**Common Causal Factors** - What was not done that would have prevented the incident or made it less severe?

*Causal Factors are NOT root causes – they are the RCA starting point!!*

<table>
<thead>
<tr>
<th>Incident Type</th>
<th>Common Causal Factors (Error or Defect)</th>
</tr>
</thead>
</table>
| General                             | Did not wear personal protective equipment – specify type of PPE  
Failed to detect defect or hazard prior to use – be specific  
Work was not stopped when hazard was identified  
Did not take action to avoid hazard – specify action and hazard type  
Hazard or defect was not kept out of work system                                                                 |
| Vehicular Incidents                  | Driver did not keep car on road  
Safe driving distance was not maintained  
Driver did not keep eyes on road or other vehicles  
Speed was not reduced for icy and slick conditions                                                                 |
| Slip, Trip, or Fall                 | Did not maintain balance  
Did not maintain three point contact  
Eyes were not on path  
Did not use hand rail / did not break fall                                                                                                                                  |
| Environmental Release               | Equipment failure that initiated the release – also analyze failure  
Release was not detected promptly – describe ‘how late’  
Release was not responded to on time – describe ‘how late’  
Release was not remediated correctly - describe                                                                                                                                 |
| Fall Protection Usage               | Did not tie off / did not tie off to approved tie off  
Fall protection failed – describe type of failure  
Fall protection was not worn correctly – describe what was wrong  
Proper lanyard type was not used – wrong length, type, etc.                                                                                                                       |
| Struck By / Caught Between          | Did not stay out of the line of fire  
Did not keep hand out of pinch point                                                                                                                                                                                                   |
| LOTO-Related                        | Did not isolate device / isolated wrong device – specify  
Did not de-energize system prior to beginning work                                                                                                                                                                                    |
| Confined Space / Open Hole          | Access to open hole was not prevented  
Action was not taken to avoid open hole  
Confined space was not sniffed prior to entry                                                                                                                                                                                        |
| Strains and Sprains                 | Center of body was not aligned with work being done  
Load was not kept close to body during lift  
Weight of load was not tested prior to lift  
Two people were not used to lift 100 pound bags                                                                                                                                                                                      |

**NOTE #1:** This list DOES NOT include all possible causal factors, either in general or specific to a given incident type.

**NOTE #2:** Equipment failures can be either incidents or causal factors – you have to decide which analysis option works the best. It is recommended that equipment failures be analyzed as incidents so that the causal factors of such failures, and their root causes, can be identified and remedied.

**NOTE #3:** Near root causes or root causes on the back of the TapRooT® root cause analysis tree are not causal factors. For example, ‘Did not follow procedure’ or ‘Did not follow JSA’ are NOT causal factors – they are on the back of the tree!
Key Questions to Ask When Analyzing Human Errors (HPD Causal Factors)

These questions should be answered for EACH causal factor prior to performing root cause analysis on that causal factor.

Procedures (Checklist in Hand)
- Was a checklist being used to perform the job?
- If YES, has a copy of the checklist been retained for ‘design quality’ analysis?
- If NO, would the use of a well-written checklist while doing this work have prevented the incident?

Training
- Can the person currently describe the correct way to do the job?
- Was the person performing the work considered qualified by the company to do it?
- If YES, describe the qualification process and collect related documentation
- If NO, describe the factors that led to an unqualified person being assigned to perform a job

Quality Control (Third party check of work)
- Was a ‘stop and hold for third party check’ process being used when the error occurred?
- If YES, describe the existing ‘stop and hold’ process, highlighting the steps that failed in this case
- If NO, would the use of a ‘stop and hold for third party check’ process have prevented the error?

Communications
- What type of verbal communication was involved with error that was made, if any?
- Was formal work turnover related to the error that was made, and have these records been collected?
- Were any standard communication practices, such as repeat back or acronyms, being used?

Management Systems
- What written policies or other standard practices are related to the work being performed? (collect copies)
- Was a policy violated, and if so, how often does this type of violation occur?
- Have corrective actions for this problem been tried in the past, and if so, why did they fail?

Human Engineering
- Was the error that was made related to using a machine interface, such as a display or controls?
- How was the person positioned relative to the work being performed when the error occurred?
- How might the work environment have contributed to the error being made?

Work Direction
- What type of preparation took place prior to work that shift?
- What type of work package was provided to guide work that day?
- What work schedules were being followed leading up to the day when the error occurred?

NOTE #1: This list does not include all key investigative questions that should be asked to better understand human error, and they may not provide enough information on their own to allow for root cause determination.

NOTE #2: Equipment difficulty causal factors have their own set of questions that need to be asked. Typically, it is recommended that equipment failures be analyzed as incidents on their own unless they contributed to a larger problem (and even then, analyzing the failure from both perspectives is often helpful. Also, equipment failure analysis normally involves more extensive data collection, such as shift reports, performance contracts, PM schedules and results, and previous failure histories and trends.

Assembled by Kevin McManus © Great Systems, 2012 www.greatsystems.com
Operator A makes decision to use JLG instead of ladder to clean piping.

