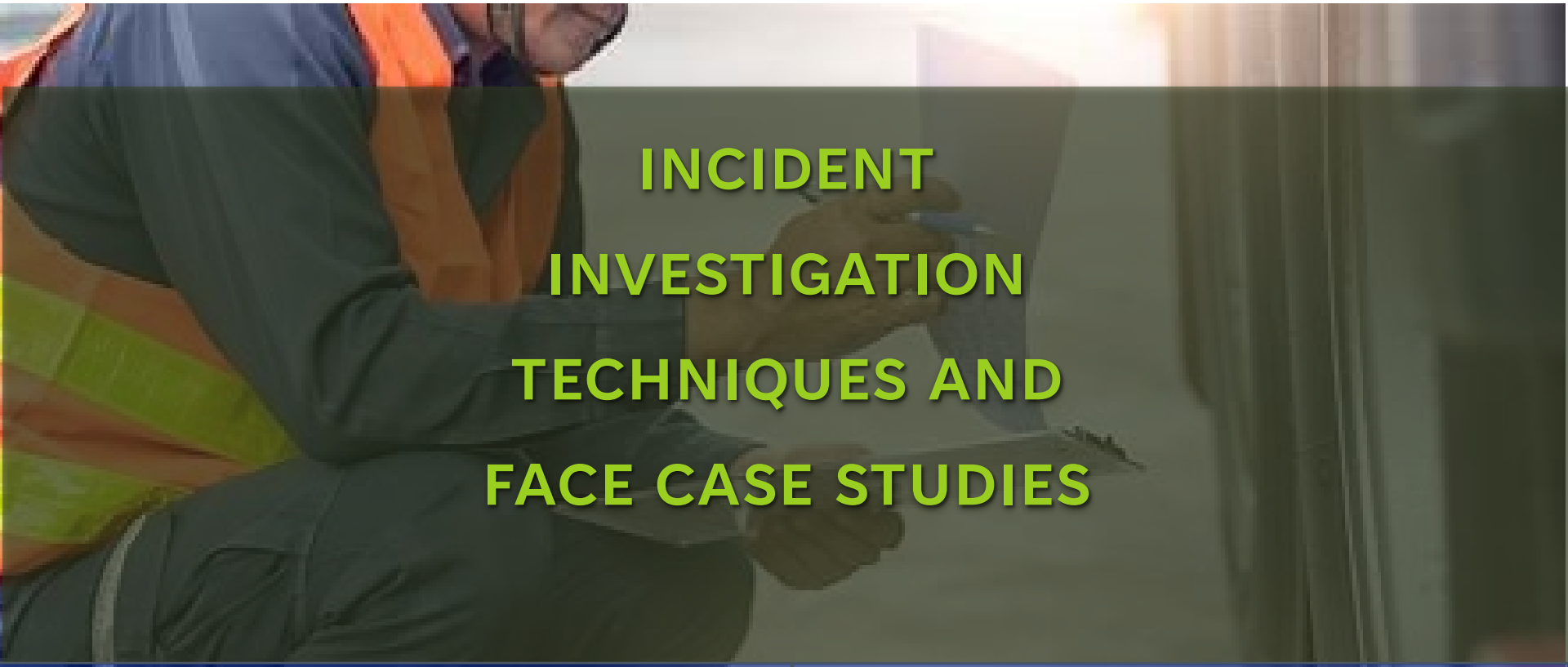

INCIDENT INVESTIGATION TECHNIQUES AND FACE CASE STUDIES

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Agenda

- Safety Principles
- Safety Management (Culture)
- Incident Reporting & Responding
- Investigation Techniques and Evidence
- Causal Analysis
- Recommended Corrective Actions
- Case Studies
- Q & A

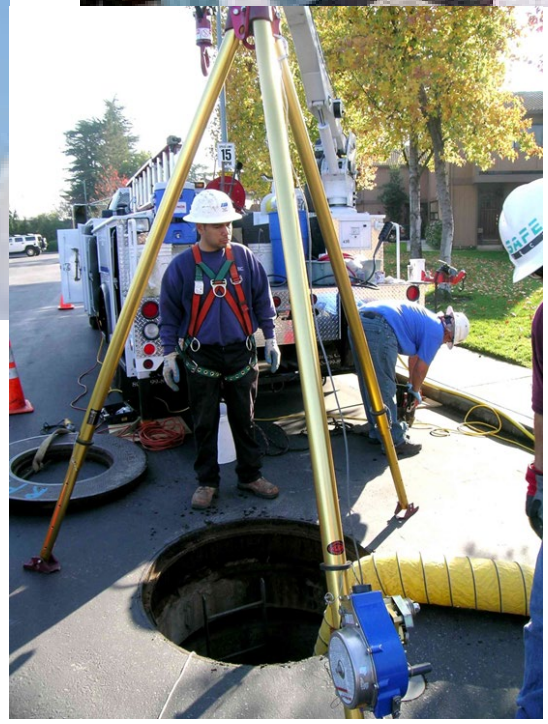
How does one define SAFETY?

- A state or condition of being safe: freedom from injury, or loss;
- A geographic location where the risk of harm is unlikely;
- A protective device (as on a pistol) to prevent accidental operation;
- A defensive football player whose position is far back from the line of scrimmage;

THE CONTROL OF ACCIDENTAL LOSS

SAFETY PRINCIPLES

- **Safety is <u>situation specific</u> and <u>value dependent</u>.**



SAFETY PRINCIPLES

- **Safety is a core value**
- **Safety is every individual taking responsibility for own behavior**
- **Safety can be managed to excellence in any industrial environment**
- **Safety "Culture" can be achieved by creating expectations for 100% safe behavior**
- **Safety key elements must be integrated into business systems**
- **Safety and high performance results are congruent**

Safety Culture

A Control Banding Approach

How does your organization rate?

Industry Leader

Focus on continuous improvement (management systems) with sustainable, value-added standards and best practices

Industry Standard

Focus on implementing standards and practices common to the specific industry

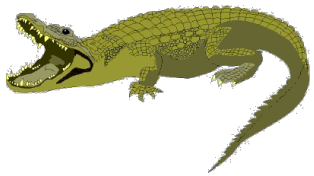
Regulatory

Focus on meeting applicable laws and regulations

Perhaps somewhere in between?

