally, maintain records required by OSHA – certification of hazard assessments, training rosters, and disciplinary actions related to PPE.

Note: OSHA requires employers to not only provide PPE but also ensure its use [40] . The company is subject to inspections and can be cited for PPE violations. However, our foremost concern is preventing injuries – something as simple as safety glasses can be the difference between an incident being a close-call versus a life-changing injury. **Wear your PPE – it's an essential part of our safety culture and compliance.**

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4. Handling of Hazardous Substances (and Safety Data Sheets Usage)

Working with hazardous chemicals is routine at Octank, but it must be done with strict adherence to safety protocols to prevent exposure, accidents, and health hazards. This section addresses general rules for safe handling, storage, and use of dangerous substances, as well as the role of Safety Data Sheets (SDS) in our hazard communication program. Every chemical used in the facility – whether a raw material, intermediate, or cleaning agent – has specific hazards (flammability, toxicity, reactivity, etc.) that employees must be aware of. By following these guidelines and referencing the SDS for each substance, we can significantly reduce the risk of chemical incidents.

4.1 Hazard Communication Program:

Octank Chemical maintains a **Hazard Communication Program** compliant with OSHA's Hazard Communication Standard (29 CFR 1910.1200). Key elements include:

- **Chemical Inventory & Labeling:** All containers of hazardous chemicals must be clearly labeled with the identity of the substance and appropriate hazard warnings (pictograms and signal words per GHS). Never use or store any chemical in an unlabeled container. Labels should be intact and legible. If you transfer a chemical to a secondary container (e.g., fill a smaller bottle from a drum), you must immediately label the new container with the chemical name and hazard info. **No unmarked bottles or tanks are permitted.**
- **Safety Data Sheets (SDS):** An up-to-date SDS is kept for every hazardous chemical on site. These are accessible to all employees (through the electronic SDS database or in binders at central locations). The SDS provides detailed information: chemical properties, health and fire hazards, first aid, spill response, required PPE, storage and handling precautions, and more. **Employees**

must familiarize themselves with the SDS of chemicals they work with [22] . Before you start using any new chemical, read its SDS to understand the risks and controls.

- **Training:** All employees receive Hazard Communication training covering how to read labels and SDS, the hazards of chemicals in their work area, and protective measures. Whenever a new chemical hazard is introduced, additional training is provided. We ensure that even contractors or temporary workers on site are informed of the chemical hazards they might encounter.
- **Written Plan:** The Hazard Communication written program document is available for review; it outlines how we fulfill labeling, SDS, and training requirements. Essentially, we commit that **all containers are labeled, SDS are accessible, and employees are effectively trained on chemical hazards** [41] .

By following HazCom rules, employees should **never be "in the dark"** about a chemical they handle – the hazards and precautions must always be communicated and understood.

4.2 General Rules for Safe Chemical Handling:

1. **Plan Ahead: Assess the risks** of any chemical task before starting [42] . Know which materials you'll use and their dangers. Only **authorized, trained personnel** may handle particularly hazardous substances (such as toxic gases, highly reactive chemicals, etc.). Consider what could go wrong – spills, splashes, fumes, reactions – and ensure controls are in place (PPE, ventilation, spill kit on standby). Have emergency equipment (eyewash, shower, fire extinguisher) readily available and checked.
2. **Use Proper PPE:** Always don the required personal protective equipment before handling chemicals. As specified in Section 3, this could include gloves, goggles, face shield, apron, respirator, etc., depending on the substance. **Old or damaged PPE must be replaced**, and PPE should be inspected prior to each use [43] . For example, check gloves for pinholes or degradation (some solvents can permeate certain glove materials). If a chemical fume hood is available and the chemical emits vapors, use the hood – local exhaust ventilation is an engineering control that greatly reduces inhalation risk.
3. **No Eating or Drinking:** Strictly prohibit any eating, drinking, smoking, or applying cosmetics in areas where chemicals are used or stored [23] . Ingestion is a possible exposure route – food and drink can absorb airborne contaminants or pick up residues from surfaces. Wash hands thoroughly after handling any chemical, even if you wore gloves [23] . Never use lab refrigerators or microwaves for food.
4. **Handling Techniques:** Always handle chemicals in accordance with their nature:
5. When pouring liquids, do it slowly to avoid splashes and glugging. Use a funnel if appropriate.
6. For corrosives (acids/bases), **always add acid to water**, never the reverse, to prevent violent reactions (remember the adage: "AA – Add Acid").
7. Keep containers closed as much as possible. Open chemicals only in ventilated areas.
8. Use tools to handle potentially dangerous containers (for example, use bottle carriers for acids, tongs for hot flasks, etc.).
9. Keep your face away from container openings and avoid directly inhaling any vapors – use wafting if you need to smell a chemical (and only if known to be safe).
10. Never pipette by mouth; use pipette bulbs or automated pipettors.
11. **Buddy System for High Hazard Work:** For extremely hazardous operations (e.g., transferring chlorine gas cylinders, entering an acid pit), do not work alone. Have a second person present or at least in close contact to summon help if something goes wrong.
12. **Keep Work Area Organized:** Clutter and incompatible storage can cause accidents. Work on a clear bench or space. Remove unnecessary items from the vicinity of your work. If working with reactive chemicals, remove all ignition sources. **Clean as you go** – promptly clean small drips or residue (with appropriate cleaning materials) to prevent slips or unexpected reactions. Good

housekeeping minimizes the chance of accidental mixing of chemicals and allows you to react quicker in an emergency [24] .

13. **Use Proper Equipment:** Only use containers, tubing, and tools that are compatible with the chemical. (For instance, do not use aluminum tools for bromine, or glass for highly alkaline solutions if it can etch the glass.) Ensure pumps, hoses, and gaskets are the correct material (check the chemical compatibility charts). Use secondary containment (spill trays) when transferring liquids, especially if near drains.

14. **Storage and Segregation:** Return chemicals to their designated storage after use. **Store chemicals safely**: keep them in a cool, dry, well-ventilated area as specified. Incompatible chemicals must be stored apart – e.g., acids in an acid cabinet away from bases, oxidizers separate from organics/flammables, water-reactives away from any moisture, etc. [24] . Flammable liquids belong in approved flammable storage cabinets. Gas cylinders must be secured upright and capped when not in use. Maintain minimal quantities of hazardous chemicals at the workstation – only what's needed for the task – to reduce the volume that could be involved in an incident.

15. **Use Chemicals for Intended Purpose Only:** Do not use a chemical for any purpose other than its intended use. For example, do not use industrial solvents to wash your hands or as a general cleaner if it's not meant for that – many lab injuries occur from improper chemical use [44] . Likewise, never mix chemicals unless a procedure calls for it; dangerous reactions can occur (mixing bleach and ammonia cleaners, as a common example, releases toxic chloramine gas).

16. **After Handling:** When finished, **dispose of waste properly** (see below), remove your PPE and wash up. Do not wear contaminated PPE or clothing outside the work area – this can spread chemicals to other areas (or even to your car/home). If your clothing is significantly contaminated, it may need to be discarded or decontaminated by specialists (do not just launder heavily contaminated work clothes at home). Practice good hygiene – wash hands and face thoroughly.

4.3 Use of Safety Data Sheets (SDS):

The SDS is your go-to reference for any chemical. It contains **16 sections** of standardized information, including hazards identification, exposure limits, required PPE, first aid measures, accidental release measures, and safe handling/storage guidelines. Key points on SDS usage:

- **Before Using a Chemical:** Read at least Sections 2 (Hazard Identification), 4 (First Aid), 7 (Handling and Storage), 8 (Exposure/PPE), and 10 (Stability and Reactivity) of the SDS. This will tell you what dangers to expect (e.g., "causes severe burns," or "flammable liquid"), how to protect yourself, and what not to do (e.g., "keep away from water" if it's water-reactive). For example, if an SDS indicates a chemical has a low flash point and releases toxic vapors, you know to use it with ignition control and in a fume hood, while wearing respirator and goggles.
- **During an Emergency:** In the event of a spill or exposure, the SDS provides crucial guidance. For a spill, check Section 6 (Accidental Release Measures) for cleanup procedures and Section 8 for PPE recommendations. For exposure, Section 4 (First Aid) guides treatment (e.g., whether to use water or specific antidote on skin, whether vomiting should be induced for ingestion, etc.). Ensure the SDS is readily available to emergency responders – **provide a copy of the SDS to medical personnel** if an employee is being treated due to a chemical exposure [41] . This helps them administer correct treatment.
- **Understanding Labels and Pictograms:** The SDS will explain the label pictograms and H statements. For instance, a flame icon means flammable, the skull-and-crossbones means acute toxicity, etc. If you see these on a container, refer to the SDS for specifics.
- **MSDS vs SDS:** Older Material Safety Data Sheets (MSDS) have been replaced by the newer SDS format, but some legacy documents might still be around. Treat them equivalently; the important part is to get the safety information, regardless of format. Our company uses the term SDS universally now.

- **Location of SDS:** Digital SDS can be accessed on any company computer via the "Octank SDS Database" link on the intranet. Hardcopies are also in binders in the control room and safety office for emergency backup. You have the right to access SDS at any time while at work – if you cannot find an SDS, request help from your supervisor or Safety Officer before working with the material. OSHA regulations ensure employees can obtain and understand SDSs as part of their right-to-know.

4.4 Special Handling Procedures:

Some particularly hazardous substances (PHS) require additional measures: - **Highly Toxic or Carcinogenic Materials:** Use in designated areas (like a specific fume hood labeled for carcinogen use). Follow any "regulated area" requirements. Double-contained transport (carry bottle in a sealed secondary container). Use disposable bench paper to catch drips and dispose of it as hazardous waste. Limit access – only trained personnel allowed. - **Reactive Chemicals:** For water-reactives, ensure absolutely no water contacts them (even moisture in the air – so use gloveboxes or desiccators as needed). For pyrophorics (air-reactive), have quenching agents ready and work under inert atmosphere. Handle peroxide-forming solvents per procedure (dates on containers, regular testing for peroxides). - **Compressed Gases:** Secure cylinders at all times. Use correct regulators. For toxic gases (e.g., chlorine, ammonia), use them in gas cabinets or ventilated enclosures with appropriate detection alarms. Never fully rely on odor; have monitors where needed. - **Manual Handling:** When moving drums or heavy containers, use proper equipment (drum carts, hoists). Never try to catch a falling chemical container – it's safer to let it fall and then deal with the spill, rather than risk a serious acid splash on yourself. - **Instrumentation and Controls:** If your process uses automation or control systems for feeding chemicals, ensure interlocks and alarms are functional (this is part of Process Safety Management). Those engineering controls go hand-in-hand with safe handling.