11/10/2007

JLG lift should not have been used to clean in this area

Employee felt JLG was safer than using a ladder - lack of 3 point contact, stiff and heavy hose, no tie off

No meeting was held on Saturday at start of shift to review work for the day

Operator was considered qualified to do this type of work

Area lift training states not to take JLGs into tight areas

Ice blasting JHA is not task specific

Operator was not using a checklist

No formal work package was issued for this work

Extensive experience with company lift - had used rental lift ~ 5 times

Training does reinforce the need to "avoid using JLGs in tight spaces"

"Tight areas" is not specifically defined in aerial lift usage policy

Not practical to use a checklist while doing this job

No JLG usage JHA exists

Had in-plant aerial lift certification in May 2007

"Tight areas" is not specifically defined lesson plan, course objectives, course content, or testing

Working in cramped quarters in addressed in classroom - do not use in tight areas

Third party inspections not required for this work

Employee concerns about working in tight areas had not been stated

Certification involves classroom and practical exercise
Example Causal Factor SnapCharT #2

Golfer arrives at course and pays greens fees → Golfer pars first three holes → Golfer hits tee shot off of #4 Par 4 435 yard hole → Ball lands in deep 6 inch rough → Golfer hits ball out of rough into sand trap → Golfer uses three more strokes to finish hole → Over Par Score for Hole

Golfer does not keep drive in fairway (slices)

- It is not practical to use a checklist while swinging a golf club
- No other driving aids were referenced prior to hitting the ball
- Golfer was trying to use visualization to hit a straight tee shot
- No third party inspection of the golfer's driving stance or mental state was made prior to hitting the tee shot
- Golfer was self taught - had never taken lessons
- Golfer was an extensive user of golfing instruction videos
- Golfer played at least 18 holes per week between March and November
- Golfer plays alone 50% of the time - does not like coaching from others

- Verbal communication was not a factor in this case
- Club head went through the ball at a 4 to 10 angle
- Golfer knew from videos that he needed to make a 6 to 12 drive
- Golfer knew from Golf Digest survey that he was swinging too fast through the ball

- Golfer was well rested and had drank only one beer
- Golfer was playing 18 rounds alone
- Golfer had played the course over 25 times before
- Golfer slices the ball on 60% of his drives

- Tee shot was hit at 4pm on sunny afternoon
- Course was dry
- Fairway was straight
- Hazards on right were clearly visible
### Measuring Investigation Effectiveness

<table>
<thead>
<tr>
<th>Description</th>
<th>LOW</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Our investigations are performed in a timely manner</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>We follow a formal investigation process</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>We create investigation plans prior to beginning data collection</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>We collect information from several sources</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>We do a good job of asking effective interview questions</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>We ask our interview questions in an effective manner</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>We support our interview facts with good data analysis</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>We consistently develop SMARTER corrective actions</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Our investigation teams work well together</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

### Measuring SnapCharT® Effectiveness

<table>
<thead>
<tr>
<th>Description</th>
<th>LOW</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Each of our events consistently contain only one action item</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>We identify both &quot;Who&quot; or &quot;What&quot;, and &quot;Does What&quot;, for each event</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>We consistently use job titles or functions instead of names</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>We consistently use dates and times on our events as appropriate</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Action items are only shown in events (not in conditions)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>We do a good job of using conditions to amplify events</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>We use our conditions to identify what was not done</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>We clearly identify and address our assumptions</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>We consistently create different seasons of our SnapCharT®</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

### Measuring Root Cause Analysis Effectiveness

<table>
<thead>
<tr>
<th>Description</th>
<th>LOW</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Each causal factor can pass the &quot;Who did what wrong?&quot; or &quot;What equipment failed?&quot; test</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Each causal factor can pass the &quot;Direct incident impact&quot; test</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>We do a consistent job of using the dictionary</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Conditions are consistently used to answer the selected dictionary question(s)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>We can validate each root cause selected with one or more conditions</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>We use notations / comments to document root cause selections</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>We consistently identify generic causes for our root causes</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

### Measuring Corrective Action Effectiveness

<table>
<thead>
<tr>
<th>Description</th>
<th>LOW</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Each of our corrective actions are specific</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Each of our corrective actions are measurable</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>We define accountability for each corrective action</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>We calculate a return on investment for our corrective actions</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Timeliness factors are considered as corrective actions are developed</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>We identify a means of verifying the effectiveness of our corrective actions</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>We consistently try to anticipate unintended consequences</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>We consistently address all applicable root causes</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
Figure 1 - Example Cross-Functional Incident Reporting and Investigation Process Flow Diagram

Incident occurs

Reportive party notifies supervisor of problem

Reporting party completes witness interview with supervisor

Reportable incident / injury?

YES

Treatment assistance provided

NO

Supervisor captures evidence at scene

Supervisor completes initial interviews

Supervisor collects key documentation

Site Supervisor conducts follow-up interviews

Site Management coordinates onsite activities and report completion

Site Management assists with additional fact gathering, root cause analysis, and corrective action development

EHS completes treatment / releases patient to medical

EHS Support notifies other parties per severity protocol

EHS Support assists w/ evidence capture at scene

EHS Support completes initial interviews

EHS Support assists w/ documents and follow-ups

Team completes RCA and writes corrective actions

Team issues investigation report

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