SWAMP

Safety Without Any Management Process



Incident Reporting & Response

"Ideal" Incident Reporting & Response Process

- from an organizational perspective

- **Train organization to report all incidents immediately.**
- **Stabilize Incident Scene (Manager/First Responders).**
- **Initiate investigation, collect evidence.**
- **Complete Incident Report, identify:**
  - **Contributing factors (persons, workplace conditions, organizational)**
  - **corrective actions**
- **Reviews findings with site management, agree on action plan**
- **Complete corrective actions – document dates and methods**

Investigation Techniques and Evidence

Investigators Qualifications

The investigation's individual or team should have access to all relevant information, including witnesses, documents, and physical evidence. The people doing the investigation should have the following:

- **An understanding of incident causation models**
- **An understanding of investigative techniques**
- **An understanding of any legal or organizational requirements**
- **Expertise in occupational health and safety**
- **Knowledge of the particular work processes, standards, and the industrial environment**
- **Knowledge of the interview process**
- **Knowledgeable about document, record, and data collection requirements**
- **Ability to analyze and recommend conclusions based on data collected**

Investigations Goals

The goal of any investigation is to:

- **Collect evidence;**
- **Analyze evidence to determine the sequence of events before, during and after the incident;**
- **Identify all contributing factors; and**
- **Recommend corrective actions based on data collected**

Planning an Investigation

- What tools will you need
- Who do you need to involve
- List the people to interview
- What do you need to know from each?
- What equipment, tools, need to be investigated?
- What do you need to know about the area and the conditions (environment)?
- What records and other paper do you need to see or get copies of?
- What decisions might you have to make there?

Investigation Tools

- The Plan
- Clipboard or notebook
- Investigation Report Form
- Digital Camera
- Tape Measure
- “Caution” Barrier Tape
- Gloves
- Other PPE (as needed)

Evidence – The Four P's

- **PEOPLE**
  - Who witnessed the incident;
  - Who has knowledge of the process & equipment;
  - Who responded to the incident; and
  - Who has knowledge of the circumstances.
- **PARTS**
  - Equipment, tools, materials and structures in the work area.
- **POSITIONS**
  - Position of those involve relative to parts
- **PAPERS**
  - Records of Training, inspections, procedures, etc.

People – The Interview

- Interview each Person Separately
- Interview In Appropriate Place
- Put The Person At Ease
- Get The Individual's Version
- Ask Necessary Questions (Timely)
- Provide Feedback
- Record Critical Information Quickly
- Use Visual Aids
- End On A Positive Note
- Keep The Line Open

Data From Witnesses

WITNESS	LOCATION	ACTIVITY	OBSERVATION
Who	Where was he/she?	What was he/she doing at the time?	What did he/she see before, during, after?

Parts Examination

- Proper Item For Task
- Damage
- Previous Damage
- Wear
- Safeguards
- Evidence of Critical Failure
- Labels, Signs & Markings

Take lots of photographs of all of the above.

Note: for these investigations, always ask permission to photograph equipment as some things may be proprietary or sensitive.

Position Evidence

Transitional Position Evidence is the most sensitive!

- **Proper Body Position**
- **Position Related To Equipment and Materials**
- **Obstructions/ Interferences**
- **Note Locations Of Evidence**
- **Take Photos**
- **Make Sketches If Necessary**

Paper Evidence

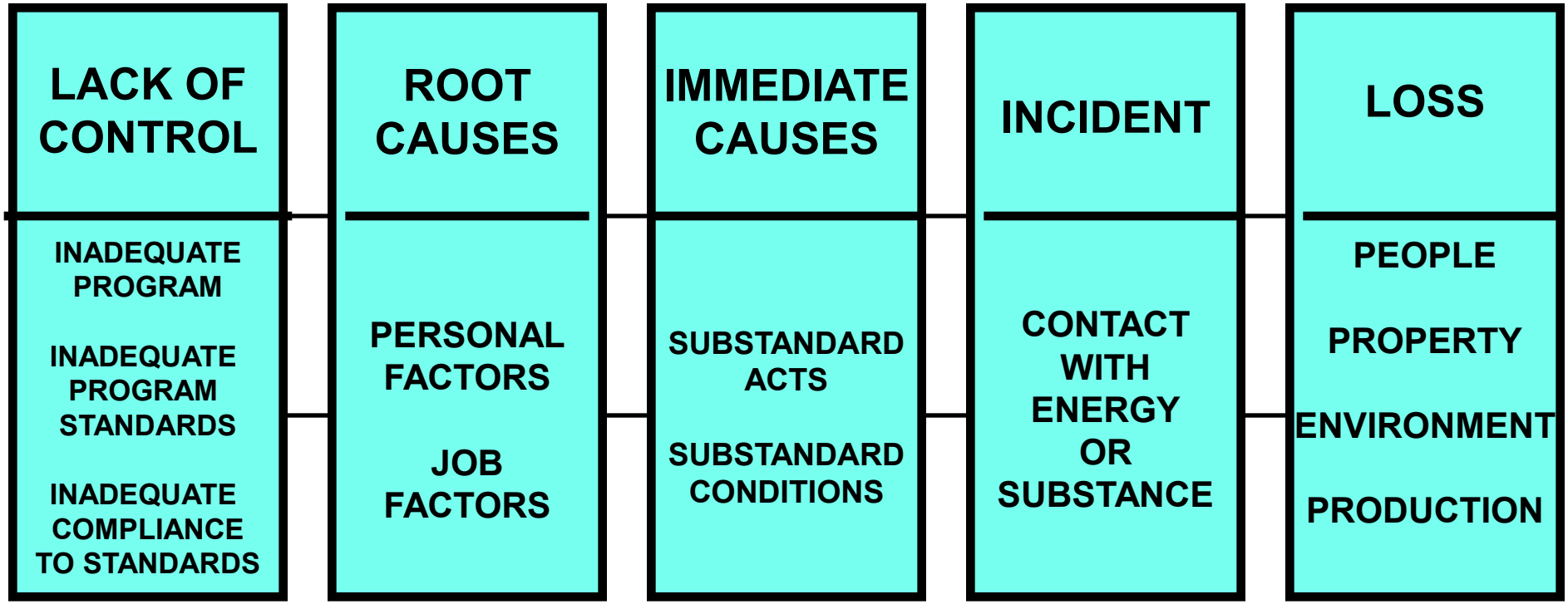
- Work Instructions
- SOPs
- Learning Systems
- PHA/JHA's
- Schedules
- Process Changes
- Maintenance Logs
- Inspection Reports
- Training Records
- CCTV Recordings

- OSHA Standards
- OSHA investigation reports
- Hazardous Material records
- Other regulatory standards
- Coroner's reports

