



Comprehensive List of Causes

A TOOL FOR ROOT CAUSE ANALYSIS

DESCRIPTION OF INCIDENT

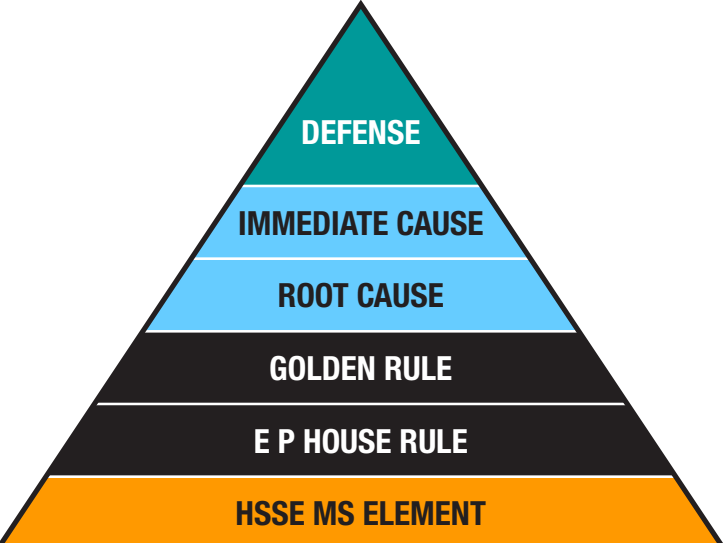
- Document the type / severity of event
- Cover the who / what / when / where / how as known at the time

IMPLEMENTATION & RESEARCH PHASES: EVIDENCE GATHERING

- Gather relevant evidence
- Implementation phase = direct evidence (scene and witnesses)
- Research phase = indirect evidence (written sources)
- Consider People / Parts / Position / Paper

ANALYSIS PHASE: IDENTIFICATION OF CRITICAL FACTORS

- Organize all evidence
- Map evidence
- Identify critical factors
- Use CLC to identify all immediate and root causes



POSSIBLE IMMEDIATE CAUSES							
UNSAFE ACTS				UNSAFE CONDITIONS			
1. Following Procedures 1-1 [E] Violation by individual 1-2 Violation by group 1-3 Violation by supervisor 1-4 Operation of equipment without authority 1-5 Improper position or posture for the task 1-6 Overexertion of physical capability 1-7 Work or motion at improper speed 1-8 Improper lifting 1-9 Improper loading 1-10 Shortcuts 1-11 Improper load vehicle capacity 1-12 Improper use of handrail 1-13 Other	2. Use of Tools or Equipment 2-1 [D] Improper use of equipment 2-2 [D] Improper use of tools 2-3 [D] Use of defective equipment (aware) 2-4 [D] Use of defective tools (aware) 2-5 [G] Improper placement of tools, equipment or materials 2-6 [D] Operation of equipment at improper speed 2-7 [D] Disrespect to the speed limit 2-8 [D] Servicing of equipment in operation 2-9 Other	3. Use of Protective Methods 3-1 Lack of knowledge of hazards present 3-2 [I] Personal protective equipment not used 3-3 [F] Lack of use of seat belt 3-4 [I] Improper breathing apparatus/wind socks for a H ₂ S exposed work environment 3-5 [I] Improper use of proper personal protective equipment 3-6 [I] Improper use of fall arrestor equipment 3-7 Servicing of energized equipment 3-8 Equipment or materials not secured 3-9 Disabled guards, warning systems or safety devices 3-10 Removal of guards, warning systems or safety devices 3-11 [I] Personal protective equipment not available 3-12 Other	4. Inattention / Lack of Awareness 4-1 Improper decision making or lack of judgment 4-2 Improper decision making of unnecessary confined space entry 4-3 Improper decision making of unnecessary work at heights 4-4 Distracted by other concerns 4-5 Inattention to footing and surroundings 4-6 [F] Distracted by use of mobile phone while driving 4-7 Horseplay 4-8 Acts of violence 4-9 Failure to warn 4-10 Use of drugs or alcohol 4-11 Routine activity without thought 4-12 Inattention to housekeeping 4-13 Other	5. Protective Systems 5-1 Inadequate guards or protective devices 5-2 Defective guards or protective devices 5-3 Inadequate personal protective equipment 5-4 Defective personal protective equipment 5-5 Inadequate warning systems 5-6 Defective warning systems 5-7 Inadequate isolation of process or equipment 5-8 Inadequate isolation of lifting area 5-9 Inadequate safety devices 5-10 Defective safety devices 5-11 Other	6. Tools, Equipment & Vehicles 6-1 [D] Defective equipment 6-2 [D] Defective oxygen/gas detector equipment 6-3 [D] Inadequate equipment for work at heights 6-4 [D] Inadequate equipment 6-5 [D] Improperly prepared equipment 6-6 [D] Defective tools 6-7 [D] Inadequate tools 6-8 [D] Improperly prepared tools 6-9 [D] Defective vehicle 6-10 [D] Inadequate vehicle for the purpose 6-11 [D] Improperly prepared vehicle 6-12 Other	7. Work Exposures to 7-1 Fire or explosion 7-2 Noise 7-3 Energized electrical systems 7-4 Energized systems, other than electrical 7-5 Radiation 7-6 Temperature extremes 7-7 Hazardous chemicals 7-8 Mechanical hazards 7-9 Clutter or debris 7-10 Storms or acts of nature 7-11 Slippery floors or walkways 7-12 Other	8. Work Place Environment / Layout 8-1 [G] Congestion or restricted motion 8-2 Inadequate or excessive illumination 8-3 Inadequate ventilation 8-4 Inadequate constant atmospheric test for confined space entry 8-5 Inadequate atmospheric test for the H ₂ S exposed space 8-6 Unprotected height 8-7 Inadequate work place layout • controls less than adequate • displays less than adequate • labels less than adequate • locations out of reach or sight • conflicting information is presented 8-8 Other

