Hand Safety Management

Tom Gouldie
Drillsafe
3 June 2010
Hand Safety Management

Highlights…

- **Summary of 2009 Wellsite Hand Injuries**
  - With some analyses: “what do these injuries tell us?”

- **Hand Hazard Identification Program**
  - What it is & how it is supposed to work

- **Wellsite Hand Safety Working Group**
  - Sharing learnings in our wellsite community

- **Annual Hand Safety Management Plans**
  - Consistent focus areas, adding some structure
15 recordable Hand & Finger injuries in wellsite operations in 2009

- Compared to 18 in 2008 & 14 in 2007
- **87%**, (13 out of 15) hand & finger recordable injuries were due to **PINCHING OR CRUSHING**
- **13%** (2 out of 15) were cuts across **SHARP AREAS**
1. Finger fractured - using drill tongs

- MTI
- Left hand little finger crushed between 2 tongs
- Fractured finger tip
- 6 January 2009
- 5:00 pm
- Fairview #206
2. Hand pinched – casing & breakout tong contact

- MTI
- Right hand pinched by casing tong
- Deep tissue bruising
- 9 January 2009
- 9:00 am
- Tirrawarra #77
3. Finger pinched – caught between equipment

- MTI
- Left hand little finger pinched between hole cover and bit breaker
- Fracture & lacerations
- 16 March 2009
- 9:00 am
- Fairview #403
4. Finger crushed - caught between pump & skid

- LTI
- Left index finger tip caught between pump liner & skid base
- 10mm finger tip cut off
- 25 March 2009
- 4:52 pm
- Fairview #83 OB3
5. Hand cut – contact with sharp sign edge

- MTI
- Left hand cut on safety sign
- 6 stitches
- 11 April 2009
- 5:00 pm
- Fairview #71A
6. Finger cut – pinched between wrench & mast

- MTI
- Right index finger pinched between mast and wrench handle
- Laceration
- 3 Stitches
- 15 April 2009
- 2:00 pm
- Fairview #413_OB2
7. Finger cut - using grinder

- MTI
- Left index finger cut from contact with grinder wheel
- Laceration
- 1 stitch
- 16 April 2009
- 2:00 pm
- Big Lake #89
8. Hand cut - caught by hose

- MTI
- Hand caught between hose and beam
- Fractured thumb & lacerations
- 6 Stitches
- 2:20 pm
- 22 April 2009
- Dawson Bend 3
9. Crushed fingers - loading truck

- MTI
- Left hand caught between combing rail & skid
- 2 broken bones in left ring finger and lacerations
- 2:50 pm
- 8 May 2009
- Tindilpie #8
10. Finger pinched – rigging down manifold

- MTI
- Finger pinched between pup joint and manifold connection
- Right index finger fractured below knuckle
- 1:15 pm
- 9 May 2009
- Donnabar #1
11. Fractured knuckle - struck by dropped tool

- MTI
- Hand caught whilst lowering tool through rig floor
- Fracture to knuckle on left hand
- 6:00 am
- 15 May 2009
- Fairview #284
12. Pinched finger – pinning mast

- MTI
- Finger pinched between pin and mast support base
- Fracture to left ring finger
- 7:30 pm
- 10 June 2009
- Huntly #1
13. Crushed finger – loading pipe

- MTI
- Finger crushed between pipe and beam
- Crushed & cut left index finger
- Stitches
- 2:15 pm
- 17 June 2009
- Tindilpie #9
14. Pinched finger – positioning flow pipe

- LTI
- Finger caught & pinched between pipe & handrail
- Crushed left finger
- 7:15 am
- 19 November 2009
- Dullingari # 36
15. Cut finger - rigging up displacement line

- MTI
- Finger caught between pipe and frame
- Cut finger
- 6 stitches
- 11:30 am
- 21 November 2009
2009 Wellsite Hand Injuries

Investigations conducted on all hand injuries...

- Total of 46 Root Causes identified (vs 26 in 2008)
- 36 of 46 (or 78%) Root Causes as Human Performance Difficulty
- 10 of 26 (or 22%) Root Causes as Equipment Difficulty
- Percentages support longstanding belief that 70% to 90% of accidents caused by human error
- But do we believe these figures? Is Equipment more at fault?
2010 Hand Hazard Identification Program

Hand Hazards broken up into 5 areas...