Causal Analysis

CAUSAL ANALYSIS

LOSS CAUSATION MODEL

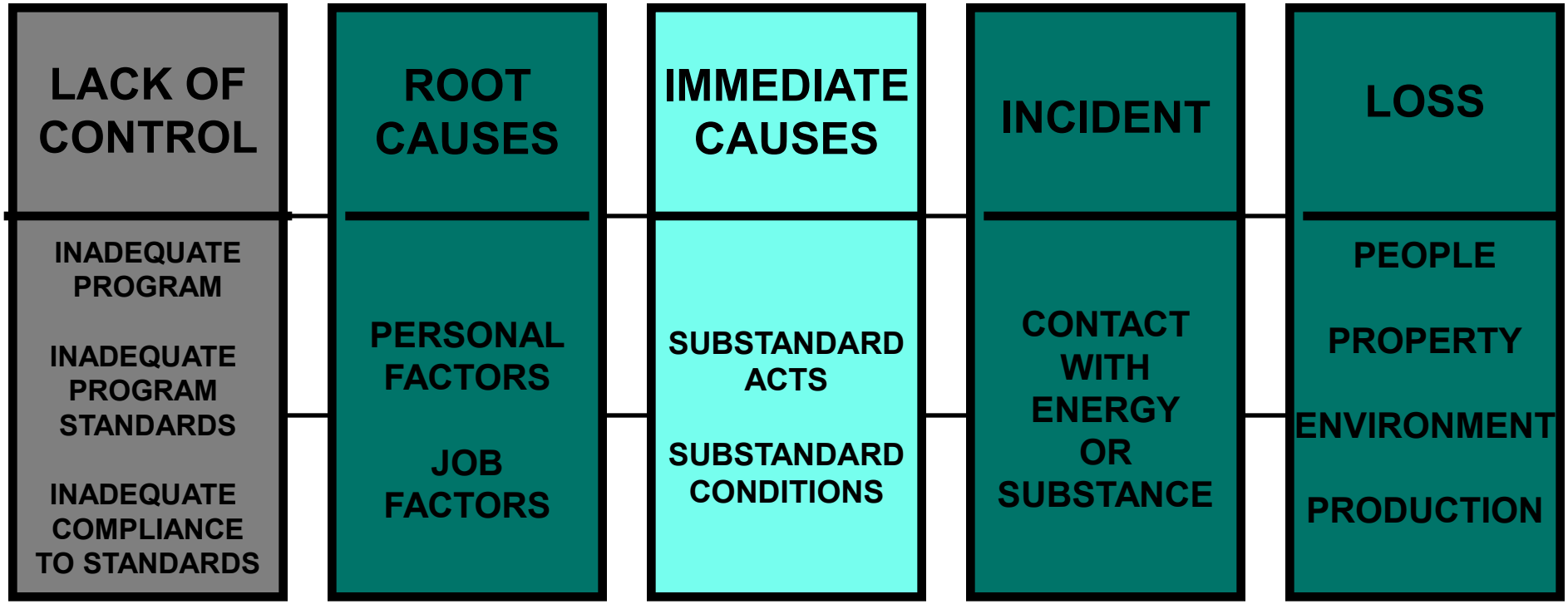


Incident - Contact With Energy or Substance

- STRUCK AGAINST
- STRUCK BY
- FALL TO LOWER LEVEL
- FALL TO SAME LEVEL
- CAUGHT IN, ON, BETWEEN
- CONTACT WITH ELECTRICITY
- CONTACT WITH HEAT OR COLD
- CONTACT WITH CHEMICAL
- CONTACT WITH SOUND
- OVERSTRESS/ OVEREXERTION/ OVERLOAD

CAUSAL ANALYSIS

LOSS CAUSATION MODEL



SUBSTANDARD ACT (PRACTICES)

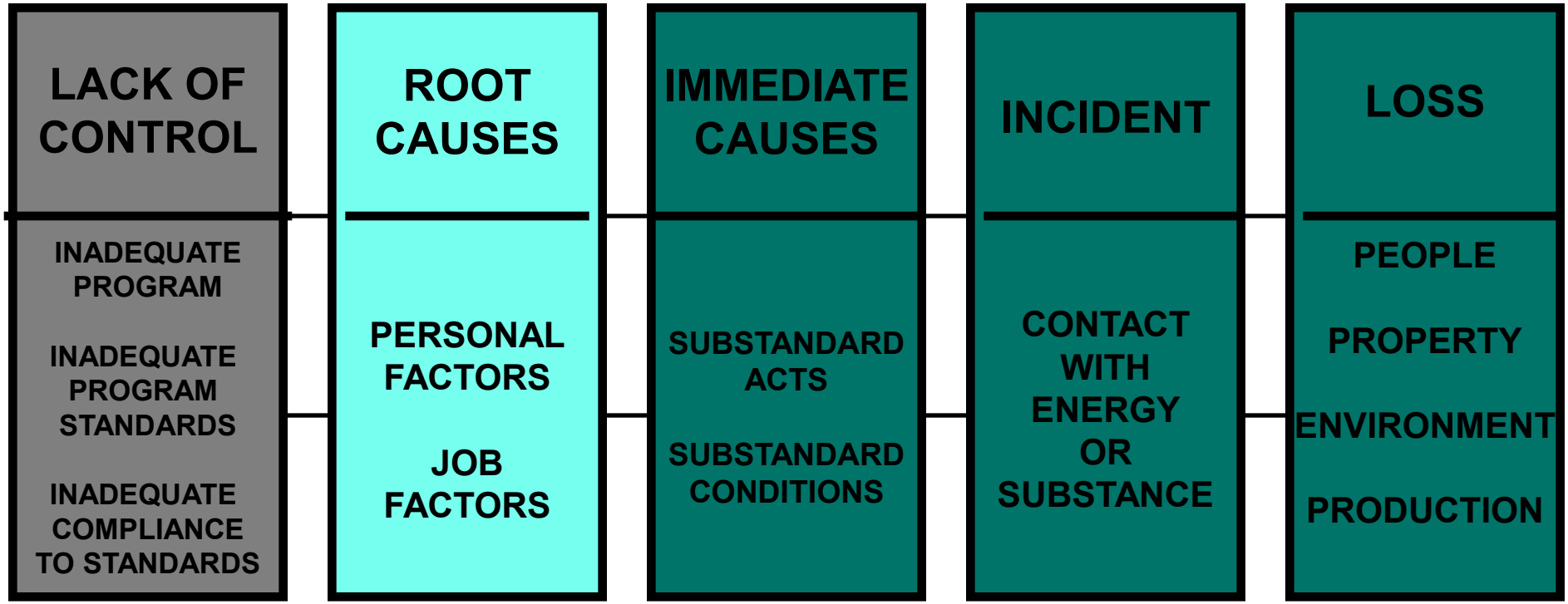
- OPERATING EQUIPMENT WITHOUT AUTHORITY
- FAILURE TO WARN
- FAILURE TO SECURE
- OPERATING AT IMPROPER SPEED
- RENDERING SAFETY DEVICES INOPERABLE
- REMOVING SAFETY DEVICES
- USING DEFECTIVE EQUIPMENT
- USING EQUIPMENT IMPROPERLY
- NOT USING OR IMPROPER USE OF PPE
- IMPROPER LOADING, PLACEMENT OR LIFTING
- IMPROPER POSITION
- INADEQUATE BREAKS AND/OR ROTATION
- SERVICING EQUIPMENT IN OPERATION
- HORSEPLAY
- UNDER INFLUENCE OF DRUGS OR ALCOHOL

