OCCUPATIONAL INCIDENTS DIRECT VS. INDIRECT COSTS

DIRECT COSTS typically refer to expenses that are immediately associated with an occupational incident. These costs are often measurable and documented.

INDIRECT COSTS are the hidden or less obvious expenses that arise as a consequence of an incident. These costs are usually harder to quantify but often exceed direct costs.

WHICH COSTS MORE?

Indirect costs are generally more expensive than direct costs. Studies suggest that indirect costs can be 2 to 10 times greater than direct costs.

DIRECT COSTS EXAMPLES

- ❑ Hospital bills, medication, rehabilitation, and doctor visits
- ❑ Workers Comp payments made to the injured employee for lost wages or disability
- ❑ Immediate increases in insurance premiums following a claim
- ❑ Costs related to handling legal claims or settlements

INDIRECT COSTS EXAMPLES

- ❑ Reduced productivity from injured employees and their coworkers.
- ❑ Time and expenses needed to train replacement workers
- ❑ Paying other workers overtime to cover for the injured employee’s absence
- ❑ Repair or replacement of damaged equipment due to the incident.
- ❑ Time spent on investigations, reporting, and paperwork
- ❑ Negative impact on the company’s reputation, potentially leading to lost business
- ❑ Lower employee morale and engagement, which can affect overall productivity

SAFETY TECHNICIAN DUTIES

SAFETY TECHNICIAN DUTIES

- ❑ Deliver safety training to both new and experienced personnel
- ❑ Act as the company's representative during visits by regulatory agencies in the absence of a site safety manager or supervisor
- ❑ Help develop, review, or revise Job Safety Analysis (JSA) or Task Safety Analysis (TSA), work plans, incident reporting forms, and emergency action plans
- ❑ Responsible for conducting audits and inspections of the job site and work activities
- ❑ Identify and help prevent or control safety hazards
- ❑ Focus safety programs on preventing the OSHA Fatal Four (falls, caught-in/between, struck by, and electrocution)
- ❑ Audit company performance and compliance with regulatory requirements
- ❑ Utilize appropriate coaching techniques to correct unsafe behavior and recognize safe behavior
- ❑ Hold safety meetings
- ❑ Audit compliance with work permits and permit-required work areas
- ❑ Support site management in conducting incident investigations
- ❑ Analyze data collected during incident investigations and help determine root causes
- ❑ Oversee industrial hygiene and conduct employee exposure monitoring.
- ❑ Monitor air quality, sound levels, etc., and ensure that all workers have suitable PPE for each hazard
- ❑ Manage the site's safety and health recordkeeping system
- ❑ Act as a liaison between the job site and insurance company representatives
- ❑ Provide or coordinate first aid and access to follow-up medical care

US DEPARTMENTS AND AGENCIES

OSHA (Occupational Safety and Health Administration)
Ensures safe and healthy working conditions by setting and enforcing safety standards and providing training, outreach, education, and assistance
OSHA is an agency within the Department of Labor

NIOSH (National Institute for Occupational Safety and Health)
Conducts research and makes recommendations to prevent work-related injuries and illnesses, serving as the research arm for occupational health and safety
NIOSH is a part of CDC (Center of Disease Control)
NIOSH is the health research partner for OSHA

DEQ (Department of Environmental Quality)
Enforces state-level environmental regulations, protecting air, water, and land resources from pollution (responsibilities and scope may vary by state)

EPA (Environmental Protection Agency)
Protects human health and the environment by creating and enforcing regulations based on environmental laws, monitoring pollution, and promoting sustainable practices

USACE (U.S. Army Corps of Engineers)
Provides public engineering services, including the construction and maintenance of military and civil infrastructure such as dams, flood control, and navigation projects

USCG (United States Coast Guard)
Enforces maritime laws, ensures maritime safety, security, and environmental protection, and provides search and rescue operations in U.S. waters

DOT (Department of Transportation)
Oversees the nation's transportation systems, developing policies and regulations to ensure safe, efficient, and accessible transportation across air, rail, road, and maritime sectors
DOT agencies include PHMSA, FAA, FRA, FMCSA, MARAD

PHMSA (Pipeline & Hazardous Materials Safety Administration)
Regulates the safe and secure movement of hazardous materials and oversees the safety of the nation's pipeline infrastructure
PHMSA assures pipeline and storage tank safety and quality

FAA (Federal Aviation Administration)
Regulates and oversees all aspects of civil aviation in the U.S., including air traffic control, safety regulations, aircraft and pilots
FAA makes the airways safer