1. **Sharp** objects (abrasions, cuts, punctures)
2. **Thermal** areas (burns, scalds, severe cold)
3. **Pinch & crush** points (bruising, pinching, crushing, amputation)
4. **Rotating** parts (entanglement, drawing in, trapping, cutting)
5. **Other** (chemical, electrical, pressure, etc)

...to better focus on high frequency injury areas.
### Hand Hazard Identification Form 1

**Hand Hazard Focus:** **SHARP OBJECTS**  (with potential for abrasions, cuts, punctures)

<table>
<thead>
<tr>
<th>WHERE?</th>
<th>WHAT?</th>
<th>WHY?</th>
<th>SUGGESTED CONTROL(S)</th>
<th>HIERARCHY</th>
<th>DONE?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Muster Board</td>
<td>Bottom edge</td>
<td>Edge is sharp and may cut hand when mounting board on side of shack</td>
<td>a. Smooth off edges, b. Bend back edge and curl around c. Place Warning signs around the board</td>
<td>E</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>I</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A</td>
<td>✗</td>
</tr>
</tbody>
</table>

1

2

3

Santos Ltd   ABN 80 007 550 923
## Hand Hazard Identification Form 6

**Hand Hazard Focus:** ..................................................

<table>
<thead>
<tr>
<th>WHERE?</th>
<th>WHAT?</th>
<th>WHY?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Muster Board</td>
<td>Bottom edge</td>
<td>Edge is sharp and may cut hand when mounting board on side of shack</td>
</tr>
</tbody>
</table>

| 1             |               |                                                          |
| 2             |               |                                                          |
| 3             |               |                                                          |

---

**Date:** ........................................

**Well / Field Site:** ...........................................

**Rig / Work Team:** ............................................

**Number of Team Members:** ....................................

**Contact Person:** .............................................

**Time taken to complete:** ....................................

---

**Rev. No** | **Prepared By** | **Site Review** | **Technical/Eng Review** | **Approved by** | **Date**
-------------|-----------------|-----------------|--------------------------|-----------------|-------
0            | M Klingner     | Wellsite Field Safety Advisors | N/A               | T. Gouldie      | Jan 2010 |

---
2010 Hand Hazard Identification Program

Moved from one-page ‘Guideline’ to a detailed ‘Work Instruction’…

Guidelines for Use of Hand Hazard ID Forms

Hand injuries continue to occur too frequently in well site work, with many of them caused by hazards which have not yet been identified.

While we should continue to make workers aware of all the hand injury risks, and should also continue to select, use and maintain appropriate gloves to protect our hands, we should also do what we can to identify all the existing hand hazards in our workplace to allow us to control them effectively.

To focus on Hand Hazard Identification, a suite of forms has been developed to cover the following specific hand hazard areas:

1. Sharp objects (abrasions, cuts, punctures)
2. Thermal areas (burns, scalds, severe cold)
3. Pinch points (bruising, pinching, crushing)
4. Rotating parts (entanglement, trapping, cutting)
5. Electrical (shocks, burns)
6. Pressure (pressure puncture, cutting, burn, abrasion)
7. Chemical (poisoning, burn, rash, skin irritation)

Each Hand Hazard Identification Form includes prompts for Where? What? Why? Suggested Controls and whether the controls have been put in place.

The intent of an independent Hand Hazard Identification Form for each hazard type is to allow a concentrated focus on that one hazard area rather than a broad based approach.

The Forms should be used for conducting hazard hunts using the following suggestions:

1. Only one of the risk areas (sharp, electrical, etc) should be selected for each hazard hunt so that hazard hunt teams are focussed.
2. Teams of 3 to 4 people maximum should be used to make sure easy communication among the team. If you have more people, set up multiple teams rather than making bigger teams.
3. Each team should use only one form to capture the hazards identified. Assign one person as the scribe while the others focus on identifying hazards.
4. Try to use a structured, systematic method to identifying the hazards, such as starting on the left and moving right, or starting at the bottom and working up.
5. Each hazard hunt should be limited to a relatively small section of the worksite to provide further focus on the hazards in that small area.
6. Sometimes aids can be used to help identify hazards, such as thermometers for hot areas, gauges for pinch points, small cloths for finding sharp areas, etc.
7. As many controls as possible should be listed for each hazard identified.
8. Time to complete the hazard hunt will depend on the worksite, but at least 20 minutes should be allocated, plus about 10 minutes for writing up the results.
9. After the initial hazard hunt and capturing those hazards on the form, revisit the area to double check that all the hazards of that type have been found.
10. A different hazard area and form should be used for the next hazard hunt, or a new team can re-survey using the same form if need be.