POSSIBLE SYSTEM CAUSES (ROOT CAUSES)														
PERSONAL FACTORS					JOB FACTORS					OTHER				
1. Physical Capability	2. Physical Condition	3. Mental State	4. Mental Stress	5. Behavior	6. Skill Level	7. Training / Knowledge Transfer	8. Management / Supervision / Employee Leadership	9. Contractor Selection & Oversight	10. Engineering / Design	11. Work Planning	12. Purchasing, Material Handling & Material Control	13. Tools & Equipment	14. Work Rules / Policies / Standards / Procedures (PSP)	15. Communication
1-1 [A] Vision deficiency (3.3) 1-2 [B] Hearing deficiency (3.3) 1-3 [C] Other sensory deficiency (3.3) 1-4 [C] Reduced respiratory capacity (3.3) 1-5 [C] Other permanent physical disabilities (3.3) 1-6 [C] Temporary disabilities (3.3) 1-7 [C] Inability to sustain body positions (3.3) 1-8 [C] Restricted range of body movement (3.3) 1-9 Substance sensitivities or allergies (3.3) 1-10 [C] Inadequate size or strength (3.3) 1-11 Diminished capacity due to medication (3.3) 1-12 Other ☐ Not Applicable	2-1 [C] Previous injury or illness (3.3) 2-2 [C] Fatigue (3.3) • due to workload • due to lack of rest • due to sensory overload 2-3 [B] Diminished performance (3.3) • due to temperature extremes • due to oxygen deficiency • due to atmospheric pressure variation 2-4 [C] Blood sugar insufficiency (3.3) 2-5 [A] Impairment due to drug or alcohol use (2.1) 2-6 Other ☐ Not Applicable	3-1 Poor judgment (3.3) 3-2 Memory failure (3.3) 3-3 Poor coordination or reaction time (3.4) 3-4 [A] Emotional disturbance (3.3) 3-5 [C] Fears or phobias (3.3) 3-6 [B] Low mechanical aptitude (3.4) 3-7 Low learning aptitude (3.4) 3-8 Influenced by medication (3.3) 3-9 Other ☐ Not Applicable	4-1 Preoccupation with problems (3.3) 4-2 Frustration (3.3) 4-3 Confusing directions / demands (3.1) 4-4 Conflicting directions / demands (3.1) 4-5 Meaningless or degrading activities (3.3) 4-6 [B] Emotional overload (3.3) 4-7 Extreme judgment / decision demands (3.3) 4-8 Extreme concentration / perception demands (3.3) 4-9 Extreme boredom (3.3) 4-10 Other ☐ Not Applicable	5-1 Improper performance is rewarded (1.1) • saves time or effort • avoids discomfort • gains attention 5-2 Improper supervisory example (1.1) 5-3 Inadequate identification of critical safe behaviors (1.1) 5-4 Inadequate reinforcement of critical safe behaviors (1.1) • proper performance is criticized • inappropriate peer pressure • inadequate performance feedback • inadequate disciplinary process 5-5 [C] Inappropriate aggression (3.3) 5-6 Improper use of production incentives (1.2) 5-7 [B] Supervisor implied haste (1.2) 5-8 [B] Employee perceived haste (3.3) 5-9 Inadequate housekeeping behaviour 5-10 Other ☐ Not Applicable	6-1 Inadequate assessment of required skills (3.4) 6-2 Inadequate practice of skill (3.4) 6-3 Infrequent (3.4) performance of skill 6-4 Lack of coaching on skill (3.4) 6-5 Insufficient review of instruction to establish skill (3.4) 6-6 Other ☐ Not Applicable	7-1 Inadequate knowledge transfer (3.4) • inability to comprehend • inadequate instructor qualifications • inadequate training equipment • misunderstood instructions 7-2 Inadequate recall of training material (3.4) • training not reinforced on the job • inadequate refresher training frequency 7-3 Inadequate training for working on a H ₂ S designated area (3.4) 7-4 Inadequate training effort (3.4) • inadequate training program design • inadequate training goals / objectives • inadequate new employee orientation • inadequate initial training • inadequate means to determine if qualified for job • need for training not identified • training records incorrect or out of date • new work methods introduced without training • decision made not to train 7-5 No training provided (3.4) 7-6 Other ☐ Not Applicable	8-1 Conflicting roles / responsibilities (3.1) • unclear reporting relationships • conflicting