SUBSTANDARD CONDITIONS

- INADEQUATE GUARDS OR BARRIERS
- INADEQUATE OR IMPROPER PROTECTIVE EQUIPMENT
- DEFECTIVE TOOLS, EQUIPMENT OR MATERIALS
- CONGESTION OR RESTRICTED ACTION
- INADEQUATE WARNING SYSTEMS
- FIRE AND EXPLOSION HAZARDS
- POOR HOUSEKEEPING; DISORDERLY WORKPLACE
- HAZARDOUS ENVIRONMENTAL CONDITIONS: GASES, DUST
- NOISE EXPOSURE
- RADIATION EXPOSURE
- HIGH AND LOW TEMPERATURE EXPOSURE
- INADEQUATE OR EXCESSIVE ILLUMINATION
- INADEQUATE VENTILATION

CAUSAL ANALYSIS

LOSS CAUSATION MODEL



PERSONAL FACTORS

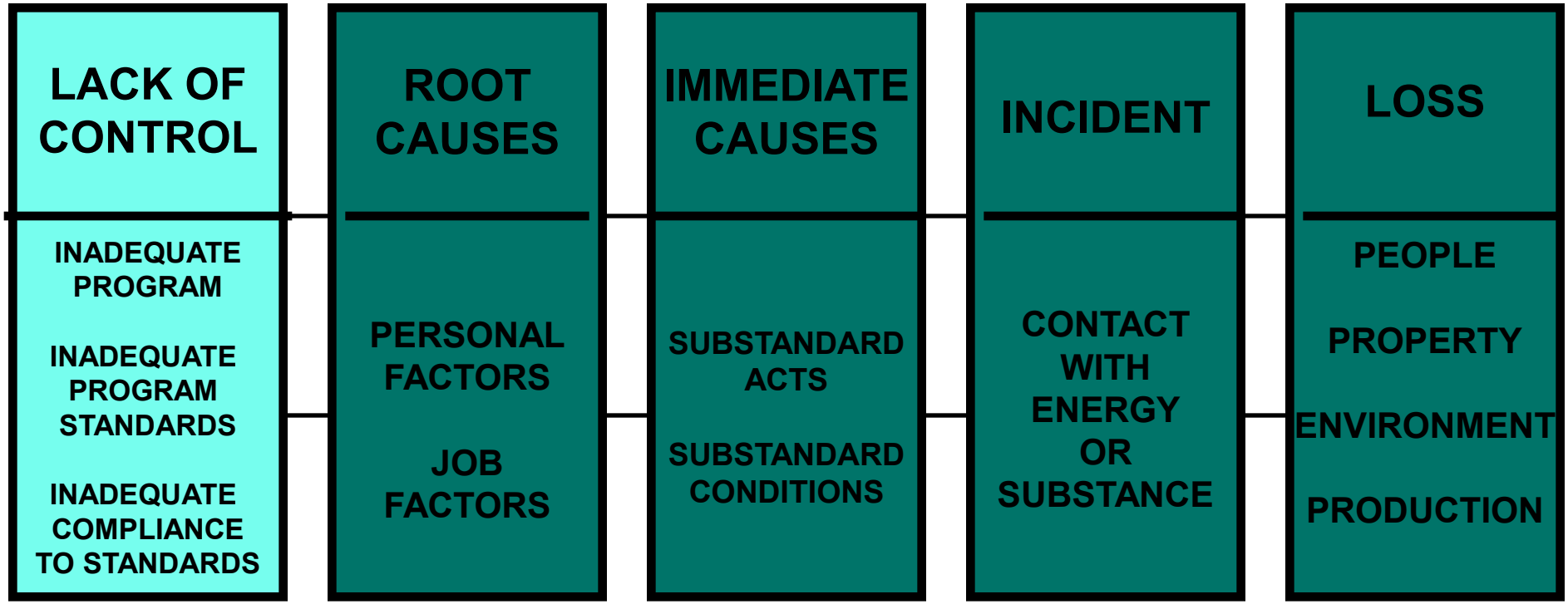
- INADEQUATE PHYSICAL OR MENTAL CAPABILITY
- LACK OF KNOWLEDGE
- LACK OF SKILL
- STRESS
- FATIGUE
- IMPROPER MOTIVATION

JOB FACTORS

- Inadequate Supervision
- Inadequate Engineering
- Inadequate Purchasing
- Inadequate Equipment
- Inadequate Maintenance
- Equipment Abuse or Misuse

CAUSAL ANALYSIS

LOSS CAUSATION MODEL



PROGRAM ACTIONS

- **INADEQUATE PROGRAM – Needs:**
  - **Leadership**
  - **Task Analysis**
  - **Program Development**
  - **Metrics**
  - **Program review**
  - **Budget**
- **INADEQUATE STANDARDS – Needs:**
  - **Rules**
  - **Employee Education**
  - **Planned Inspections**
  - **Incident Investigation procedure**
  - **Hazard Identification and Correction**
  - **Recordkeeping**

PROGRAM ACTIONS

- **INADEQUATE COMPLIANCE – Needs:**
  - **Hiring and Placement**
  - **Employee Orientation & Training**
  - **Engineering Controls**
  - **Administrative Controls**
  - **Personal Protective Equipment**
  - **Purchasing Controls**
  - **Energized Equipment Procedures**
  - **Standardize Maintenance Programs**

CAUSAL ANALYSIS

PRINCIPLE OF MULTIPLE CAUSES

ACCIDENTS ARE SELDOM, IF EVER,

THE RESULT OF A SINGLE CAUSE

They are the result of a series of random related or unrelated acts/events that interact to cause the accident. Unlike the causation model, eliminating one of the events does not assure prevention of future accidents.

Many other factors may have contributed to an injury. An accident investigation will not only recommend corrective actions but also address the underlying system weaknesses that caused it.

CAUSAL ANALYSIS

PRINCIPLE OF MULTIPLE CAUSES

- **Develop the sequence of events;**
- **Once the steps in the process are developed, we can then study each event to determine related:**
  - **Hazardous conditions. Things and states that directly caused the accident**
  - **Unsafe behaviors. Actions taken/not taken that contributed to the accident.**
  - **System weaknesses. Underlying inadequate or missing programs, plans, policies, processes, and procedures that contributed to the accident.**

(collectively known as “Contributing Factors”)

Recommended Corrective Actions

Recommended Corrective Actions

Once the Contributing Factors have been identified, recommendations (i.e., corrective actions) can be determined. Recommendations Should be based on:

- **Regulatory standards (i.e., OSHA, EPA, FDA);**
- **Industry standards (i.e., ASTM, ANSI, ISO, NIOSH, etc.);**
- **Best Management Practices;**
- **Hierarchy of Controls;**
- **Your professional opinion; and**
- **Opportunities for Improvement.**

Note: Always start with regulatory standards and site those standards in the report reference section.