4.5 Hazardous Waste and Disposal:

As part of safe handling, know how to dispose of or remove hazardous substances after use: - Collect chemical waste in appropriate containers (compatible material, with lid). Label them as "Hazardous Waste" with contents and hazard. - Do not pour chemicals down the drain or in regular trash unless specifically authorized (some non-hazardous materials may be permitted, but assume not). Follow Octank's waste segregation guidelines (e.g., halogenated solvents vs. non-halogenated). - Keep waste containers closed except when adding waste. Do not overfill. Store waste in designated accumulation areas. - The Safety Officer/Waste Coordinator will arrange off-site disposal per regulations (EPA, etc.). Your role is to ensure waste is handled safely on site until pickup.

Roles and Responsibilities – Hazardous Substances:

- **Operator/Employee:** Follow standard operating procedures (SOPs) for each chemical process or task – these SOPs incorporate safe handling instructions. Never deviate from written procedures without authorization. Remain vigilant for any signs of chemical hazards while working (e.g., unusual odors, leaks, symptoms of exposure like dizziness). If something seems wrong, stop and notify a supervisor. Always utilize the proper PPE and engineering controls provided. Take personal responsibility to **know the chemicals you work with** – read the SDS, ask questions if unclear. Handle chemicals with respect: even seemingly "common" chemicals can be dangerous in certain conditions. Do not perform any new or unusual chemical operation without a risk review (and likely a permit to work for non-routine tasks). Label all chemical containers immediately when you transfer substances. If you notice any container with missing or damaged label, fix it (replace the label) or report it. Store chemicals in the right place after use, and keep your work area safe for the next person. If you are tasked with mixing or reacting chemicals,

double-check you have the correct chemicals and amounts (mistaken identity or wrong concentrations cause many accidents). When in doubt about a hazard or procedure – pause and consult the Safety Officer. It is far better to delay a job than to cause an accident out of uncertainty.

- **Safety Officer/Chemist:** The Safety Officer (often in conjunction with facility chemical experts or industrial hygienists) maintains the HazCom program and ensures all chemical hazards are evaluated. They approve all new chemicals brought on site (via a pre-purchase or pre-introduction review) to ensure proper controls are in place. Safety is responsible for providing or arranging specific training on particularly hazardous substances. They audit chemical storage and handling periodically for compliance (for example, checking that incompatible chemicals are not stored together, that containers are sound and labeled, etc.). In the event of any chemical-related incident (spill, exposure, near-miss), the Safety Officer leads the investigation and updates handling procedures or SDS information dissemination accordingly. They also liaise with regulatory bodies if required (e.g., Tier II chemical inventory reporting, Toxic Release Inventory reporting). The Safety Officer keeps the SDS repository up to date [41] and makes sure employees can readily access and understand them (possibly translating or giving summaries for non-English speakers if needed). They may also conduct routine health monitoring for employees working with certain toxins (as per OSHA requirements for exposure to specific substances) – for example, periodic lead level checks if working with lead compounds. Essentially, the Safety Officer is the champion of chemical safety, continuously working to minimize risk through proper procedures, controls, and training.

Important: Handling hazardous substances safely is **non-negotiable**. Many chemicals can seem routine, but complacency can be very dangerous. Always approach chemicals with a mindset of knowledge and caution. By following these guidelines and respecting the information on SDSs, we protect our health and the environment while carrying out the plant's operations efficiently.

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5. Confined Space Entry

Confined spaces – such as storage tanks, reactor vessels, pits, silos, or vaults – are potentially one of the most hazardous work environments in the plant. They often have limited entry/exit, poor ventilation, and may contain dangerous atmospheres or other hazards (engulfment, mechanical equipment, etc.). Octank Chemical has a **Permit-Required Confined Space** program aligned with OSHA 29 CFR 1910.146 to ensure any entry into such spaces is done safely and under strict control. **No one may enter a permit-required confined space without proper training, authorization, and a permit.** This section describes the procedure for safe confined space entry, including atmospheric testing, isolation (lockout/tagout), ventilation, rescue preparedness, and roles of the Entrant, Attendant, and Entry Supervisor (often the Safety Officer or Supervisor authorizing the entry).

5.1 Definition and Hazards: A confined space is any area that 1) is large enough for a person to enter and work, 2) has limited or restricted means of entry or exit, and 3) is not designed for continuous occupancy [45]. Examples at our plant include interior of blending tanks, empty chemical storage tanks, tanker truck tanks, certain process vaults, etc. A **permit-required** confined space has one or more hazards such as a hazardous atmosphere, risk of engulfment (e.g., loose solids that can bury a person), internal configuration that can trap/asphyxiate (sloping floors, converging walls), or any other serious safety hazard (like energized equipment or heat stress). The main hazards to consider: - **Asphyxiating or Toxic Atmospheres:** Lack of oxygen or presence of toxic gases/vapors. Normal air is ~20.9% oxygen; OSHA defines oxygen-deficient atmospheres as <19.5% O_2 and oxygen-enriched as >23.5% O_2 [46]. Both are dangerous – too little O_2 causes unconsciousness, too much can make fires/explosions more likely. Toxic gases (like hydrogen sulfide, carbon monoxide) or vapors from chemicals can accumulate and poison

entrants [47] . - **Flammable Atmospheres:** If flammable gas/vapor is present at >10% of its Lower Explosive Limit (LEL), the space is at risk of fire/explosion [48] . A small spark could set off an explosion in a confined space – hence strict control of ignition sources and continuous monitoring. - **Engulfment:** Materials like grains, powders, or liquids can engulf and suffocate a person if they unexpectedly release or shift. (Not common in our chemical processes except maybe some catalyst powders or if a tank inadvertantly fills.) - **Mechanical/Electrical Hazards:** Pumps, agitators, conveyors, or other moving equipment inside the space can injure or kill if not de-energized. Similarly, electrical equipment could shock if not disconnected. - **Physical Hazards:** Confined spaces might be hot (causing heat stress), extremely noisy, or have falling object risks. They also often have poor lighting and slippery surfaces.

Because of these, we take a meticulous approach to preparing and executing confined space entries.

5.2 Permit System Overview:

Before entry, a **Confined Space Entry Permit** must be obtained. The permit is a written (or electronic) checklist and authorization that ensures all safety measures are in place. It is issued by the Entry Supervisor (usually a Safety Officer or department supervisor) and is valid only for a specified duration (shift or job duration). The permit covers: - Identification of the space and purpose of entry. - Hazards present (or potentially present). - Atmospheric test results (initial and continuous monitoring requirements). - Isolation measures taken (LOTO, etc.). - Ventilation measures. - PPE and equipment required. - Names of Entry Team: authorized Entrants, Attendant, Supervisor. - Rescue plan and emergency services coordination. - Time duration of permit (start and expiration). - Confirmation that all precautions are in place and permission to enter is granted.

5.3 Steps for Safe Confined Space Entry:

Step 1: Preparation & Hazard Elimination
a. Obtain Authorization: The task requiring entry must be reviewed and approved. Only trained authorized entrants may go inside, and an Attendant and Supervisor must be designated. Begin by filling out a confined space entry permit form, listing the work to be done and potential hazards.
b. Empty and Flush the Space: Wherever possible, the confined space should be emptied, cleaned, or flushed of hazardous materials before entry. For example, if a tank held a flammable liquid, it should be drained, rinsed with water or steam purged to remove residues. This reduces atmospheric hazards.
c. Isolate All Energy Sources**: Apply** Lockout/Tagout (LOTO) **to isolate the confined space from any energy or material input** [49] **. This includes locking out electrical sources (switches, breakers) for any motors or agitators in the space, shutting and locking valves (with chains and lockouts) for pipes leading into the space (and blanking or blinding lines if needed), and disconnecting mechanical linkages. If there's any chance of material flowing into the space (liquids, gases, steam), those lines must be physically blocked or blanked off in addition to closing valves** [49] **. The isolation must cover all hazards: electrical, mechanical, hydraulic, pneumatic, chemical, thermal, etc. Each lockout device should be applied by an authorized person and tagged. Only the person who applied each lock can remove it (see Section 6 on LOTO for procedure). The Entry Supervisor verifies isolation is complete before proceeding.**
d. Secure the Space:** Lock or barricade all external hatches or manways that will not be used for entry, so no one can inadvertently open another entrance or fall in. Post signs or tags at all entry points: "DANGER – Confined Space Entry in Progress – Authorized Personnel Only." This prevents unauthorized entry.

Step 2: Pre-Entry Atmospheric Testing
Prior to entry, the atmosphere inside the confined space must be tested with a calibrated **multi-gas**

detector (capable of measuring oxygen level, flammability, and relevant toxic gases) [50] . An authorized gas tester (often the Safety Officer or another trained person) will do the following: - Test from **outside the space** through a port or opening, using a pump and sampling tube if necessary. Never rely on your nose; many dangerous gases are odorless or can deaden your sense of smell. - Take measurements at several levels inside (top, middle, bottom) because some gases are heavier or lighter than air and stratify [51] . For instance, check low areas for heavier-than-air gases like carbon dioxide, and high areas for lighter-than-air like methane. - **Acceptable entry conditions:** Oxygen between 19.5% and 23.5% by volume (no entry if O_2 <19.5% or >23.5%) [52] ; Flammable gas/vapor below 10% of LEL; All toxic gas readings (e.g., H_2S, CO, etc., depending on the space's exposure potentials) must be below their permissible exposure limits (and preferably 0 for IDLH gases). - If initial tests fail (e.g., low oxygen or presence of toxic gas), **no entry** until the space is ventilated (see next step) and re-tested to meet criteria. Document all readings on the permit. The Safety Officer signs off that atmosphere is safe for entry. - Important: **Continuous monitoring** is required in the space during entry (typically with a personal multi-gas monitor carried by the entrant or one lowered into the space that the attendant can watch) [53] . Conditions can change, especially if work is being done (welding can consume oxygen or produce fumes, rust disturbance can release CO_2, etc.), so we never assume it stays safe – we verify continuously.