FRA (Federal Railroad Administration)
Promotes safe, reliable, and efficient rail transportation by enforcing safety regulations, conducting inspections, and investing in rail infrastructure
FRA makes the railways safer

FMCSA (Federal Motor Carrier Safety Administration)
Regulates and ensures safety in the trucking and commercial bus industries by setting safety standards, conducting inspections, and enforcing regulations for commercial motor vehicles
Commercial Vehicle Safety Act 1986 makes the highways safer

MARAD (Maritime Administration)
Supports the U.S. maritime transportation system, ensuring the availability of a reliable commercial maritime industry for national security and economic growth
Marad makes the waterways safe and environmentally cleaner

BEST-PRACTICE ORGANIZATIONS & STANDARDS

that contribute to worker protection

NFPA (National Fire Protection Association)
Develops fire safety standards and codes, such as NFPA 70 (National Electrical Code), to protect workers from fire and electrical hazards on construction sites

ANSI (American National Standards Institute)
Oversees the development of voluntary safety standards for construction equipment, PPE (personal protective equipment), and work practices, ensuring consistency and safety

ASME (American Society of Mechanical Engineers)
Sets safety codes and standards for cranes, hoists, elevators, and other construction machinery, promoting safe operation and handling of heavy equipment

NEC (National Electrical Code)
Provides comprehensive safety standards for electrical installations, reducing the risk of electrical hazards, shocks, and fires on construction sites

NBC (National Building Code)
Establishes minimum building safety requirements, ensuring that construction practices, materials, and designs adhere to safety standards to protect workers and future occupants

NSF (National Sanitation Foundation)
Ensures the safety of water, air, and environmental quality on construction sites by setting standards for equipment and materials that workers interact with, especially in water-related construction

API (American Petroleum Institute)
Develops safety standards for construction projects in the oil and gas industry, focusing on the safe handling of hazardous materials, pipelines, and equipment

NCCER (National Center for Construction Education and Research)
Standardized training and certification programs are provided to improve construction workers' safety knowledge, skills & practices

SAIA (Scaffold & Access Industry Association)
Sets safety guidelines and best practices for scaffolding, aerial lifts, and access equipment, helping prevent falls and accidents on construction sites

ASTM (American Society for Testing and Materials)
Develops safety standards for construction materials, products, and practices, ensuring that materials used in construction are safe, reliable, and suitable for their intended purpose

UL (Underwriters Laboratories)
Tests and certifies construction products, tools, and electrical components to ensure they meet safety standards, reducing the risk of fires, electrical shocks, and equipment failures on construction sites

EPA LAWS & DEFINITIONS

CAA Clean Air Act regulates all sources of air emissions. The 1970 CAA authorized the EPA to establish National Ambient Air Quality Standards (NAAQS) to protect public health and the environment

CWA Clean Water Act establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters

RCRA Resource Conservation and Recovery Act governs the disposal of solid waste and hazardous waste

CERCLA Comprehensive Environmental Response, Compensation & Liability Act gives the EPA the ability to intervene in managing land contaminated with high levels of hazardous materials. And penalize $ the polluting companies

NPDES National Pollutant Discharge Elimination System
The CWA prohibits anybody from discharging "pollutants" through a "point source" into the "water of the USA" unless they have an NPDES permit. The permit contains limits on what you can discharge, monitoring & reporting requirements, and other provisions to ensure that the discharge does not hurt water quality or people's health

POLLUTANTS CAN INCLUDE dredged soil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt, and industrial, municipal, and agricultural waste

SUPERFUND program is responsible for cleaning up some of the nation's most contaminated land and responding to environmental emergencies, oil spills and natural disasters. To protect public health and the environment, the Superfund program focuses on making a visible and lasting difference

VAPOR INTRUSION

occurs when there is a migration of vapor-forming chemicals from any subsurface source into an overlying building.