Access to Information

Regulatory standards:

Cal/OSHA (Title 8 California Code of Regulations)

https://www.dir.ca.gov/samples/search/query.htm

Federal OSHA

https://www.osha.gov/laws-regs

OSHA Establishment Search page (inspection dates, violation and citation history)

https://www.osha.gov/ords/imis/establishment.html

Other useful information sources:

- Industry/Trade Associations
- Equipment Manufacturers
- Historical Weather
  https://www.wunderground.com/history
- Sheriff's Departments
- Cal/OSHA District offices
- County Coroners offices
- The internet

Case Studies

Case Study 1 – Warehouse Worker Crushed by Collapsed Pallet

Summary

- **A 39 year-old male warehouse worker was acting as a "spotter" and assisting a forklift operator who was moving some double stacked shrink wrapped pallets of cased bottled water.**
- **Incident was at end of night shift (9:00 pm to 5:30 am).**
- **The forklift operator tried to remove the top pallet, causing it to become unbalanced.**
- **As the operator reinserted the forks, the cased water shifted against the shrink wrap, which gave way and dumped the cased water on the spotter.**
- **The operator and several co-workers moved the spotter, who was unresponsive and called emergency services. Paramedics arrived but were unable to revive the spotter who died from his injuries.**

The People

- **The employer is a national chain of retail warehouse operations with approximately 500,000 employees.**
- **The location where the incident occurred has approximately 175 employees**
- **About 25 employees work the night/replenishment shift.**
- **The deceased was a 39-year-old male part-time warehouse worker who was working on the "night crew." He had been working part-time for approximately 3 months.**
- **The forklift operator was the Night Crew Manager and has been with the company for over 8 years.**

Programs and Training

The employer had written safety programs and SOPs that included:

- **An Injury Illness Prevention Program;**
- **A code of safe work practices;**
- **Critical Operating Safety Standards;**
- **Corporate incident reporting/ Worker's Compensation claims process; and**
- **Emergencies (i.e., an emergency action plan).**

Programs and Training

Training covered by the aforementioned SOP's were provided through supervisor instruction, qualified co-employee trainers and through online courses that address the following topics:

- **Hazard Communication**
- **Safety orientation**
- **Safety responsibilities**
- **Personal protective equipment**
- **Ladder and equipment safety**
- **Merchandising and customer safety**
- **Emergency situations and procedures**
- **Lift equipment safety**
- **Safe Lifting (i.e., material handling/ergonomics)**
- **Safe loading policy**
- **Spotter training**
- **Palletized merchandise.**

Zone of Safety

- **The "Zone of Safety" is a concept that is frequently applied to heavy industrial and construction equipment, typically referring to the minimum distance one must stand away from equipment while it is in operation.**
- **The employer in this case defines the Zone of Safety as "10 feet in the direction the lift equipment is moving and four feet on all other sides."**
- **All lift equipment operators must successfully complete the certification for any of the specific truck they will be operating (State law).**

The Equipment

The primary piece of equipment involved with this incident was CAT® model 2C6000 forklift. The forklift is liquid propane fueled, weighs about 9,440 pounds and has a lift capacity of 6000 pounds.

Safety features include overhead guards, side/rearview mirrors, a backup alarm, strobe lights and a loud, audible horn.

The Incident Scene

- **The incident scene was a covered, well-lit outdoor loading area at the front of the building where customers (often construction contractors) typically load large quantities of building and construction materials.**

- **The store had yet to open and there were no customers or other eye witnesses present at the time of the incident.**

- **The incident was captured on multiple security cameras.**

The Investigation

The incident occurred around 4:45 am, close to the end of the victim's shift (9:00 pm – 5:30 am).

The victim was a spotter assisting the forklift operator who was attempting to unstack the top pallet of cased bottled water:

- **The double stacked pallet was approximately 9.5 feet high.**
- **The pallets were both individually shrink wrapped.**

As the forklift operator tried to remove the top pallet, the forks made contact with an interior pallet component, pushing the top pallet backward and causing it to tilt at a slight angle. This caused the cases to shift against the shrink wrap, which gave way and dumped the cased water.

The Investigation

Unbeknownst to the forklift operator, the spotter had moved behind the pallet, out of line-of site, when the shrink wrap gave way.

- **It was several minutes before the operator realized that the spotter was under the cases of water pallet.**
- **Calling for help, the operator and several co-workers moved the spotter, and called emergency services.**
- **CPR was not initiated until the paramedics arrived on the scene. They were unable to revive the victim who died from his injuries at the scene.**

The Investigation

The incident was captured on CCTV and shows both the spotter walking behind the pallet and the forklift operator repositioning the forks and attempting to unstack the pallet. The victim was standing between the unstable pallet and a wall, and was not visible from the forklift operator's position.

Video evidence indicates that the spotter had not adhered to the company SOP by standing within the "Zone of Safety" while the forklift was operating. It also appears that neither the operator or the spotter was in verbal communication with each other, as both had been trained to do per the company SOPs.

The Investigation

Following the incident, the forklift was taken out of service and was evaluated by a 3rd party vendor to determine if there were any mechanical problems with the equipment (none were found).

The investigation also revealed that while the company SOPs did address unbalanced or unstable (palletized) loads, they did not describe what to do when such an occurrence is encountered, other than alerting the forklift operator.

Contributing Factors

The following were identified as key contributing factors in this incident:

- **The victim was inexperienced and did not adhere to his safety training by standing within the "Zone of Safety" while the forklift was in operation**
- **The forklift operator and spotter were not within line of sight or communicating with each other per company requirements.**
- **No employees on duty at the time of the incident had adequate training and instruction related to First aid/medical emergencies.**
- **The Company SOPs did not address methods to secure unbalanced or unstable palletized loads.**

AND . . .

Contributing Factors

The victim was acutely intoxicated with alcohol at the time of the incident.

- **In this case, the post-mortem toxicology report was positive for acute ethanol intoxication. While the coroner's report stated that the cause of death was multiple blunt force crushing traumas to the torso, it listed acute ethanol toxicity as a contributing factor.**
- **Ethanol intoxication can lead to a number of physical and behavioral conditions, including decreased attention, impaired memory, disorientation as well as significant impairments decision-making and impulse control.**
- **The victim's blood alcohol was high enough to suggest he had more than likely been drinking on the job.**

Recommended Corrective Actions

The FACE program recommended the following corrective actions:

- **Establish Zones of Safety around the lift equipment and train employees to stay outside of the zones at all times;**
- **Ensure that all spotters position themselves as to stay within line of sight and sound of the operator;**
- **Implement a Workplace Supported Recovery Program;**
- **Train a number of employees in first aid/CPR so that first aid is available to all employees on every shift; and**
- **Develop a method (SOP) for correcting (manually breaking down and restacking merchandise on) unstable or unbalanced pallets.**

Case Study 2 – Contract Agricultural Worker Died After Being Engulfed by Tons of Nuts