Step 3: Ventilation

If the confined space is capable of being ventilated, set up **forced air ventilation** to purge any hazardous atmosphere and provide fresh air [54] . Use an explosion-proof blower if flammables are a concern. Duct the blower output into the space, ideally to the bottom if heavier gases are an issue, to get full circulation. Ventilate for a sufficient time (per calculations or as indicated on permit) before entry and keep it running the entire time entrants are inside (unless it's absolutely not possible due to process reasons, in which case special precautions and perhaps airline respirators are needed). Natural ventilation (just opening the hatch) is often not enough [54] . Ensure the vent fan is not just at the opening but actually forces fresh air in and exhausts the bad air out. If the space cannot be ventilated or ventilation alone cannot make the air safe, then entrants must wear appropriate respiratory protection (supplied air) and the entry is treated with extreme caution (possible rescue team on standby with SCBA, etc.). Ventilation equipment should be set up so it does not interfere with egress (hoses and cords secured out of walkways).

Step 4: Equipment and PPE Setup

Gather all tools and equipment needed for the job and for safety: - **Retrieval System:** Set up a **tripod or davit** and winch above the entry point for vertical entries [55] . The entrant must wear a full-body harness with a retrieval line attached to the winch. This allows for non-entry rescue by the attendant if the entrant is incapacitated. For horizontal entries, a retrieval line with a suitable anchor or pulley system should be in place if possible. - **Personal Protective Equipment:** As determined by the permit, entrants will wear appropriate PPE. Typically: hard hat (protect from head bumps or falling debris), safety glasses (or goggles for chemical protection), gloves suitable for the environment (chemical-resistant if residue present, cut-resistant if sharp edges, etc.), protective clothing (coveralls or chemical suit if needed). If any potential for atmospheric hazard remains, use the proper respirator (air-purifying or supplied-air per the hazard; SCBA if needed for IDLH conditions). A note: if the space was just inerted or similar, no entry is allowed without SCBA and rescue team – but ideally we will not enter truly IDLH atmosphere unless absolutely necessary and with full precautions. - **Lighting:** Use low-voltage (typically 12V) or intrinsically safe explosion-proof lights for illumination inside the space. Adequate lighting is critical, but it must not introduce ignition risk or electrical hazard. - **Tools:** If doing hot work (welding, cutting) inside, a separate **Hot Work Permit** is required in addition to the entry permit, and special precautions (continuous gas monitoring for flammables, fire watch, etc.). Only use approved tools – for example, pneumatic or hand tools instead of electric if flammable atmosphere risk (to avoid sparks), or non-sparking tools if flammable residues might be present. - **Communications:** Establish a communication method between entrant and attendant – often verbally if the opening allows, but if not, use radios or hard-line communication sets. Ensure radios are intrinsically safe if in potentially flammable atmospheres. Test

communication before entry and have a backup method (like tugging on lifeline signals, etc., if radios fail). - **Rescue Equipment:** Aside from retrieval winches, have additional rescue gear ready depending on scenario – e.g., an SCBA available for rescue personnel, a stretcher or sked to pull someone out if needed. The **rescue plan** must be in place: our plant's plan is usually non-entry rescue by attendant via the winch for most situations. For complicated spaces, the local fire department or confined space rescue team is pre-notified and standing by if needed.

Step 5: Pre-Entry Briefing and Final Check
Conduct a toolbox talk with the entry team (Entrants, Attendant, Supervisor) before entry. Go over the permit requirements, identified hazards, and what work will be done. Everyone should understand the emergency procedures (what to do if an alarm goes off or if the entrant is in trouble). Verify that all preparation steps are done: LOTO in place, atmosphere tested acceptable and monitors are on, ventilation running, rescue equipment set, PPE on, permit signed by Entry Supervisor. If anything is amiss, **do not enter** until resolved.

Step 6: Entry and Work
With the permit signed and all controls verified, the Entrant may now carefully enter the space. The Attendant stays outside **at the entry point at all times** – absolutely no leaving the post or entering the space by the attendant is allowed while someone is inside. The attendant's responsibility is to monitor the entrant and the environment. - The entrant should maintain communication – e.g., give a thumbs-up or verbal confirmation periodically (the permit may specify a check-in interval, say every 5 minutes, or continuous voice contact). The entrant should move cautiously, looking out for any immediate hazards not previously visible. - The gas monitor should be worn by the entrant; if at any point it alarms (e.g., oxygen dropping or toxic gas rising), **the entrant must immediately leave** the space and the entry is aborted until conditions are reassessed [53] . - If the entrant feels any distress (dizziness, difficulty breathing, etc.), they must signal the attendant and exit promptly. - The attendant must **keep a constant count** (and name) of persons inside (if multiple entrants, though usually one at a time in our plant's spaces). Only the authorized number of people are allowed in (no one extra just to "take a look"). The attendant also ensures that no unauthorized persons enter the area. They should have the means to call for emergency help (radio or phone) immediately if needed. - The work performed inside should be per plan. If new hazards are introduced (for example, you suddenly need to use a solvent to clean, which introduces fumes not accounted for), **stop** and re-evaluate/update the permit with the Safety Officer before continuing.

Step 7: Exit and Closing
When the task is completed or if the permit conditions time out, the entrant(s) will exit the space slowly and carefully, using the ladder or retrieval line assistance. The attendant helps as needed from outside (e.g., guiding a lifeline). Once all workers are out, the Entry Supervisor will cancel the permit (noting time out) and close off the space (closing manways, etc., and removing entry equipment). Remove all tools and ensure nothing is left inside. Account for all gear.

After the job, do a debrief: Did everything go as expected? Any issues like unexpected fumes or difficulties? This information can improve future entries. All copies of completed permits are kept on file.

Emergency: - If an entrant becomes unresponsive or calls for help and cannot exit on their own, the attendant **shall not** enter the space to attempt a rescue (unless properly trained and relieved by another attendant, which is not typical for our facility) [56] . Instead, the attendant should begin retrieval with the winch to pull the entrant out if possible (non-entry rescue) and simultaneously call for the rescue team via radio/phone according to the emergency plan. The plant's emergency alarm should be activated. Rescue personnel (who have SCBA and training) will enter if the victim cannot be extracted with the line. Attendant duties also include keeping others away and guiding rescue team when they arrive. - Time is

critical in such an emergency (especially if it's oxygen deficiency or toxic exposure). This is why our emphasis is on prevention (atmosphere control) and retrieval systems – to enable a quick rescue without sending additional victims in. The rescue team (which may be our own trained team or local fire department Hazmat/Rescue unit) must be on standby if the entry has significant risk. We have arrangements with the local fire department for confined space rescues; we notify them in advance when a high-hazard entry is happening, so they're prepared.

Roles and Responsibilities – Confined Space:

- **Authorized Entrant (Operator going inside):** Must have current confined space entry training and be listed on the permit. Their role is to safely execute the work inside while continuously being mindful of the space's conditions. They **must follow all safety rules**: wear required PPE and harness, test their gas monitor, maintain communications, and evacuate immediately if any hazard arises or upon any order from the attendant. They should also self-assess their fitness – never enter a confined space if feeling ill or impaired. Entrants should familiarize themselves with the space layout and exit route (know how to get out quickly). They are also responsible for performing the work task efficiently to minimize time in the space (less exposure time is safer).
- **Attendant (Safety Watch):** An attendant is assigned to remain outside the confined space entry point for the entire duration of entry. The attendant's primary job is to **monitor the entrant(s)** and the environment, and to act in case of an emergency. Attendants keep an accurate count of who is inside and ensure no unauthorized persons enter. They maintain communication with entrants (calling out status checks if entrants are quiet for long, etc.). If any warning signs appear (entrant seems to be struggling, or gas monitor alarms, or the attendant notices something like a strong odor or smoke), the attendant must order the entrants to evacuate immediately. The attendant is equipped and trained to initiate non-entry rescue using the retrieval system if needed [56] . They also call for emergency help without delay. An attendant must not abandon their post for any reason while entry is in progress – if they need relief (bathroom break, etc.), entry must be paused and entrants withdrawn unless a qualified relief attendant takes over. Essentially, the attendant is the lifeline for those inside – a serious responsibility.
- **Entry Supervisor (Permit Authorizing individual, e.g., Safety Officer or Department Supervisor):** This person is accountable for the overall safety of the confined space entry. They ensure the permit is properly filled out, all preparatory steps are completed, and that conditions are safe **before** approving entry [57] . The Entry Supervisor confirms that the entrants and attendants are qualified and understand their duties. They have authority to cancel or suspend the entry if conditions change or if safety procedures are not being followed. Often, the Safety Officer or a senior supervisor plays this role. The Entry Supervisor does not necessarily remain at the site the whole time (though often they do for complex jobs), but they must be readily available. They also verify after the job that the space is returned to a safe state (no tools left, covers secured). If any incident or unexpected hazard occurred, they will conduct a follow-up investigation and revise procedures as needed.
- **Rescue Team:** While not always an Octank internal role (we may rely on external responders), we ensure that a rescue capability is in place for every permit space entry. The designated rescue personnel must be **standing by and ready to respond** quickly. If internal, they would be suited up with SCBA and rescue equipment, not engaged in any other duties that would delay response. If external (local fire dept), we coordinate in advance and confirm their availability time. Rescue personnel also need to have access to the same information – they should be aware of the hazards inside (e.g., if an inert gas was used, etc.) and have an entry plan.

Note: Every permit-required confined space at Octank is identified by signage: "Danger – Permit-Required Confined Space – Do Not Enter Without Authorization." Never assume a confined space is safe to enter because "we've done it before" or it's a quick look – even brief entries require at least testing and

likely a permit. Shortcuts in confined space procedure can be fatal. By following the above steps – isolation, testing, ventilation, PPE, and active monitoring – we significantly mitigate the risks and ensure that entries are completed safely and efficiently ⁵³ ⁵⁸ .

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6. Electrical Safety and Lockout-Tagout (LOTO) Procedures

Working with or around electrical equipment poses the risk of shock, electrocution, arc flash, and other serious injuries. Additionally, many machines and processes at Octank have hazardous energy sources (electric, hydraulic, pneumatic, chemical, gravity, etc.) that must be controlled to prevent accidental startup or release of energy during maintenance or servicing. This section covers two critical safety areas: **General Electrical Safety** and the formal **Lockout-Tagout (LOTO)** procedure for hazardous energy isolation.