The overall results should be captured in Santos’ EHS Toolbox as an inspection and/or the contractors’ hazard register system.

Tom Gouldey
Operations Integrity Engineer
30 January 2009

© Hands & Fingers 2009 Hand Safety hazard identification Program/Guidelines for use of Hand Hazard ID Forms Rev 0.doc
5 Guidelines for each Hand Hazard Category

Hazards to hands and fingers has been categorised into several areas to allow focus on each type of hazard. Hazards can arise if hand or fingers come into contact with the hazard through intention or accident:

- People can trip and grab a sharp edge or hot tubing to break their fall.
- People reaching for a tool can scrape across a sharp edge.
- People near a rotating shaft can inadvertently catch their glove in the shaft.

Guidelines in conducting Hand Hazard Identifications in each Category are given below:

Form 1 - Sharp Objects

Sharp objects can include sharp points, edges and catch points which are capable of causing punctures or lacerations to the hands or fingers. Look for imperfections, burrs, sharp edges, ends of screws or nails, etc. while conducting this Hand Hazard Identification.

NO direct contact with any of these potential hand hazards should be made by any team members while conducting the Hand Hazard Identification. Team members conducting this Hand Hazard Identification should consider wearing a pair of general purpose work gloves along with any other site specific protection to ensure safety is maintained.

The Hand Hazard Identification Kit includes pieces of cloth. Use the cloth to identify sharp areas and catch points by draping and dragging it along exposed surfaces. Hand hazards can be identified by the cloth snagging or ripping due to contact with a specific section of the exposed surface.

Form 2 - Thermal Hazards

Thermal hand hazards consist of either hot and cold areas or objects. International Standard ISO 13783 parts 1 and 3 define hot and cold surfaces as capable of causing damage to the body from instantaneous contact at the temperatures given in Table 1.

Table 1: Hazardous Hot & Cold Surfaces Capable of Causing Immediate Injury (ISO 13732-1.3)

<table>
<thead>
<tr>
<th>Material</th>
<th>Hot Surface Temperature (°C)</th>
<th>Cold Surface Temperature (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uncoated Metal</td>
<td>75 or higher</td>
<td>-20 or lower</td>
</tr>
<tr>
<td>Ceramics, Glass, Stone</td>
<td>90 or higher</td>
<td>-25 or lower</td>
</tr>
<tr>
<td>Plastics</td>
<td>99 or higher</td>
<td>NA</td>
</tr>
</tbody>
</table>

The same standards also describe that surfaces at the following temperatures are capable of causing damage to the human body if direct contact is maintained for 15 seconds.

Table 2: Hazardous Hot & Cold Surfaces Capable of Causing Injury Within 10 Seconds (ISO 13732-1.3)

<table>
<thead>
<tr>
<th>Material</th>
<th>Hot Surface Temperature (°C)</th>
<th>Cold Surface Temperature (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uncoated Metal</td>
<td>69 or higher</td>
<td>-12 or lower</td>
</tr>
<tr>
<td>Ceramics, Glass, Stone</td>
<td>70 or higher</td>
<td>-18 or lower</td>
</tr>
<tr>
<td>Plastics</td>
<td>75 or higher</td>
<td>NA</td>
</tr>
</tbody>
</table>

Appendix C: Australian Standards Documentation

C.1 AS 4024.1801-2006: Safety Distances to Prevent Danger Zones Being Reached by the Upper Limbs

Table C1: Reaching Through Opening Standards for Persons Greater Than 14 Years Old (AS 4024.1801-2006)

<table>
<thead>
<tr>
<th>Part of body</th>
<th>Opening</th>
<th>Safety distance (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Slot</td>
<td>Square</td>
</tr>
<tr>
<td></td>
<td>6 &lt; ε ≤ 8</td>
<td>≥ 20</td>
</tr>
<tr>
<td></td>
<td>8 &lt; ε ≤ 10</td>
<td>≥ 80</td>
</tr>
<tr>
<td></td>
<td>10 &lt; ε ≤ 12</td>
<td>≥ 100</td>
</tr>
<tr>
<td></td>
<td>12 &lt; ε ≤ 20</td>
<td>≥ 120</td>
</tr>
<tr>
<td></td>
<td>20 &lt; ε ≤ 30</td>
<td>≥ 850</td>
</tr>
</tbody>
</table>

Note: If the length of the slot opening is less than or equal to 65 mm, the thumb will act as a stop and the safety distance can be reduced to 200 mm.