reporting relationship • unclear assignment of responsibility • conflicting assignment of responsibility • improper or insufficient delegation of authority 8-2 Inadequate leadership (1.1) • standards of performance missing or not enforced • inadequate accountability • inadequate or incorrect performance feedback • inadequate work site walk-through • inadequate safety promotion 8-3 [A] Inadequate risk assessment regarding: (4.2) • Confined space entry • H ₂ S • Dropped Object • Work at Heights 8-4 [B] Inadequate correction of prior hazard / incident (4.5) 8-5 [B] Inadequate identification of worksite / job hazards (4.1) 8-6 [B] Inadequate monitoring of weather conditions (4.4) 8-7 Inadequate management of change system (5.4) 8-8 [A] Inadequate incident reporting / investigation system (6.4) 8-9 Inadequate or lack of safety meetings (3.6) 8-10 Inadequate performance measurement & assessment (6.1) 8-11 Other ☐ Not Applicable	9-1 [A] Lack of contractor pre-qualifications (3.5) 9-2 [A] Inadequate contractor pre-qualifications (3.5) 9-3 [A] Inadequate contractor selection (7.3) 9-4 [A] Use of non-approved contractor (7.3) 9-5 [A] Lack of job oversight (7.3) 9-6 [A] Inadequate oversight (7.3) 9-7 Other ☐ Not Applicable	10-1 Inadequate technical design (3.2) • design input obsolete • design input not correct • design input not available • design output inadequate • design input infeasible • design output unclear • design output not correct • design output inconsistent • no independent design review 10-2 Inadequate standards, specifications, and / or design criteria (5.2) 10-3 [A] Inadequate assessment of potential failure (4.2) 10-4 Inadequate ergonomic design (4.1) 10-5 Inadequate design of excavation (4.1) 10-6 Inadequate monitoring of construction (7.1) 10-7 [A] Inadequate assessment of operational readiness (8.4) 10-8 Inadequate monitoring of initial operation (6.1) 10-9 Inadequate evaluation and / or documentation of change (5.4) 10-10 Other ☐ Not Applicable	11-1 [A] Inadequate work planning (5.3) 11-2 [A] Inadequate journey risk assessment (4.2) 11-3 [A] Inadequate use of the "buddy system" for a confined space entry (5.3) 11-4 Lack of awareness regarding wind (4.2) direction and appropriate escapes routes 11-5 Inadequate lifting plan in place (5.3) 11-6 [A] Inadequate preventive maintenance (6.2) • assessment of needs • lubrication / servicing • adjustment / assembly • cleaning / resurfacing 11-7 [A] Inadequate repair (5.2) • communication of needed repair • scheduling of work • examination of parts • parts substitution 11-8 [B] Excessive wear and tear (5.2) • inadequate planning for use • extension of service life • improper loading • use by untrained people • use for wrong purpose 11-9 Inadequate reference materials or publications (5.3) 11-10 [A] Inadequate audit/inspection/monitoring (5.2) • no documentation • no correction responsibility assigned • no accountability for corrective action 11-11 [A] Inadequate inspection of lifting equipment and safety devices (5.2) 11-12 [A] Inadequate Emergency Plan in place (5.5) 11-13 [A] Inadequate job placement (3.3) • appropriate personnel not identified • appropriate personnel not available • appropriate personnel not provided 11-14 Other ☐ Not Applicable	12-1 Incorrect item received (5.3) • inadequate specifications to vendor • inadequate specifications on requisition • inadequate control on changes to orders • unauthorized substitution • inadequate product acceptance requirements • no acceptance verification performed 12-2 Inadequate research on materials/equipment (3.4) 12-3 [A] Inadequate mode or route of shipment (3.4) 12-4 [A] Improper handling of materials (3.4) 12-5 [A] Improper storage of materials or spare parts (3.3) 12-6 [A] Inadequate material packaging (4.1) 12-7 [B] Material shelf life exceeded (4.1) 12-8 [B] Improper identification