6.1 General Electrical Safety Rules:

- Only **qualified electricians** or authorized maintenance personnel are allowed to work on electrical circuits and equipment (defined as those with proper training to recognize and control electrical hazards). Unqualified employees should not tamper with electrical panels, wiring, or devices.
- **Inspect cords and tools:** All electrical tools and cords should be in good condition with no exposed wires or damaged insulation. Use GFCI (Ground Fault Circuit Interrupter) protection when using portable electric tools in damp areas or outdoors.
- **No live work**: The policy is to de-energize (shut off power and verify off) equipment before working on it. Energized work is only permitted under exceptional circumstances (like testing/ troubleshooting that requires power) and with additional precautions (insulated tools, PPE, second person standby, and management authorization via Energized Electrical Work Permit).
- **Approach distances:** Keep safe distance from live parts. For low voltage (<50V) it's generally safe, but for 120V and above, do not touch live exposed parts. For high voltage (if any at site), only specially qualified personnel with proper PPE (arc flash suits, etc.) can approach within defined boundaries per NFPA 70E.
- **Arc flash PPE:** When opening electrical panels or switching high-current circuits, appropriate arc-rated clothing, face shield, and voltage-rated gloves must be worn as determined by arc flash analysis labels on equipment.
- **Housekeeping:** Keep water and conductive materials away from electrical equipment. Do not use metal ladders or wear conductive jewelry when working with electricity.
- **Report issues:** If you see a tripped circuit breaker, a blown fuse, a burning smell from a motor, or flickering lights – report it. These can be signs of electrical problems. Don't reset breakers repeatedly without finding out why they tripped.
- **Emergency response:** Know where electrical shutoffs are for your area. In case of an electrical fire, use a Class C or multi-purpose (ABC) extinguisher – never throw water on it. If someone is shocked and possibly in contact with live electricity, do not touch them; cut power first or use a non-conductive object to push them away from the source, then call for help and begin first aid/ CPR if trained.
- **Lightning/Static:** If working with flammable liquids, ensure bonding and grounding to dissipate static electricity.

6.2 Lockout-Tagout (Control of Hazardous Energy):

LOTO is a safety procedure to ensure machines or equipment are **isolated and cannot be energized or started** while maintenance or repair work is being done. This protects workers from the release of

hazardous energy (electric current, moving parts, pressurized fluids/gases, etc.). OSHA's LOTO standard (29 CFR 1910.147) requires a program and specific steps. Octank's LOTO procedure includes these **six core steps** [59] :

Step 1: Preparation – Before shutting down, the authorized employee (person who will perform the maintenance) **identifies all energy sources** that power or move the equipment [60] . This includes primary electrical power, secondary or stored energy (capacitors, batteries, springs, elevated weights), hydraulic or pneumatic lines, gas, steam, chemical lines, and any thermal energy (heaters). They review the equipment's energy isolation points (refer to machine-specific LOTO procedure if available) and gather the necessary lockout devices (padlocks, valve lockouts, circuit breaker lockouts, chains) and tags. Notify all affected employees (operators or others in the area) that the machine will be shut down and locked out and **why** [61] – communication is key so no one attempts to use it.

Step 2: Shutdown – Power down the machine or process using normal stopping procedure (press Stop button, toggle switch off, close valve, etc.) [62] . This ensures operations are ceased in an orderly way (e.g., preventing a load drop or spill). Make sure all moving parts come to a complete stop.

Step 3: Isolation – **Physically isolate** the equipment from all energy sources [63] . This can include: - Turning off and disconnecting the main electrical disconnect switch (and possibly pulling fuses, rack out circuit breakers for added security). - Closing valves for fluid and gas lines; also bleeding off pressure after closing (see next step). - Blocking or disconnecting mechanical linkages (for example, blocking a gear or shaft to prevent movement). - For gravity hazards, securely chock or block elevated parts that could fall (like raised loader buckets, machine rams, etc.). Each isolation point must be secured by applying a **lockout device** and tag.

Step 4: Lockout/Tagout Device Application – Attach **locks** to each energy isolating device so it cannot be moved to the "on" or energized position [64] . Use only approved red lockout padlocks labeled with the worker's name (Octank assigns personal LOTO locks to each authorized employee). In some cases, multiple people will work on the same equipment – each person must apply their own lock (via group lockout hasps if needed so multiple locks can attach) ensuring that the machine cannot be started until all locks are removed. Along with the lock, **tags** are affixed that indicate the name of who locked it out, the date/time, and the reason ("Lockout for maintenance – Jane Doe") [65] . The tag is a warning device, and the lock is the physical restraint. **Only the person who applied a lock may remove it** – this is crucial. Tags communicate that the equipment is under LOTO and must not be altered. Note: If isolating circuit breakers or plugs, lockout devices like breaker blockers or plug caps should be used such that the energy cannot be reconnected without removing the lock.

Step 5: Release of Stored Energy – Even after isolation, **stored or residual energy** in the system must be relieved, drained, or otherwise made safe [66] . This includes: - Releasing pressure from hydraulic or pneumatic lines (open pressure relief valves, drain accumulators to a safe container, bleed air from lines). - Releasing or blocking springs (either tension or compression springs). - Allowing capacitors to discharge (or manually discharge them using proper resistive equipment). - Let hot parts cool down or use cooling methods if necessary (thermal energy can harm or later cause fire when you open equipment). - Block any parts that could still move due to gravity or stored mechanical energy. For example, lock a flywheel in place, or insert a safety block in a press that could drop. This step is about rendering the equipment to a "zero energy state". After this, **secure or restrain** any components that could re-accumulate energy (for instance, blank off a hydraulic line that could get recharged, or keep a vent open to prevent pressure build-up). Many accidents have happened because stored energy was not controlled (like a charged capacitor shocking a tech, or a compressed spring releasing suddenly) – take this step seriously.

Step 6: Verification of Isolation – Finally, **verify that the equipment is truly locked out and de-energized** [67] . The authorized person will double-check each energy source: - Try to start the equipment by pressing the start button or turning the switch (with all locks in place). Nothing should happen – this confirms electrical energy is cut. Then return controls to "off" after the test. - Use appropriate test instruments to check for voltage on electrical circuits (multimeter on known live source first to ensure it's working, then on the circuit – it should read zero volts). Only qualified electricians should test high voltage parts. - Visually inspect that valves are closed and locked, and check pressure gauges – gauges should read 0 (zero pressure) if fully isolated and bled. - Ensure mechanical blocks are holding and parts are stable. Verification is a critical step: do not skip it. Only after verifying isolation is it safe to begin the maintenance or servicing work on the equipment.

The six steps above can be remembered as **"Prepare – Shut – Isolate – Lock – Release – Verify."** [59] This entire process must be done **every time** maintenance is performed, no matter how quick the task may be.

Performing the Work Under LOTO: Keep the key to your lock on your person (or in a lock box if group LOTO; each person then holds their key to the box lock). If the job spans shifts, incoming workers should apply their locks and outgoing remove theirs, with a turnover meeting to transfer information. NEVER ever remove someone else's lock or restore energy without authorization. If work is incomplete by end of shift, maintain the LOTO – communicate to next shift.

Restoring Equipment to Service (removing LOTO): When the work is finished, the area must be cleared of tools and people, all components reassembled, and guards reinstalled. Notify everyone that locks will be removed and energy restored. Each person removes their own lock and tag. Before the first person unlocks, ensure others aren't still in harm's way. Group LOTO devices are removed only after all personal locks are off. The supervisor or authorized person will do a final check. Then re-energize the system in a controlled manner. Watch for any abnormalities upon startup.

Enforcement: LOTO procedures are mandatory. Failure to follow them can be fatal and is a serious violation. Octank management will enforce strict compliance. Periodic audits of LOTO procedures are conducted to ensure proper practices (OSHA requires at least annual inspection of each authorized employee's LOTO performance).

Roles and Responsibilities – LOTO:

- **Authorized Employee (Maintenance/Operator performing LOTO):** This is the person who locks out the equipment to work on it. They are trained in LOTO procedures. They must understand the types and magnitudes of energy involved with the machinery. Their duty is to follow all steps – don't take shortcuts. They communicate with affected operators about shutdown. They use the correct lockout devices and ensure all energy is isolated. Importantly, they verify the isolation themselves (test-run and/or meter). They keep the keys to their locks under their control. When multiple authorized personnel are working, each puts their lock – do not just rely on someone else's lock. They remove their locks promptly when work is done (after checking area) and notify when machine is ready to return to service.
- **Affected Employee (Machine operators or others in area not performing the LOTO):** They need to be aware of LOTO activities. They should never attempt to start or use equipment that is locked/tagged out. If they see a machine with a lock and tag, they must leave it alone and perhaps confirm with maintenance that they are aware. Affected employees should cooperate fully with those doing maintenance – for example, by shutting down equipment when asked and advising if

there are any unusual energy sources the maintainer might not know (like a hidden capacitor or UPS system).
- **Supervisor/Management:** Ensure that LOTO procedures are available and enforced. Before any job, confirm LOTO is applied. Supervisors should not pressure workers to shortcut LOTO due to time constraints – nothing is so urgent that it's worth a life or limb. They also coordinate if multiple teams or contractors are involved, making sure everyone's locks are in place (e.g., using a group lockout box system). If an outside contractor is working on our site equipment, we coordinate LOTO – both parties apply locks (each his own lock). Management is also responsible for providing adequate lockout equipment (locks, hasps, tags) and training.
- **Safety Officer/LOTO Program Manager:** Maintains the written LOTO program and conducts training for authorized and affected employees. They perform the periodic inspections/audits of LOTO execution (observing a random lockout procedure and certifying it was done correctly) [39] . If gaps are found, they retrain or correct. They keep a record of all authorized personnel. They also handle any incidents where a lock might have to be removed by force (which is extremely rare and done only under strict protocol when the lock owner is not present – requiring management approval and ensuring that person is not in the machine).
- **Electricians/Engineers:** For electrical LOTO specifically, qualified electricians may be the ones doing the lockout on electrical disconnects. They need to use proper test equipment to verify zero energy. Engineers may identify energy isolation points and help develop equipment-specific LOTO procedures, ensuring even complex systems (with multiple energy sources) have a clear step-by-step lockout plan.

Important Warning: Never assume a system is de-energized – always follow the full LOTO procedure. Many tragic accidents have occurred when someone thought a circuit was off or a valve was closed, but it wasn't or was re-energized by someone else unknowingly. Our LOTO locks are **your lifesavers** – treat them as such.

Key principles to remember: One Person, One Lock, One Key. Lock out **all** energy sources (don't forget secondary ones), and test before you touch. By rigorously implementing lockout-tagout, we protect everyone from the often invisible dangers of uncontrolled energy [68] [66] .