Table C2: Minimum Gaps to Prevent Crushing of Fingers & Hands (AS 4024.1803-2006)

<table>
<thead>
<tr>
<th>Part of Body</th>
<th>Minimum Gap (mm)</th>
<th>Illustration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hand</td>
<td>100</td>
<td>Fist</td>
</tr>
<tr>
<td>Wrist</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finger</td>
<td>25</td>
<td></td>
</tr>
</tbody>
</table>

Rev. No: 0  Prepared By: M. Stagner  Site Review: WorkSafe Field Safety Advisors  Technical/Eng Review: N/A  Approved by: T. Goudie  Date: Jan 2010

WI-813-007 Hand Hazard Identification Rev 0.doc
The Hand Hazard Identification Toolkit

- Universal systematic approach to identify hand hazards
- Designed by Santos, using Australian & International Standards
- Tools to identify:
  - Sharp & Catch Points
  - Thermal Hazards
  - Hand & Finger Crush Points
  - Deficiencies in machinery guarding for Danger Zones
- Markers and stickers to indicate ‘hazardous’ or ‘safe’

Contents of Wellsite Hand Hazard Identification Toolkit Version 2
2010 Hand Hazard Identifications

- Hand Hazard Identifications reviewed from 6 companies
- A total of 287 hazards identified from 109 forms completed
- More than 390 controls suggested, 44% were immediately implemented
- 72% of controls suggested were ‘low order’
  - “watch out” or “follow procedure” or “wear proper PPE”
- Higher order controls need to be used
Using ID Toolkit: Pinch, Crush & Sharp

→ Re-orientate handles
→ Extend pipe section to move handles further away
→ Bring handle out further in front
→ Flip valve around
→ File down sharp edges
→ Fill gaps with rubber compound
Using ID Toolkit: ‘Spot The Hazard’

- 4 Thermal Hazards
- 3 Sharp Hazards
- 9+ Pinch & Crush Hazards

wellsite
HAND SAFETY

Santos
Wellsite Hand Safety Working Group

Tom Gouldie
Drillsafe
3 June 2010
Wellsite Hand Safety Working Group

Focus on and share hand safety info...

- Met for the 4th time in Brisbane, 9 March 2010
  - Previously met on 8 Apr, 16 Jun & 23 Nov 2009
  - Alternate between Adelaide & Brisbane, for safety professionals

- Attention for Meeting #4:
  - Review improvements to Hand Hazard ID Program
  - Set Focus Areas for 2010 Hand Safety Management Plans
Wellsite Hand Safety Working Group

Results of Meeting #4…

- 26 attendees all together (19 in person, 7 on telephone)
  - Representing 14 contractors + Santos staff from Adelaide & Brisbane

- Consensus that ‘premium gloves’ make a big difference
  - Both in protection and in ‘safety attitude’
  - Get a group together to purchase large volume gloves?

- We need a consistent knife rationale and policy
  - General agreement that “No-knives” should be the default

- Hammers, flogging spanners, flange makeup still an issue

- Have a separate ½ day Hand Safety Forum? No.

- Hand Hazard ID important, dedicated team?
Received around 25 Hand Safety Management Plans from wellsite contractors in 2009

Reviewed these Plans to find good practices in the 5 Areas we agreed we should address:

1. Awareness and Training
2. “Hands Off” Program
3. Glove Selection and Use
4. Finding Hand Hazards
5. Use of Hand Tools
Summary: Learnings from 2009 Plans

• Make your Plan specific to your people and your activity

• Emphasize more on finding and fixing hand hazards

• Need more focus on non-powered hand tools

• Appoint “hand safety champions” who become specialists in hand hazard identification and control

• Use long term/whole of life thinking in selection of gloves, seriously consider ‘premium’ gloves

• Audit to see if Plan is being followed
2010 Hand Safety Management Plans

Areas addressed in 2010 Plans…

1. Hand Hazard Identification
   - “Do it once, do it well…”, look at sharing resources

2. Hand Tool Use
   - Knife policies & procedures, justify use of knives
   - Use of hammers, flogging spanners, making up flanges

3. Selection and Use of Gloves
   - Whole of life approach, increase use of ‘premium gloves’

4. “Hands Off” Program
   - “How to keep hands out of danger”

5. Hand Safety Awareness
   - Behaviours, procedures, posters, stickers, campaigns
Questions?

Tom Gouldie
Drillsafe
3 June 2010