VAPOR FORMING CHEMICALS INCLUDE

VOLATILE ORGANIC COMPOUNDS (VOCS)

- Trichloroethylene, Benzene, Naphthalene, Mercury, Pesticides and PCBs

PCBs

- PCBs primarily cause Cancer
- PCBs were often used in dielectric gel in old electrical transformers & fluorescent light ballasts.
- The reason PCBs were banned is that they are highly toxic, cancerous & do not easily degrade.
- PCBs can lay dormant in the soil for several years/decades and affect the health of workers, children playing & pets

POLLUTION PREVENTION ACT

- Pollution prevented or reduced at the source when feasible
- Pollution that cannot be prevented should be recycled in an environmentally safe manner whenever feasible
- Pollution that cannot be prevented or recycled should be treated in an environmentally safe manner when feasible
- Disposal or other release into the environment should be employed only as a last resort and should be conducted in an environmentally safe manner

REDUCING POLLUTION & GREENHOUSE GASES

SUSTAINABILITY RECOMMENDED PRACTICES INCLUDE:

- Procurement of sustainable products and services and helping to create a more sustainable marketplace for all
- Encouraging chemical technologies to incorporate principles of green chemistry into chemical design, manufacture & use
- Safer Choices of products that perform & contain ingredients that are safer for human health and the environment

Root Cause Analysis (RCA)

LEVEL 1 - DIRECT CAUSE – EXAMPLES

How did the employee get injured or become ill?

❑ Cuts, strains, burns, poisonings, falls, electrocutions, etc.

LEVEL 2 – INDIRECT CAUSE – EXAMPLES

What was the employee(s) doing wrong at the time?
What at-risk behavior was the employee performing?

❑ Unsafe/At-Risk acts performed by the workers
❑ Using equipment or tools with missing guards or are broken
❑ Using equipment or tools that have not been inspected
❑ Workers running, horseplaying, or ignoring rules
❑ Working in areas with slip, trip, or fall hazards
❑ Elevated work without guardrails or personal fall arrest
❑ Working on electrical that is energized or without LOTO

LEVEL 3 – ROOT CAUSE – EXAMPLES

The underlying issue is normally a management deficiency

❑ Outdated or no policies, procedures, processes, permits, etc.
❑ Inadequate or no training programs or requirements to attend
❑ No accountability, discipline, interventions, retraining, etc.
❑ Lack of inspections, audits, observations, or investigations

WHY IS A ROOT CAUSE ANALYSIS (RCA) SO IMPORTANT?

A root cause analysis allows an employer to discover the underlying or systemic deficiency rather than the generalized or immediate causes of an incident. Correcting only an immediate cause may eliminate a symptom of a problem, but not the problem itself.

Example 1

Level 1 Punched in the face and broken nose
Level 2 Workers were horseplaying
Level 3 No policy or training against horseplay

Example 2

Level 1 Cut off a finger
Level 2 Worker was using a saw with a broken or missing guard or improper hand placement
Level 3 No inspection or equipment removal procedure or lack of training

Example 3

Level 1 Electrocution while working on an electrical panel
Level 2 Worker(s) did not use LOTO
Level 3 Lack of training or supervision or no policy or procedure

RISK EQUALS

Probability/Likelihood – The chance that a given event will occur

Consequences – The results of an action, condition, or event

Exposure – The amount of time and the degree to which someone or something is exposed to an unsafe condition, material, or environment

This formula helps prioritize risks:

Probability + Consequences + Exposure = Risk

LEVELS OF SEVERITY

1. Negligible – An injury is not likely.
2. Marginal – Minor illness, injury, or property damage are likely.
3. Critical – Severe illness, injury, or property damage are likely.
4. Catastrophic – Death or permanent disability are likely.

Risk = Probability x severity

Risk = Probability + severity + exposure

Probability = Likelihood if an event happening

Severity = Consequence or impact

SAMPLE

LIKELIHOOD	Negligible (1)	Marginal (2)	Serious (3)	Very Serious (4)	Critical (5)
Frequent (5)	5 Risk acceptable	10 Review at appropriate time	15 High priority	20 High Risk	25 High Risk
Moderate (4)	4 Risk acceptable	8 Review at appropriate time	12 High priority	16 High Risk	20 High Risk
Occasional (3)	3 Risk acceptable	6 Risk acceptable	9 Review at appropriate time	12 High priority	15 High priority
Remote (2)	2 Risk acceptable	4 Risk acceptable	6 Risk acceptable	8 Review at appropriate time	10 Review at appropriate time
Unlikely (1)	1 Risk acceptable	2 Risk acceptable	3 Risk acceptable	4 Risk acceptable	5 Risk acceptable