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7. Working at Heights (Fall Prevention and Protection)

Falls are one of the leading causes of workplace injuries and fatalities, especially in industrial settings. At Octank Chemical, various tasks may require working at height: accessing the top of reactors or tanks, performing maintenance on elevated platforms, working on scaffolding, using ladders, etc. We are committed to the principle that **no task is so urgent that it cannot be done safely with proper fall protection**. This section covers precautions for any work at height (generally defined as working above **4 feet** in general industry, where OSHA requires fall protection [30]), including use of fall protection systems, ladders, scaffolds, and aerial lifts.

7.1 Hierarchy of Fall Protection:
Always start by planning how to eliminate or reduce the need to work at height: - **Engineering Controls (Passive protection):** Whenever possible, perform work from the ground (e.g., use extendable tools or long-handled devices). If that's not feasible, install permanent platforms or guardrails at elevated work areas so that workers are protected without needing personal gear [69] . Guardrails (with top rail ~42 inches high, mid-rail, and toe-board) are an excellent passive protection method and should be the first choice for any routine elevated work like platforms around equipment [69] . - **Fall Restraint Systems:** If guardrails cannot be used, consider restraint systems that prevent a worker from reaching a fall edge (like a short leash/harness that physically stops you from getting to the roof edge). - **Fall Arrest Systems:**

When above methods are not possible, use personal fall arrest systems (PFAS) which will catch a person in the event of a fall. This includes a full body harness, a connecting lanyard or self-retracting lifeline, and a secure anchor point. Ensure anchor points can support at least 5,000 lbs per person attached [32] or are designed and installed under the supervision of a qualified engineer. - **Administrative Controls:** Safety practices like permitting work at height, having a buddy system or spotter, restricting work during high winds or bad weather, and clear signage ("Fall Hazard – Use Harness") supplement the physical controls.

7.2 Use of Personal Fall Arrest Systems (PFAS):
When using a harness and lanyard, follow these guidelines: - **Harness Fit:** Put on the full-body harness and adjust snugly; chest strap at mid-chest, leg straps snug under thighs, D-ring centered between shoulder blades. Only trained personnel should wear and use PFAS. Inspect the harness for damage (cuts, frays, worn stitching, D-ring deformities) before every use. - **Anchor Points:** Use only approved anchorage points that can support the required load [32] . On site, there may be designated anchor eyebolts or structural beams certified for tie-off. Do not tie off to conduit, small pipe, or non-structural components. If a certified anchor is not readily available, a professional engineer must approve alternatives or use a portable anchorage (such as beam clamps or sling around a robust member). - **Lanyards:** If using a shock-absorbing lanyard, ensure it's the right length (usually 6 ft) and will limit fall distance. Alternatively, use a self-retracting lifeline (yo-yo) for vertical mobility which can reduce free-fall distance. Inspect lanyards for damage (no cuts, functioning shock pack, connector in good shape). - **Calculate Fall Distance:** Before you climb, ensure that if you fell, you wouldn't hit a lower level or the ground. This means calculating the total clearance needed: lanyard length + deceleration distance (e.g., 3.5 ft for shock absorber) + height of worker (say 6 ft) + safety margin. For example, a 6 ft lanyard with a 3.5 ft shock absorber and a 6 ft tall worker needs well over 15-18 ft of clearance. If not available, use a shorter system or relocate anchor overhead [70] . Keep attachment above your dorsal D-ring if possible to minimize free fall. - **100% Tie-Off:** If you need to move between anchors (while on a lattice or tower perhaps), use twin lanyards or a positioning lanyard to ensure you are always attached to something before you detach the other (maintain continuous protection). - **Swing Falls:** Try to anchor directly above your work area to avoid swing fall hazards which can injure you by swinging you into an object if you fall at an angle.

7.3 Ladders: - **Selection:** Use the right ladder for the job (proper height so you don't stand on top rung, proper weight capacity, non-conductive for electrical areas). Inspect ladder condition (no cracks, non-slip feet intact, rungs clean). - **Setup:** Place on stable, level ground. For extension ladders, follow the 4:1 rule (for every 4 feet of ladder height, the base is 1 foot out from the wall). Extend at least 3 feet above the top landing if you intend to step off the ladder onto a roof or platform [71] . Secure the top (tie it off) if possible to prevent slipping. - **Climbing:** Maintain **3-point contact** at all times (two hands and a foot, or two feet and a hand). This means don't carry tools in hand while climbing – use a tool belt or hoist materials up after. Face the ladder when climbing up or down. **Do not overreach** – your belt buckle should stay between the side rails; if you can't reach something, climb down and reposition the ladder. Only one person on a ladder at a time. - **Top Steps:** Never stand on the top cap or the step below the top on a step ladder – it's not designed for standing, and you could easily lose balance [71] . - If using a ladder in a doorway or access point, block the door or have a coworker guard the bottom. - **Alternatives:** For higher or longer-duration tasks, scaffolds or lifts are safer than ladders. Use ladders mainly for short tasks (a couple of hours at most) or access, not heavy work.

7.4 Scaffolding and Platforms: - Only trained scaffold erectors may assemble scaffolds. Before use, a competent person must inspect and tag the scaffold (green tag = safe for use, yellow = caution/special conditions, red = not to use). - Scaffolds should be fully planked, with guardrails and toe-boards on open sides if above 4 ft. - When working on scaffolds, still be cautious of falling objects: wear hardhats, toe-boards should stop tools from falling off. If necessary, use tool lanyards. - Do not move mobile scaffolds

with people on them. Lock wheels when in use. - Climb scaffolds via the provided ladders or stair units, not the frame (unless designed for climbing).

7.5 Aerial Lifts (Boom Lifts, Scissor Lifts): - Only authorized personnel trained in manlift operation can use these. - Inspect lifts before use (function test, guardrails in place, etc.). - **Harness use:** On any boom lift, you must wear a harness and lanyard attached to the basket **anchor point** (in case of being ejected or catapulted due to movement) [72] . Scissor lifts: harnesses are often recommended but not strictly required if guardrails are intact and you stay inside. - **Operation:** Check for overhead hazards (power lines – maintain at least 10 feet clearance unless de-energized). Use outriggers if equipped, ensure solid footing of tires. Do not exceed the basket's weight limit. Travel slowly and carefully, especially when elevated. - **Positioning:** Don't lean out of the basket or stand on rails to reach something – if you can't reach, reposition the lift. - If the lift has a boom (articulating or telescoping), be mindful of **fall distance** if any bounce – the harness/lanyard will protect you but could still allow some jolt. Keep lanyard short on lifts to minimize any movement if you did fall against the rail.

7.6 Housekeeping and Other Considerations at Height: - Keep your work area organized to prevent tripping at height. If you're on a platform, don't leave tools scattered. Use tool belts or containers. - Mark and barricade the area below where you're working if there's any risk of something dropping. Use signs "Caution: Overhead Work" to keep people from walking underneath. - Weather: If working outdoors, do not work at height during high winds, storms, or icy conditions. Wind can be extremely dangerous on ladders and lifts (most boom lifts have max wind ratings – adhere to them). Postpone the job if weather is unfavorable. - **Training:** All employees who might work at height must undergo fall prevention training which covers recognizing fall hazards, proper use of fall protection equipment, and how to handle and store that equipment [73] . They should also be trained on rescue procedures if a fall arrest happens (how to quickly rescue someone hanging to avoid suspension trauma). - **Inspection:** Fall protection equipment (harnesses, lanyards, anchors) must be inspected regularly (at least annually by a competent person, and by the user before each use). Remove from service any equipment that shows wear or has arrested a fall.

Roles and Responsibilities – Working at Height:

- **Employee (Working at Height):** Plan your work so you minimize time at height and avoid going up and down unnecessarily (but do not rush!). Always use the provided fall protection – do not "forget" to clip in or unhook because it's inconvenient. Check that your harness is snug and you've removed any slack from lanyard that's not needed. You are responsible for your own attachment at all times – never unhook yourself until you are safely on the ground or a protected area. Use caution when transitioning from ladders to roofs or platforms; maintain tie-off if possible during the transition (e.g., use a double lanyard system). Evaluate the area for hazards: overhead power lines, unstable surfaces, etc., and discuss with your supervisor if any concerns. If you feel unsafe (e.g., anchor point looks inadequate or you need a different ladder), stop and get the right equipment. When on the ground, don't walk under someone else working at height; respect barricades.
- **Safety Officer/Supervisor:** Ensure that a fall hazard analysis is done for jobs above 4 feet. Provide the correct equipment for the job (guardrail systems, lifts, harnesses, anchors) – and **do not allow work to proceed** if proper protections aren't in place. Supervise high-risk jobs: for instance, if contractors are doing roof work or our team is on a high scaffolding, consider having a Safety observer present. The supervisor must enforce that PPE like harnesses are being used and used correctly [74] . They should also verify that rescue plans are considered (if someone fell in a harness on an overhead structure, how to get them down quickly?). The Safety Officer arranges training and refreshers for fall protection. They also conduct periodic site audits – e.g., checking if portable ladders are being used properly, guardrails secure, etc. In the event of an incident or

near-miss (like a dropped object or a slip where harness caught someone), investigate and implement improvements (maybe need an extra railing, different type of lanyard, or additional training on keeping tether lines taut).

- **Facilities/Maintenance (Engineering Controls):** Responsible for installing and maintaining fixed ladders, guardrails, and anchor points. They need to ensure anchor certifications and load ratings are done. If maintenance work frequently occurs at a certain height with no built-in protection, consider engineering a safer solution (like a catwalk or mezzanine).
- **Co-workers (Ground level):** If you are spotting someone or just nearby, be aware of overhead work. Do not distract a person who is on a ladder or in a precarious spot. Politely remind if you see someone not using their fall protection properly (maybe their lanyard is not attached – sometimes a simple oversight that can be life-critical).

Important: Fall protection is not just a regulatory checkbox – it is truly life-saving. A fall from as low as 6 to 10 feet can be fatal or cause permanent injury. By rigorously using guardrails, harnesses, and safe climbing practices, we protect ourselves. Remember that OSHA requires fall protection from 4 feet in general industry [30] , but even on a lower ladder, caution is necessary. Let's aim for zero falls by always thinking **"Height = Hazard: Protect Myself."**

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8. Forklift and Moving Equipment Safety

Powered Industrial Trucks (PITs), such as forklifts, pallet jacks, and other mobile equipment, are essential for material handling at Octank. However, they pose significant hazards: collisions, tip-overs, struck-by incidents, and lifting accidents can result in severe injury or death. This section provides rules for **forklift operators** and those working around moving equipment to ensure safe operations. Octank enforces OSHA's standard 29 CFR 1910.178 for PITs, which includes operator training, vehicle maintenance, and safe driving practices.