Summary

- A 47-year-old male agricultural contract worker working in a tree nut processing facility went in search of shoe covers, recalling that he had seen a box in an empty storage silo.
- The shift occurred at night (6:00 pm to 6:00 am).
- When he did not return to his workstation, a supervisor went looking for him and noticed about 50-75 tons of nuts spilling out of the open access hatch to one of the 850 ton silos.
- The supervisor called a team of co-workers to clean up the spill, and after a few minutes found the unresponsive worker buried under the nuts.
- The supervisor called 911 and several co-workers performed CPR until emergency services arrived.
- Paramedics were unable to revive the victim, who died from asphyxiation

The People

- **This was a multiemployer workplace subject to OSHA's "Determination of Citable Employer" requirements.**
- **The exposing employer is a nationwide staffing agency that has approximately 18,000 employees.**
- **The location where the incident occurred is a nut processing facility that has approximately 10 full time employees and uses from 10 to 24 temporary employees based on seasonal needs.**
- **The deceased was a 47 year-old male temp worker who had been working full-time for approximately 7 months.**

Programs and Training

The exposing employer had:

- **A written Injury Illness Prevention Program; and**
- **A Job Hazard Analysis (JHA) evaluation form that was to be used for evaluating client sites to determine safety related training and PPE for temporary staff.**

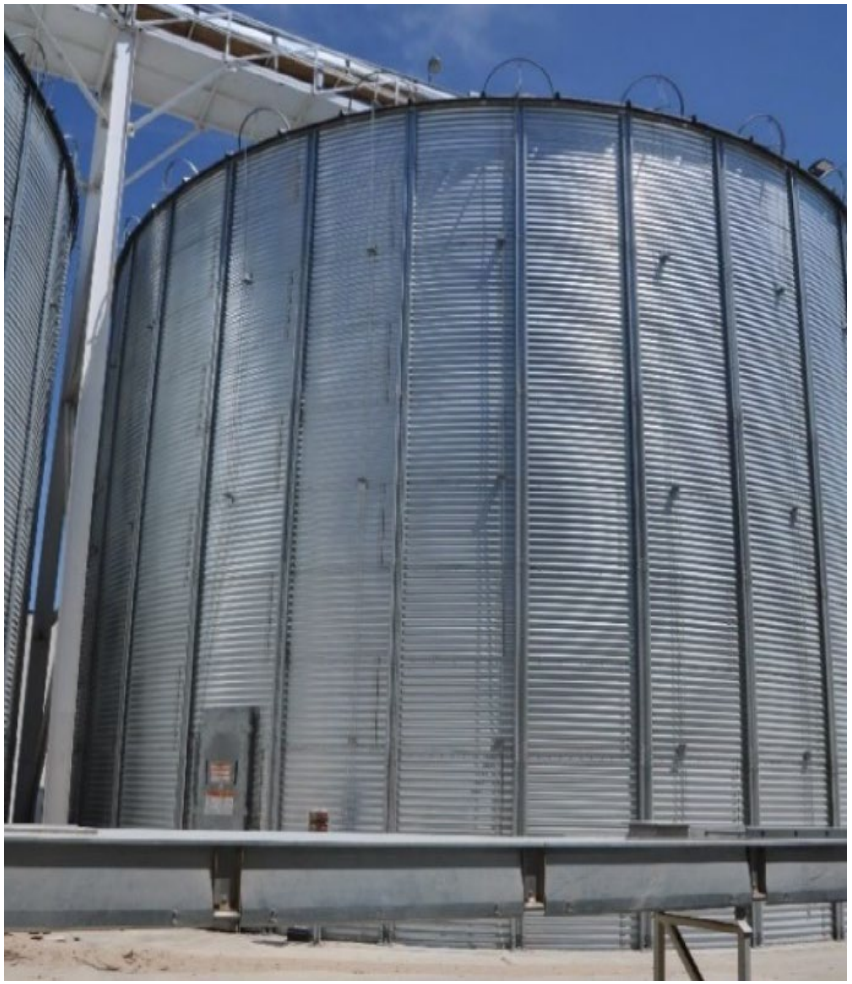
Programs and Training

The controlling (host) employer had:

- **A written Injury Illness Prevention Program;**
- **A Hazard Communication Program;**
- **A Heat Illness Prevention Plan; and**
- **Additional written procedures in the following:**
  - **Code of safe work practices**
  - **Personal protective equipment**
  - **Emergency procedures**
  - **Material handling**
  - **Machine safeguard**
  - **Electrical safety**
  - **Ladder safety**
  - **Chemical safety**
  - **Tool safety**
  - **Forklift operating procedures**
  - **GMP requirements**

The Equipment

The primary piece of equipment involved with this incident was an 850 ton storage silo with an outward swinging access door.



The Incident Scene

- **The incident scene was a well-lit outdoor storage area containing numerous silos and conveyor systems for transferring the nuts to and from the process equipment.**

- **Adjacent to the silo storage area was a process building where the nuts were segregated by size prior to being transferred into the silos, and a packaging line where the nuts were transferred from the silos into several different sized containers prior to shipment.**

- **There was no confined space warning sign on the silo doors prior to the incident.**

The Investigation

The incident occurred around 4:15 am, close to the end of the victim's shift (6:00 pm – 6:00 am).

According to witness statements, the victim was tasked with labeling 'super sacks' which contained 2200 pounds of product, located in the process building.

Because the facility must adhere to GMP requirements for food processing operations, all workers were required to wear shoe coverings in the area.

The victim's was last seen leaving th work area, recalling that he had seen shoe covers in an empty silo that he was cleaning a few days prior.

The Investigation

Around 5 a.m., a co-worker noticed that the victim was missing and notified the site supervisor, who dispatched another co-worker to find him.

Around 5:20 a.m., the co-worker walked past the silo area and noticed that the access door to one of the 850-ton silos was open with a large quantity of nuts (about 50 – 75 tons) spilling out. He informed the supervisor who assembled a team of co-workers to clean up the spillage, and after a couple of minutes, found the victim unresponsive under the nuts.

The supervisor and co-workers called 911 and performed CPR until emergency services arrived. Paramedics arrived but were unable to revive the worker, who died of traumatic asphyxiation.