SEVERITY

SAMPLE

Risk Assessment Matrix

SEVERITY / Effect of Hazard		PROBABILITY: Frequency of Occurrence Over Time — A Likely	B Probable	C May	D Unlikely
I	Loss of Mission Capability, Unit Readiness or Asset; Death	1	1	2	3
II	Significantly Degraded Mission Capability or Unit Readiness; Severe Injury or Damage	1	2	3	4
III	Degraded Mission Capability or Unit Readiness; Minor injury or Damage	2	3	4	5
IV	Little or No Impact to Mission Capability or Unit Readiness; Minimal Injury or Damage.	3	4	5	5

Risk Assessment Codes

1 – Critical 2 – Serious 3 – Moderate 4 – Minor 5 – Negligible

Safety Management System (SMS) I

A Safety Management System) SMS is a structured framework that integrates safety policies, procedures, and practices within an organization to proactively identify, assess, and mitigate risks to ensure a safe working environment. It encompasses continuous monitoring, improvement, and compliance with safety regulations to prevent accidents and promote a culture of safety.

It is a framework for EHS and can scale to all-size companies in all industries. It includes the following components:

MANAGEMENT & LEADERSHIP

- ❑Demonstrates EHS commitment & continuous improvement
- ❑Communicates to EHS commitment to workers
- ❑Sets program expectations and responsibilities
- ❑All level managers make EHS a core organizational value and establish safety and EHS goals and objectives
- ❑Provides needed resources and support for the program
- ❑Sets a good example by also complying by all policies & procedures

WORKER PARTICIPATION

- ❑Workers are involved in all aspects of the program
- ❑Workers are involved in setting goals, identifying & reporting hazards, investigating incidents & tracking progress
- ❑All workers, including contractors and temporary workers, understand their roles and responsibilities under the program and what they need to do to effectively carry them out
- ❑Workers are encouraged & have means to communicate openly with management & report safety & health concerns without retaliation
- ❑Any potential barriers or obstacles to worker participation in the program are removed (Ex: language, lack of information, disincentives)

HAZARD PREVENTION & CONTROL

- ❑Procedures to continually identify EHS hazards & evaluate risks
- ❑Assessments of existing hazards & control measures are followed by periodic inspections & reassessments to identify new risks

HAZARD PREVENTION & CONTROL

- ❑Employers and workers cooperate to identify and select options for eliminating, preventing, or controlling workplace hazards.
- ❑Plans are developed that ensure controls are implemented, interim protection is provided, progress is tracked, and the effectiveness of controls is verified.

Hazards are either permanently or temporarily corrected
Permanent = Prevention of Hazards *(Elimination, Substitution)*
Temporary = Control of Hazards *(Engineering, Administrative, PPE)*

EDUCATION & TRAINING

- ❑Workers are trained to understand how the program works and how to carry out the responsibilities assigned to them under the program
- ❑All workers are trained to recognize workplace hazards and to understand the control measures that have been implemented

PROGRAM EVALUATION & IMPROVEMENT
LEADING AND LAGGING INDICATORS

- ❑Control measures are periodically evaluated for effectiveness
- ❑. Processes are established to monitor program performance, verify program implementation, identify program deficiencies and opportunities for improvement, and take actions necessary to improve the program and overall safety and health performance
- ❑. Key Performance Indicators (KPIs) are used to measure safety performance. KPIs include Leading and Lagging Indicators.
- ❑ Leading Indicators are preferred since they are a proactive tool
- ❑Lagging Indicators are a reactive tool
- ❑This a part of a company' s Performance Analysis

COORDINATION & COMMUNICATION

On Multiemployer Worksites

- ❑The host employer and all contract employers coordinate on work planning and scheduling to
- ❑identify and resolve any conflicts that could impact safety or health.
- ❑Workers from both the host and contract employer are informed about the hazards present at the worksite and the hazards that work of the contract employer may create on site.

SAFETY PROGRAM COMPONENTS CAN INCLUDE

Management support and a policy statement
A policy on alcohol and drug abuse
Safety policies and procedures
Orientation and training
Access to first aid and follow-up medical care
Pre-project and pre-task safety planning
Safety meetings and employee involvement
Sub-contractor management
Emergency action plans and methods for dealing with the media
Inspections, employee observations, and audits
Incident investigation and analysis
Recordkeeping
Program evaluation and follow-up

HEALTH AND SAFETY PLAN TOPICS CAN INCLUDE

Hazard communication
Bloodborne pathogens
Welding, burning, and cutting
Respiratory protection
Personal protective equipment
Elevated work and fall protection
Hearing conservation

Confined-space entry
Lockout/tagout
Cranes, hoists, rigging, and other lifting devices
Heavy, Construction, and Mobile equipment operations
Trenching and Excavation