8.1 Operator Training and Authorization:
Only **trained and certified operators** are allowed to drive forklifts on the premises [75] . Operator training includes formal instruction, practical driving training, and an evaluation. Operators must know how to handle the specific type of truck (counterbalance forklift, reach truck, etc.) and the environment's unique challenges (narrow aisles, ramps, hazardous locations). Under no circumstances may an untrained employee or any under 18 years of age operate a forklift. Certifications are reviewed every 3 years (or sooner if there's an incident or unsafe operation observed, requiring refresher training).

8.2 Pre-Operational Inspections:
At the start of each shift, forklift operators shall perform a pre-use inspection. This involves checking: - **Tires** (condition/inflation), **brakes** (pedal holds pressure, parking brake works), **steering** (responsive, no excessive play). - **Horn** and warning lights/backup alarm – ensure they function [76] . - **Hydraulic controls** – lift/lower, tilt, side-shift (if equipped) to ensure smooth operation, no leaks. - **Mast chains** and forks – no cracks, deformities; fork pins secure; forks aligned and locking pins in. - **Fluids** – fuel level or battery charge, hydraulic fluid, engine oil if applicable, coolant (for combustion engine forklifts). - **Attachments** (if any, like drum grabbers) are secure. If any issue is found that affects safe operation (for example, brakes not working properly, or a hydraulic leak), **do not operate**. Tag the forklift "Out of Service" and report to maintenance. It must be **removed from service if unsafe** [77] until repaired.

8.3 Safe Driving Practices: - **Seatbelt:** Always wear the seatbelt when operating a forklift [78] . This keeps you within the safety cage in a tip-over (the overhead guard protects you if you stay seated; if not belted, you might jump or fall out and be crushed). - **Speed:** Obey the plant's speed limit for forklifts (typically ~5

mph indoors, 10 mph outdoors or as posted). Go slow around corners and in congested areas. - **Corners and Visibility:** Slow down and **sound the horn at intersections, blind corners, or doorways** [76] . Our facility has convex mirrors at blind corners – use them but still honk and go slowly. Always look in the direction of travel – if reversing, turn and look behind, don't rely solely on mirrors. - **Pedestrian Right-of-Way:** Pedestrians always have the right-of-way. Operators must **watch for pedestrians** and maintain a safe distance [79] . If someone is walking nearby, either stop or creep by very slowly after you have their attention. Use the horn to alert but never assume they see you. - **No Riders:** Never allow anyone to ride on the forks or an unauthorized position on the truck [79] . Forklifts are one-person equipment unless there is a second seat. Likewise, do not use the forks or pallet as an improvised manlift (unless you have an approved forklift work platform that is properly secured and with fall protection). - **Stability and Loads:** Know the forklift's capacity and **never exceed the rated load** [78] . Ensure loads are stable, centered, and secure. If pallets are poorly stacked, re-stack before moving. Use ropes or straps if necessary to stabilize irregular loads. Keep the load low (forks 4-6 inches off ground) while traveling to maintain a low center of gravity [80] . Do not raise or lower the load while the forklift is in motion – come to a complete stop before lifting to adjust load height [80] . - **Fork position:** When unloaded, travel with forks lowered (just above floor to avoid catching on bumps) and slightly tilted up. When carrying a load on level ground, keep it low and slightly tilted back for stability. If vision is obstructed by a bulky load, drive in reverse carefully, or get a spotter to guide you. - **Ramps:** When driving on an incline, keep the load **upgrade**: drive forward up a ramp with a load, and reverse down a ramp with a load (to keep load uphill) to prevent tipping or dropping load. No turning on ramps. - **Clearances:** Watch overhead clearance—be mindful of door heights, low pipes, lights, or sprinkler systems. Also ensure you have enough clearance on sides in narrow aisles to avoid crushing hazard. - **Operating Surface:** Only drive on stable, even surfaces that can support the weight. Avoid soft ground, oil slicks, puddles (they may hide potholes). Slow down on wet or slippery floors and make turns gently to prevent skidding. - **Parking:** When you park the forklift, fully lower the forks to the floor (flat) to remove potential tripping hazard, put controls in neutral, turn off engine, and set parking brake. Park only in authorized areas, not obstructing exits, aisles, or electrical panels. - **No Stunts or Improper Use:** Absolutely no horseplay with equipment. Do not use the forklift for purposes it isn't designed (like towing unapproved attachments or pushing carts in a makeshift way without approval). Do not speed or make abrupt moves. Never allow others to be lifted on forks or stand under raised forks or loads [79] . - **Visibility & Lights:** If operating in dark areas or at night outside, ensure lights are on. Our forklifts have flashing beacons – ensure they function. Also use the reverse alarm (do not disable it; if it's malfunctioning, report it).

8.4 Special Precautions: - **Hazardous Areas:** If the forklift is operated in areas with flammable vapors (like solvent storage), it must be rated for such (Explosion-proof or EE rated). Only properly rated forklifts are allowed in classified hazardous locations [41] . - **Elevators:** Do not drive a forklift into a freight elevator unless it's rated to handle the weight of the forklift plus load and you've been authorized. Chock wheels if on an elevator. - **Trailers/Trucks:** Before driving a forklift into a trailer for loading, ensure the trailer is chocked or otherwise restrained (dock lock) and the dock plate/bridge is properly in place. Inspect trailer condition (floors, etc.) to ensure it can support forklift. Use trailer jacks if trailer not attached to tractor to prevent up-ending. - **Load Handling:** Stack loads evenly and straight. Do not pile too high as to become unstable. When stacking, place the heavier loads on lower shelves. Use proper spacing to not knock adjacent stacks. - **Communication:** Forklift operators should use horn and, where appropriate, hand signals to communicate intentions (like signaling a spotter). Pedestrians should make eye contact with drivers before crossing paths.

8.5 Maintenance of PITs: - Forklifts must undergo regular preventive maintenance. If during the pre-shift check something minor is found but not safety-critical (like a slightly dim light), report it so it gets fixed. Any safety issue (brakes, etc.) the forklift is taken out of service [81] . - Refueling or Battery Charging: Do so only in designated, well-ventilated areas. Turn off forklift when refueling; no smoking or open flames in refuel/charge areas (batteries emit hydrogen). Follow proper battery charging procedures (PPE for acid,

use hoist or assistance for heavy battery changes, electrolyte levels okay, etc.). - Keep forklifts clean – avoid oil/grease buildup that could catch fire or cause slips. After maintenance or refueling, ensure no loose tools or objects left on the truck.

8.6 Working Around Forklifts (Pedestrian Safety): Not everyone will drive a forklift, but everyone must be aware of them in the environment: - Stay within designated pedestrian walkways (marked by yellow lines on floor where provided). Minimize walking through active forklift zones. - When you hear a horn or backup alarm, stop and locate the forklift. Never assume the driver sees you – they might have blind spots or be looking the other way. Make sure you are **seen**: make eye contact with the driver if crossing their path. - Do not approach a moving forklift from any side. If you need to talk to a driver, wait until they stop and lower forks, then approach from the side where they can see you. - Never stand or walk under raised forks or loads [79] . Even if the forklift is stopped, the hydraulics could fail or load could fall. - Keep a safe distance. Forklifts can swing wide on turns or the back end can swing quickly. Stay at least several feet away. - Be aware that forklifts are quieter than you might think, especially electric ones – don't rely only on hearing them. - If you are working in an area where forklifts are operating (like picking from racks), be vigilant when stepping into aisles. Also do not leave obstructions on the floor that could cause a forklift to swerve.

Roles and Responsibilities – Forklift Safety:

- **Forklift Operator:** You are responsible for operating safely at all times. Conduct thorough pre-operation checks [82] . If any doubt about the equipment's safety, do not operate it. Follow all plant traffic rules (one-way routes, stop signs inside the warehouse, etc.). Adjust your driving to the conditions – slower in tight or busy areas. Always look in direction of travel – no driving while distracted (no cell phones or headphones). Use horns at blind spots [76] . Never lift an unknown load without assessing weight and stability. It's better to take two trips with a lighter load than overload and tip the forklift. If at any point you feel a potential tip (e.g., rear wheels coming up), do not jump – brace yourself, hold the steering wheel, keep body inside the cage, feet on floor. Report all incidents (even minor collisions or scrape of racking) immediately; do not hide damage. Keep the forklift tidy (don't keep extra pallets or trash on it). Turn it off when not in use and park only in approved spots. And crucially, stay current on your training – attend refresher courses and performance evaluations.
- **Supervisors/Area Managers:** Make sure only authorized, trained operators are assigned to forklift duties. Enforce speed limits and safe practices – if you observe unsafe driving or near-misses, intervene and document it. Recognize good safety behavior too (positive reinforcement). Keep the work environment conducive to safe driving: aisles should be clear of trip hazards and sufficiently wide for maneuvering; intersection mirrors in place; good lighting. If the workflow creates a lot of interaction between forklifts and pedestrians, consider engineering changes (like pedestrian barriers or alternate routes). Ensure that daily checklists are being done and signed off. If a forklift is taken out of service, assist to get it repaired before returning to use. Verify that each operator has the needed PPE (hard hat, safety shoes, high-visibility vests if required in loading bay, etc.). For any new attachment or unique use of forklifts, provide additional training and update the equipment's capacity plate if needed. Periodically audit forklift operations and retrain if widespread issues are seen.
- **Maintenance Team (Fleet Management):** Keep forklifts in safe, working condition. Perform regular maintenance (per manufacturer schedule), including brakes, steering, engine, hydraulics, and safety features (horn, lights). Document all maintenance. If a forklift has a chronic issue, pull it from service until fully repaired. When modifying or adding attachments to a forklift, collaborate with the manufacturer to get an updated rating and ensure the modification is safe. They should also maintain things like proper tire inflation (solid tire condition) as that affects stability.