Contributing Factors

The following were identified as key contributing factors in this incident:

- **The staffing agency did not conduct a job hazard analysis to identify any hazards at their client's facility.**
- **The staffing agency did not provide adequate safety training to the victim prior to his assignment.**
- **The staffing agency's risk management program did not provide their client a copy of their 'facility safety assessment' nor did they follow up with any safety recommendations.**

Contributing Factors

- **The host employer, at the time of the incident, lacked a procedure to manage silo entries (i.e., confined space), nor was the silo access door locked.**

- **The host employer had not installed an inner swinging door inside the silo access door.**

Recommended Corrective Actions

The FACE program recommended the following corrective actions for the Staffing Agency:

- **Conduct a thorough JHA of their client's operation, to include a site visit;**
- **Ensure that all contract employees working at client sites are trained on both their company's policies as well as the duties that they will perform at the client site, as part of the onboarding process.**
- **Following any client site assessments or JHA, staffing agencies should share their findings with their clients and develop a reasonable action plan to address identified hazards, training, and personal protective equipment.**

Recommended Corrective Actions

The FACE program recommended the following corrective actions for the Nut Processing Facility:

- **Ensure that storage silos are fitted with inward swinging inner access doors;**
- **Develop and implement a procedure to manage and control unauthorized silo entries:**
  - **Treat all silo's as permit-required confined spaces;**
  - **Posting warning signs on all silo entrance hatched to read "Danger! Potential atmospheric and engulfment hazards. Do not enter without management authorization" or similar language.**
  - **Keep all silo doors locked except when entering, and only provide keys to trained, authorized individuals.**

Recommended Corrective Actions

The FACE program recommended the following corrective actions for the Nut Processing Facility:

- **Only allow workers trained in the silo procedure to enter. The training should detail circumstances where entry is permissible and when it is not.**
- **Conduct atmospheric testing prior to entry. If the silos have built-in fans, test each silo at least once to ensure that the fans are providing adequate ventilation to maintain a safe atmosphere.**
- **Entries, even for declassified confined spaces, should never be done alone. As with any hazardous operation, one of more additional workers should be on scene to provide aid should conditions change.**

Case Study 3 – Cannabis Flower Technician Experiences Fatal Asthma Exacerbation

Summary

- **A 27-year-old flower production technician at an indoor cannabis cultivation and processing facility experienced an asthma exacerbation. She was working with processed cannabis, became short of breath and ultimately stopped breathing and lost consciousness.**
- **Staff at the site called 911 and several co-workers performed CPR until emergency services arrived.**
- **She was transported to a regional trauma center where she remained on life support until she died, 3 days later**

The People

- **The employer is a cannabis producer and retailer with production and retail sites in multiple U.S. states.**
- **The company had acquired their Massachusetts facility in 2019 and, after a substantial buildout and licensing period, commenced operations at the site in 2021.**
- **The company has about 300 employees at the site, divided over two shifts (day and swing) with about half engaged in plant cultivation and the rest working in production and administrative roles.**

The People

Production staff were engaged in the following roles:

- **Preparing the flowers for sale as raw flowers**
- **Processing the cannabis to use in making pre-rolled cannabis joints (victim's role)**
- **Processing the cannabis to make extracts for oils and edible products**
- **Inventory and packaging**
- **Distribution of products to offsite retail stores**

The company had a safety manager local to the site and a regional safety manager. Other workers supported maintenance and security at the site.

Programs and Training

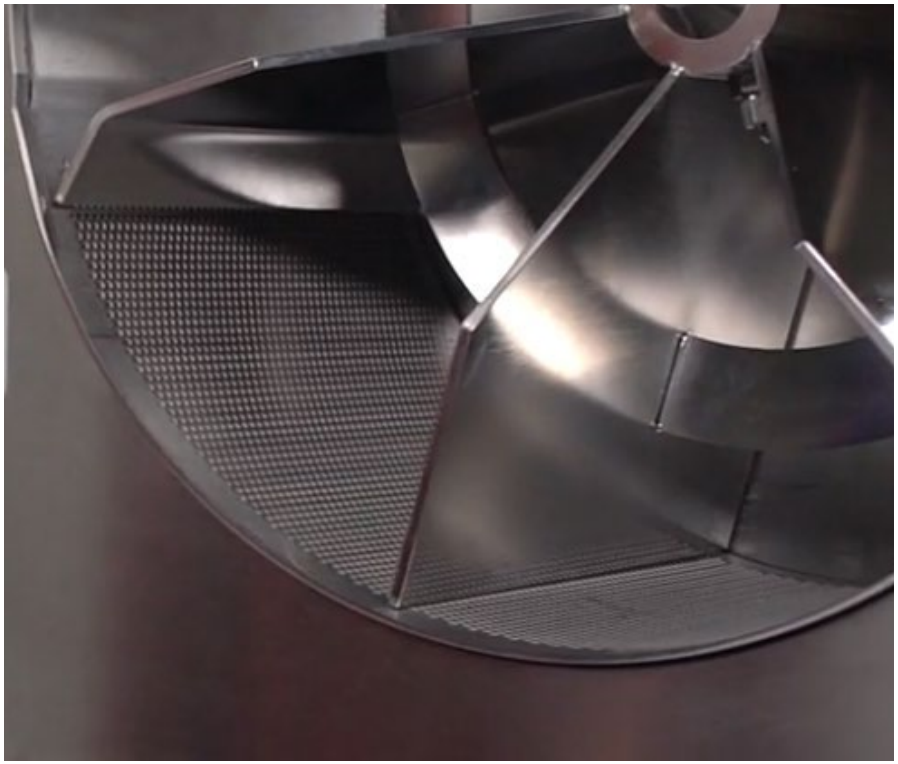
- **The employer had a written Hazard Communication Program.**
- **Workers were provided one hour of safety training in during orientation when hired. This included several health and safety topics, including Haz Comm.**
- **Certain employees were provided first aid/CPR training including use of automated external defibrillators (AEDs) available at the site.**
- **The training did not include content about safety considerations for handling the cannabis plant or products nor information about the risk of allergic reaction to the cannabis plant or dust.**

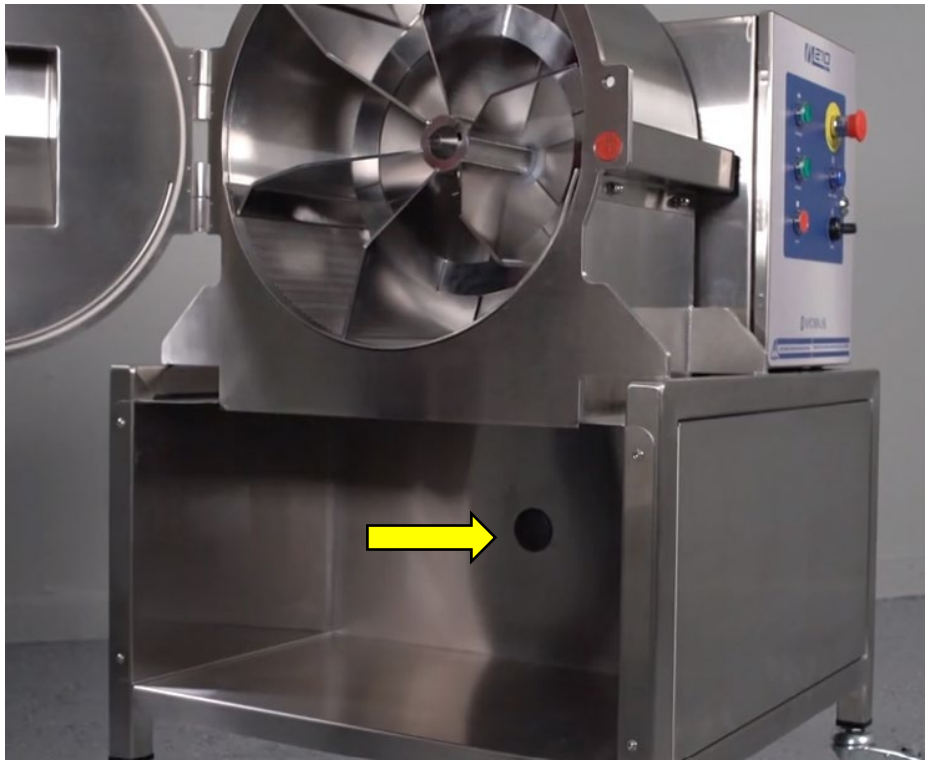
The Equipment

The primary pieces of equipment involved with this incident was a grinding machine