of hazardous materials (4.1) 12-9 [B] Improper salvage and / or waste disposal (4.5) 12-10 [A] Inadequate use of safety and health data (4.3) 12-11 Other ☐ Not Applicable	13-1 [B] Inadequate assessment of needs and risks (4.2) 13-2 Inadequate human factors / ergonomics considerations (4.2) 13-3 Inadequate standards or specifications (5.3) 13-4 Inadequate availability (5.3) 13-5 [A] Inadequate adjustment / repair / maintenance (5.3) 13-6 [B] Inadequate salvage and reclamation (5.3) 13-7 [B] Inadequate removal / replacement of unsuitable items (5.3) 13-8 No equipment record history (4.3) 13-9 [A] Inadequate equipment record history (4.3) 13-10 Other ☐ Not Applicable	14-1 Lack of PSP for the task (3.3) • lack of defined responsibility for PSP • lack of job safety analysis • inadequate job safety analysis 14-2 Lack of "Permit to work" system (5.3) 14-3 Inadequate development of PSP (5.3) • inadequate coordination with process / equipment design • inadequate employee involvement in the development • inadequate definition of corrective actions • inadequate format for easy use 14-4 Inadequate implementation of PSP, due to deficiencies (5.3) • contradictory requirements • confusing format • more than one action per step • no check-off spaces provided • inaccurate sequence of steps • confusing instructions • technical error / missing steps • excessive references • potential situations not covered 14-5 Inadequate enforcement of PSP (3.6) • inadequate monitoring of work • inadequate supervisory knowledge • inadequate reinforcement • non-compliance not corrected 14-6 Inadequate communication of PSP (3.6) • incomplete distribution to work groups • inadequate translation to appropriate languages • incomplete integration with training • out of date revisions still in use 14-7 Inadequate accountability for the "Permit to Work" system (5.3) 14-8 Other ☐ Not Applicable	15-1 [B] Inadequate horizontal communication between peers (3.6) 15-2 [C] Inadequate vertical communication between supervisor and person (3.6) 15-3 [A] Inadequate communication between different organizations (3.6) 15-4 [B] Inadequate communication between work groups (3.6) 15-5 Inadequate communication between shifts (3.6) 15-6 Inadequate communication methods (5.3) 15-7 [B] Inadequate lines of communication while in a confined space (3.6) 15-8 No communication method available (3.6) 15-9 Incorrect instructions (5.3) 15-10 Inadequate communication due to job turnover (3.4) 15-11 Inadequate identification of safety and health data, regulations or guidelines (3.4) 15-12 Standard terminology not used (5.3) 15-13 Verification/repeat back techniques not used (3.6) 15-14 Messages too long (3.6) 15-15 Speech interference (3.6) 15-16 Other ☐ Not Applicable

For each identified critical factor, consider if any of the listed root cause categories apply. If 'yes,' circle the specific root cause. If none of the root causes in the category apply, then check the 'not applicable' box at the bottom of the column.

OBS.: The HSE MS sub-element is identified in brackets next to each root cause. e.g.: Root Cause 15-3, Inadequate communication between different organizations HSE MS Sub-element (3.6) - Communication

Developed by SBEP HSE Team

GOLDEN RULES					EP HOUSE RULES					
[A] Comply with the law, standards and procedures	[B] Intervene in unsafe and non-compliant situations	[C] Respect our neighbours	[D] Stop any job that feels unsafe	[E] I use the right Tools for the job and use them correctly	[A] I am Aware of and understand the rules for a job or I find out	[E] I Naturally hold the handrail when using the stairs	[F] I Do use a seatbelt and do not use a cell phone whilst Driving	[G] I keep my work Area clean, tidy and free of obstruction	[H] I Reduce sources of waste	[I] I Dress with the correct Personal Protective Equipment (PPE) for the task