- **Safety Officer:** Oversee the PIT safety program. Ensure initial and refresher trainings are conducted and properly documented (especially when an operator is observed operating unsafely or is involved in an incident – that triggers re-training). Evaluate the facility layout for any improvements in traffic management (like floor markings or physical barriers to separate forklifts and people). Enforce that all incidents and near-misses are analyzed to prevent recurrence. Possibly implement tools like blue/red safety lights on forklifts (projecting light on floor ahead or behind forklift) if needed. The Safety Officer also ensures compliance with any additional regulatory requirement, e.g., if handling hazardous materials, ensuring Hazmat training is integrated [41].
- **Pedestrians/All Employees:** Everyone in the facility should be aware of forklifts. This means adhering to pedestrian pathways, not cutting through forklift zones, and not creating unsafe situations (like leaving a pallet in a lane). If assigned to work near forklift operations (like picking parts or assisting loading), wear high-visibility vests so operators can see you easily. Never distract or assume a forklift driver sees you – be proactive in your own safety. If you witness unsafe forklift use (speeding, ignoring stop signs, using phone while driving, etc.), report it to a supervisor immediately – silence can lead to accidents.

By following these practices, we aim for incident-free material handling operations. Forklift safety is a two-way street: responsible driving and alert pedestrians. **Remember:** a forklift may seem commonplace, but it's a 5,000+ lb piece of heavy equipment – treat it with respect and caution always [83] [84].

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9. Emergency Evacuation Protocol

In the event of a major emergency – such as a large fire, explosion, toxic chemical release, or any other incident requiring evacuation – Octank Chemical has an Emergency Action Plan to facilitate safe and orderly evacuation of all personnel. Every employee must be familiar with the evacuation procedures for their area, including alarm signals, evacuation routes, assembly (muster) points, and their responsibilities during an evacuation. Quick and calm execution of these steps can save lives.

9.1 Alarm and Notification:

- **Emergency Alarm:** The plant is equipped with an audible alarm system (and flashing beacons in high-noise areas). The alarm for general evacuation is a loud siren and whoop sound. In case of fire, any employee detecting it should immediately activate the nearest fire alarm pull station [4]. For other emergencies (like detecting a major gas leak or spill), either the same fire alarm may be used or a specific announcement via PA will be made. Treat any alarm or **announcement of evacuation** seriously – do not delay or assume it's a drill unless officially told so.
- **Notification:** Upon hearing the alarm or being told to evacuate, **stop all work** [4]. Operators should shut down processes if and only if time permits and it's part of their training to do so safely (e.g., turning off Bunsen burners or stopping feed pumps to prevent exacerbating the emergency). However, in most cases, life safety is priority – evacuate immediately rather than tend to equipment. If you can and it's safe, secure any active operations (close chemical containers, turn off machinery) to reduce hazards during evacuation.
- **Communication:** Floor wardens or designated evacuation coordinators will sweep areas if possible to ensure everyone is out (only if it's safe for them). They may shout "Evacuate!" or give instructions. There's also an emergency PA system; listen for any specific guidance ("Evacuate from the south gate", or "Avoid the west side due to fumes", etc.). If you initiated the emergency (pulled alarm), also call the emergency number to give details (so they know the nature of emergency and location).

9.2 Evacuation Routes:

- **Exit Awareness:** Know at least two ways out of your work area in case one is blocked [85] . Primary and secondary evacuation routes are posted on the safety maps in each department. Typically, these routes are marked by green EXIT signs and arrows in hallways. Do not use elevators (if any); always use stairs or ground-level exits.
- **During Evacuation:** Walk briskly, do not run (to avoid trips or panic). Follow the exit signs to the nearest safe exit. If there's smoke, stay low (crawl if needed) to avoid inhaling smoke [7] . Feel doors with the back of your hand before opening – if it's hot, do not open; use alternate route [86] . Close doors behind you if you are the last out, to contain potential fire (but do not lock them).
- **Assist Others:** If you encounter colleagues or visitors who need assistance (injured or with disabilities), help them if you can without jeopardizing your safety, or inform the nearest evacuation warden of their location so that emergency personnel can assist. We have an Evacuation Assistance list; those designated to help certain individuals must perform those duties if safe.
- **Hazard-Specific:** Depending on the emergency, avoid certain areas. E.g., if a chemical gas leak in one section, move crosswind or upwind as instructed, not downwind where the gas is. Our PA announcements will guide if possible ("Attention: chlorine leak on Unit 1 – evacuate to east assembly, avoid west gate" etc.).

9.3 Assembly (Muster Point) and Headcount:

- **Assembly Areas:** Go directly to your department's **designated assembly point** outside the building at a safe distance [11] . Assembly points are in open areas upwind of the plant – for instance, the main one is the far end of the parking lot, another on the east fence by the oak tree (as listed on maps). Each area has a sign. Know the assembly point for any area you are in.
- **Roll Call:** Supervisors or designated wardens will take a **head count** of their team once at the assembly [11] . **Report to your supervisor or warden** so they know you are safe. If you cannot find your immediate supervisor, report to any warden in a yellow vest and give your name and department. Do not wander off or leave the site entirely, as this complicates accounting for everyone.
- If you know of someone who was in the building but hasn't shown up at assembly, inform the warden: provide their name and last known location [11] . This information will be passed to the emergency incident commander (so rescue personnel can be dispatched if safe). Conversely, if you evacuated to an alternate assembly point or left the site, notify via phone when safe so you're not presumed missing.
- **Stay Put:** Remain at the assembly area until further instructions. Do not re-enter the facility to look for someone or for any reason. The incident commander (Plant Manager or Safety Officer liaising with fire department) will give the all-clear when it's safe or may direct further evacuation (for example, moving to a secondary assembly if wind shifts smoke toward you).

9.4 Accountability and Reporting:

- The senior person at each assembly point (often a department head) will report headcount results to the incident commander: who is accounted for and who, if anyone, is missing or unaccounted. We have employee and shift rosters for reference.
- Ensure visitors or contractors with you also evacuate and muster. The host or permit issuer is responsible for accounting for contractors in their area.
- If someone is missing, do **not** attempt to re-enter to rescue – trained firefighters or rescue teams will do that if feasible. Inform the emergency responders on scene with details of the missing person's possible location and any hazards in that area [87] .

9.5 Special Conditions:

- **Fire/Explosion:** As covered in Section 1 (Fire Response), evacuate upon alarm. Remember R.A.C.E. – but once alarm is sounded and if fire is beyond incipient stage, evacuate. Stay low in smoke [7]. If your clothing catches fire, **Stop, Drop, and Roll** to extinguish it [88].
- **Chemical Release:** If it's a toxic gas release and an evacuation order is given, you might be instructed to evacuate upwind/crosswind. In some cases (very short term release), the plan might be to shelter-in-place (stay indoors, close HVAC) but this would be specifically instructed. Otherwise, evacuate as per normal routes, but if you smell gas or see a cloud, go perpendicular to wind to escape it.
- **Severe Weather (Tornado etc.):** This is a different emergency where evacuation is to interior shelters rather than outside. Our alarm tone for severe weather is different (a long continuous tone). In that case, you go to designated shelter areas (interior hallways or bathrooms marked as shelter). This protocol is separate; listen for instructions. Only evacuate outdoors if it's safe to do so.
- **Earthquake:** Drop, cover, hold during quake, then likely evacuate cautiously after shaking stops due to possible structural damage.

9.6 After Evacuation / All Clear:

- The emergency officials (fire dept or plant incident commander) will evaluate when it's safe to re-enter the facility. Do not re-enter until you hear the official "All Clear" announcement or a recognized authority gives permission [10].
- Even after clearance, only critical personnel may be allowed in initially to assess damage. Others might be sent home or told to wait.
- A headcount will be done again if moving assembly points or releasing people to go home.
- We have an Emergency Evacuation Accountability Form to be filled by wardens to document that everyone was accounted for (or who was missing/injured etc.).
- Participate in any post-incident debrief or counseling if needed. These situations can be stressful; the company provides support.

Roles and Responsibilities – Emergency Evacuation:

- **All Employees:** Know the sound of alarms and at least two exit routes. When alarm sounds or told to evacuate, do so immediately. Stop any activity safely (shut off burners, etc., if right at hand), leave your area promptly. Don't collect personal items beyond maybe a coat if right next to you – time is critical. Assist those near you if they need help and you can provide it. Proceed to assembly area and check in. Follow instructions from wardens or emergency personnel. Remain until accounted for and cleared to leave.
- **Evacuation Wardens/Floor Captains:** These individuals (often supervisors or safety committee members) have fluorescent vests and are responsible for checking their designated area (if conditions allow) to ensure everyone has evacuated. They check restrooms, closed doors, etc., quickly while exiting. They direct people along safe routes ("Stairwell this way, keep moving"). They may carry flashlights for visibility. At assembly, they take roll call for their group [11]. They compile names of missing persons and last known locations to give to incident command. They also prevent re-entry by curious or panicked individuals. Wardens receive training for these duties. They should know any special needs persons on their floor and plan assistance for them. They report headcount results and any pertinent info (e.g., "heavy smoke seen in Lab C, couldn't check that room") to the incident commander or emergency services on arrival.
- **Incident Commander (Plant Manager/Safety Officer):** This person sets up at the Emergency Command Post (often the main gate or security office) and liaises with responding fire brigade/

EMS. They gather info from wardens about who's missing and where, and from alarm panels about where the incident is. They coordinate with external responders on search-and-rescue for missing people and technical info about the facility (like providing SDS for chemicals involved, utility shutoffs, etc.). They decide when to give all-clear or if further measures (like offsite evacuation) are needed. They ensure no one re-enters prematurely. After the event, they lead the headcount reconciliation and any media/authority communications.

- **First Aid Team:** If any injuries during evacuation (e.g., someone tripped and fell), our first aid responders at assembly areas can provide initial care while waiting for EMS.
- **Security Personnel:** They may assist in securing gates for emergency vehicle entry, direct traffic, and ensure that once people are out, they stay at assembly (no wandering into danger zones or leaving unless instructed).
- **Emergency Responders (Fire, etc.):** They will do the actual firefighting, rescue, and hazard control. Provide them with any information they request. For example, if someone is missing, tell them "John Doe from maintenance is unaccounted, likely was working in basement pump room." This helps them. Also, if asked about what chemicals or processes are in the affected area, give details (the more they know, the safer and more effective their response).

Drills: The site will conduct periodic evacuation drills (at least annually) to practice. Treat drills seriously – they reveal weaknesses in our process. Everyone must participate and treat it like a real event so we are prepared. After drills, feedback is gathered to improve (for instance, if a back exit was found locked or a muster point was confusing, we fix those).