The Equipment

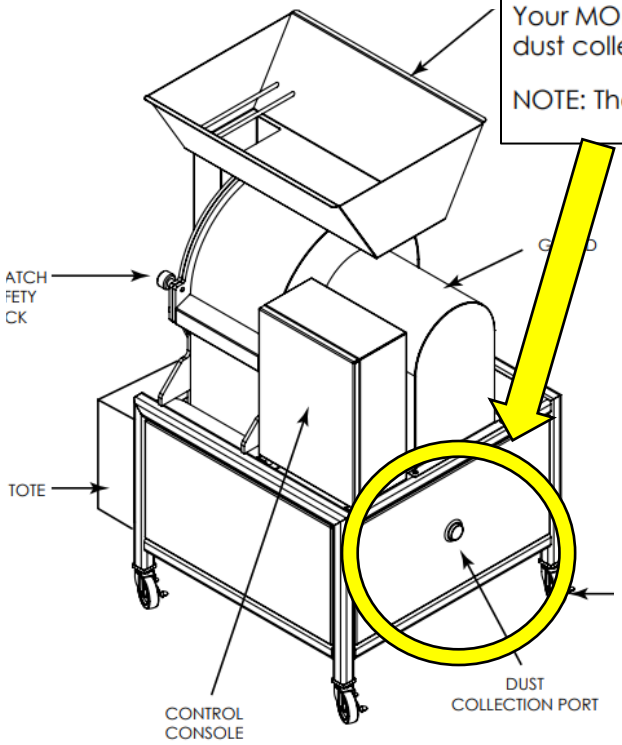
Grinding machine





The Equipment

Grinding machine



DUST COLLECTION PORT

Your MOBIUS M210 MILL is equipped from the factory with a ***dust collection port.*** Connect a vacuum or dust collection system to your milling machine to minimize the airborne dust generated.

NOTE: The dust collection port does not affect the machine operation or throughput.

From Operation Manual

10. ALWAYS OPERATE DEVICE IN A WELL-VENTILATED AREA. Dust generated from certain materials can be a health hazard. Use a dust collection system whenever possible.

11. WEAR A FACE MASK OR DUST MASK. Milling operation may produce dust. If dust extraction is not considered, a dust mask must be worn.

The Equipment

As well as a shaker box pre-roll filling machine.

The Incident Scene

- **The building, more than 150 years old, is located in a historic industrial area and was originally a mill until the cannabis company purchased the property in 2019. The building underwent renovation to convert the space to accommodate cannabis growing and processing with the majority used for cultivation.**
- **The grinder, blender, and shaker box were located together in an approximate 225 square foot room where the workers assembled pre-rolls.**

The Investigation

- **The victim began working at the facility in May 2021.**
- **Approximately 3 months after starting at the facility, the victim reportedly experienced cough, shortness of breath, and a runny nose that worsened throughout the workday.**
- **These symptoms became worse after she changed roles in October 2021, moving from counting finished product to being a flower technician in the grinding room.**
- **She reported an increase in symptoms when working within the grinding room to her supervisor and she would move to an assembly workspace just outside the room to reduce her exposure.**

The Investigation

- **Other attempts to reduce her exposure to cannabis dust were implemented by the company included closing the door to the grinding room and installing plastic sheeting around the dust collection vacuum. She also began to use an N95 filtering facepiece respirator that she obtained from outside of work.**
- **In early November 2021, about five weeks after having started the flower technician role, she experienced an episode of acute shortness of breath at work. Emergency medical services (EMS) were called and responded to the scene.**
- **In the ambulance on the way to the hospital, she was treated with oxygen and a bronchodilator delivered through a nebulizer.**

The Investigation

- **At the hospital she felt better – she had an oxygen saturation of 97% recorded and her shortness of breath had resolved. She denied a history of asthma, discussed a possible allergy to something at work, and reported having a chronic cough and runny nose.**
- **It was suspected she might be developing asthma and had underlying allergies. She was prescribed a five-day regimen of oral steroids and a rescue inhaler, along with over-the-counter allergy medication.**
- **Two months later (early January 2022) the victim was working in the production area loading ground product into paper rolls to create pre-rolls She was using an N95 filtering facepiece respirator and wearing nitrile gloves.**

The Investigation

- She became increasingly short of breath and her condition worsened until she experienced respiratory arrest and cardiac arrest at the site.
- Co-workers performed CPR and deployed an AED.
- She was intubated at the site and after five epinephrine injections her heart was restarted prior to her arrival at the regional trauma center.
- Scanning indicated she had sustained a brain injury from lack of oxygen. She remained in the intensive care unit for three days and did not recover.
- The medical examiner listed the cause of death as brain death, due to cardiac arrest, due to respiratory arrest, due to a presumed severe asthma attack.

Contributing Factors

Massachusetts FACE investigators identified the following unrecognized hazards as key contributing factors in this incident:

- **Failure to recognize ground cannabis as a potential occupational respiratory hazard**
- **Failure to adequately control the spread of airborne cannabis dust**
- **Lack of a comprehensive safety and health program and overall safety training**

Recommended Corrective Actions

The FACE program recommended the following corrective actions for the Employer:

- **Employers should assess and control hazardous materials (JHA/QEA) in the workplace, including asthmagens;**
- **Employers should ensure that all workers are properly trained about hazardous materials in the workplace;**
- **Employers should develop and implement a comprehensive safety and health program that addresses hazard recognition, avoidance of unsafe conditions, and proper use of equipment;**
- **Employers should implement a medical surveillance program to monitor the health of their workers;**

Recommended Corrective Actions

The FACE program recommended the following corrective actions for the Employer:

- **Equipment manufacturers should adopt and implement the concept of Prevention through Design (PtD) to identify potential hazards associated with equipment and then eliminate these hazards through design changes; and**
- **Industry licensing agencies in Massachusetts should consider how they can further support the health and safety of cannabis industry workers.**

Q & A

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