In summary, evacuation is all about **getting everyone out safely and accounting for them** in an emergency [4] [11] . Pay attention to alarm signals, know your exits and assembly point, and move with urgency but not panic. Property and production can be replaced; people cannot. By adhering to these procedures, we maximize our chances that in a serious incident, every single person goes home safe at the end of the day.

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10. Image/Data Handling and Security for AI Camera Snapshots

(This section addresses protocols for handling digital images and data, particularly from AI-powered safety monitoring cameras, to ensure privacy, security, and proper use of such data.)

Octank Chemical employs **AI-enabled cameras** in certain areas of the plant for safety and security monitoring as part of our advanced safety system. These cameras may capture snapshots or video clips automatically when they detect safety violations or incidents (for example, an AI camera might take a snapshot if it detects missing PPE, a person entering a restricted zone, or if a fall occurs). While these tools enhance safety oversight, they also produce sensitive data – images of employees and operations – which must be handled with care. Protecting the privacy of our workforce and the security of these digital records is a priority. The following procedures govern how we handle AI camera snapshots and related data:

10.1 Data Privacy and Access Control:

- **Limited Access:** All images and video captured by the facility's AI safety cameras are considered **confidential**. Access to these images is restricted to authorized personnel only – namely, the Safety Department and certain IT security staff on a need-to-know basis. Raw camera footage or snapshots are not to be freely distributed. They are stored on a secure server with authentication required. Each authorized user has unique login credentials; sharing credentials is prohibited.

- **Privacy Compliance:** Our handling of camera data aligns with privacy laws and regulations (such as GDPR and relevant local laws) to protect employees' personal data [89] . This means we do not use the images for any purpose other than legitimate safety and security management. The system and procedures are designed to be **privacy-preserving** [90] – cameras are positioned only in work areas (no cameras in bathrooms, locker rooms, or private areas), and any personal identifiable information from images is safeguarded. We also post signage in areas under video monitoring to ensure transparency that recording is in progress.
- **Data Encryption:** Images and video files are stored in encrypted form on our servers. Transmission of these images (from camera to server, or server to authorized user's viewing station) is encrypted via SSL/VPN so that they cannot be intercepted.
- **Retention Policy:** Camera snapshots triggered by safety events are retained for a defined period (for example, 90 days) unless flagged for a specific investigation or legal hold, in which case they may be retained longer. After the retention period, images are securely deleted or archived in a secure, access-limited manner if needed for trend analysis (with personal identifiers removed if possible).
- **Anonymization:** Wherever feasible, data analysis is done on anonymized data. For instance, if we are generating safety reports, we focus on incident type, location, etc., without spotlighting individuals. If images are used for training or awareness (like "see this unsafe behavior"), we will blur faces or otherwise mask identities, unless the person involved has consented or it's necessary for the message.

10.2 Proper Use of AI Camera Data:

- **Safety Improvement, Not Surveillance:** The primary purpose of AI camera snapshots is to prevent accidents and improve safety compliance (for example, alerting if someone isn't wearing PPE or if a vehicle is too close to a pedestrian) [91] [92] . These systems might send real-time alerts with images to the Safety team for quick action. We **do not** use these cameras to monitor productivity or track individuals' work hours, etc. There is no constant human surveillance; the AI flags safety events and the Safety team reviews those events. Any secondary use (like using footage for training material) is carefully considered with respect to privacy.
- **Incident Investigation:** In the event of an incident (like an injury or near-miss), relevant camera footage may be reviewed by the investigation team. This is done in a private setting. The footage may help determine cause and preventive measures. Such footage may also be shared with regulatory authorities or insurance investigators if required, but always through secure means and only what is necessary.
- **No Unauthorized Sharing:** Employees (including safety staff) must not share or disclose camera images or videos outside the authorized channels. For example, it would be a breach of policy to post a camera snapshot on social media or even internally outside of a safety context. The images are not entertainment; they are sensitive. Only approved communications, such as safety bulletins, may include images and only after going through proper approvals (with faces blurred and identifying details removed, as mentioned).
- **Audit Trails:** The system keeps a log of who accesses or downloads any image/video. The Safety Officer periodically reviews these logs to ensure no unauthorized viewing or copying occurred. Misuse of camera data is grounds for disciplinary action.
- **Exporting Data:** If an image needs to be exported (say, to provide to an outside investigator or to include in a safety report), only the Safety Officer or IT security can perform the export. The image should be watermarked as confidential and encrypted if sent electronically. Ideally, we avoid sending raw images; instead, relevant personnel are invited to view them on our secure platform.

10.3 Protection of Sensitive Content:

- **Content Sensitivity:** Some camera snapshots might capture injuries or medical emergencies. These are considered highly sensitive. We handle such content with utmost discretion and empathy. They might be needed for incident analysis or training, but we will consider the feelings and privacy of the individuals involved. Typically, such images are not shown broadly; if used in training, personal details are obscured and context given.
- **Consent for Use:** If we ever want to use a recognizable image of an employee (for a positive safety showcase or training), we will obtain their consent beforehand. However, in general, training materials will use staged photos or illustrations, not actual incident footage.
- **System Security:** The camera system itself is maintained by IT with updated firmware and cybersecurity measures to prevent hacking. Only official company devices are allowed to access the video system; no personal devices. Remote access (if any) is limited to key personnel over secure connections.
- **GDPR and Legal Rights:** For jurisdictions under GDPR or similar laws, employees may have rights to their data. If an employee requested to see images of themselves or to ensure deletion, we would handle that through HR/Safety in compliance with applicable law, balancing safety management needs and privacy rights. Generally, since these images are for safety, they fall under legitimate interest in safety operations [89], but we still safeguard them appropriately.

10.4 Handling AI "False Alarms" and Data Accuracy:

AI cameras aren't perfect. Sometimes they might capture a "violation" that isn't one (false positive). For example, it might flag a person as not wearing gloves when they actually are. Our protocol is: - Safety Officer reviews the alert image. If it's a false alarm, the image is typically tagged as such and not used for any punitive action obviously. We also use these to fine-tune the AI system (providing feedback to the vendor or adjusting sensitivity). - Any conversations with employees triggered by an AI alert should acknowledge that the technology is an aid, and we verify facts before any action. (In other words, no employee will be reprimanded solely on the AI camera's claim without human verification). - We maintain trust in these systems by being fair and transparent. Employees have been informed that the AI cameras exist for their safety, not to constantly watch them. The privacy measures and limited use are part of maintaining that trust [93].

10.5 Roles and Responsibilities – Image/Data Security:

- **Safety Officer/Data Controller:** The Safety Officer (or designated Data Controller for camera system) ensures compliance with these policies. They authorize who can access the system, ensure training on data handling is given, and audit use. They also handle any data subject requests regarding camera footage in coordination with HR (to address privacy concerns). They promote a culture where the cameras are seen as a positive safety tool, not "big brother."
- **IT Security Administrator:** Sets up user accounts, manages encryption keys, monitors for any cybersecurity threats to the system. Performs regular backups of the footage (since a catastrophic incident might need those records) but in encrypted form. Handles secure deletion when footage is past retention. If any breach of the image data occurs (unauthorized access or leak), IT must alert management immediately and steps will be taken to contain it and notify as required.
- **Authorized Safety Staff (Analysts/Monitors):** Those who review camera alerts must do so professionally. They should focus on the safety issue, not extraneous details. For instance, if they notice unrelated behavior in a video that is not safety-related, they are not to use that for any other purpose. Their notes and reports from camera observations should be factual and only as detailed as needed for safety. If they suspect misuse of the system (like someone repositioning a camera without approval or an employee tampering with one), they report it.

- **Employees:** Employees should be aware that these cameras are in use for safety, but also that their privacy is protected. They are expected not to tamper with or obstruct cameras (that's a serious violation because it can impede safety). If they have concerns about the camera usage or feel it's being misused, they can report to HR or Safety anonymously. We want everyone to feel comfortable that these systems are for their benefit.
- **AI System Provider:** While not our staff, we hold our AI camera service providers to high standards. They have committed to complying with privacy regulations (like GDPR) and have robust security on their platform [89]. We have agreements in place that any cloud-processed data is protected and not used by them for anything beyond providing our service (unless anonymized for improving algorithms, which is usually allowed under privacy guidelines with no personal identifiers).

10.6 Examples of Compliance:

- If an AI camera flags "no hard hat" and captures an image of a worker, the Safety Officer might get an alert. They check the image: if indeed the person has no hard hat in a required area, the Officer approaches the employee in person to address it (coaching on PPE compliance) rather than, say, emailing the picture to their manager widely. The image is stored as an event with time stamp in the system. It's used for trend analysis (e.g., if we see repeated PPE misses in an area, we do a targeted safety talk).
- Suppose an incident occurs (a slip and fall). The system captured a 12-second video of it [91]. That clip is reviewed in the investigation meeting. It's kept internally on file. If we want to use it as a training example later, we either recreate a similar scenario or blur the individual's face and any name badges, etc., then get approval. We don't just show it casually.
- Regular privacy review: annually, Safety and IT will review whether we are meeting our image handling standards, and update policies if new technology or new concerns arise.

In conclusion, handling AI camera snapshots carries responsibility: we harness the power of advanced monitoring to **enhance safety** while **upholding the privacy and dignity** of our workers. By following strict access controls, aligning with privacy regulations, and focusing on safety-purpose use, we ensure these tools are a benefit, not a risk, to our team [89] [90].

References:

(The references below correspond to the source material that informed this manual's content and guidelines.)

- Extra Space Management Inc. Health & Safety Manual – Fire Safety and Emergency Action Plan [1] [94] [6]
- Safety Management Group – "Spill Response: The Four Critical Steps" [15] [14] [21]
- CHEMTREC – "10 Basic Rules for Safely Handling Hazardous Materials" [23] [25]
- OSHA 29 CFR 1910.146 – Permit-Required Confined Spaces (and related guidance) [53] [52]
- OSHA 29 CFR 1910.147 – Lockout/Tagout standard and Vector Solutions LOTO 6-step guide [68] [66]
- SafeRack – "Top 10 Safety Tips when Working at Heights" [30] [32]
- OSHA Powered Industrial Trucks (Forklift) Quick Card [78] [84]
- OSHA Emergency Action Plan Guide (OSHA 3088) – Evacuation planning and accountability [11] [4]
- Intenseye and EHS Today articles – AI safety monitoring and data privacy [89] [90]

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