Phil Jarrell, Growth Director
Plant & Personnel Safety
June, 2017

PLANT & PERSONNEL SAFETY
Reducing Risk
Your Presenter Today

• Phil Jarrell is the Global Growth Director for Plant & Personnel Safety at Honeywell Process Solutions.

• Phil’s team is responsible for bringing Honeywell’s wide range of P&PS offerings to HPS customers with the goal of reducing Safety and Security risks to their businesses.

• Phil earned a BS in Chemistry and MS in Chemical Engineering both from The University of Alabama.

• He has over 30 years experience serving end-users in and suppliers to the Oil & Gas, Refining, Chemicals, Mining/Minerals and other process industries. His roles include Research Engineering, Operations, Sales, Business Development and Program Management and Marketing.
Plant & Personnel Safety - Reduce Risks and Costs to ALARP

1. External factors
   - Regulations, Incidents, Corp Goals
2. Drive Corporate HSSE/PSM\(^{(2)}\) to
   - Do Risk Assessments
3. In order to...
   - Identify Top Risks
4. Which then...
   - Develop LOP\(^{(3)}\) Projects
5. After Which...
   - Require ongoing Validation
6. And periodically...
   - Refresh Risk Assessments

(1) As Low As Reasonably Practicable
(2) Health, Safety, Security, Environmental / Process Safety Management
(3) Layers of Protection
Plant & Personnel Safety Risk Assessment & Design

Process Safety Lifecycle

1. Hazard and risk assessment
   - CSFE Assessment
   - Facilitators
   - PHA / HAZOP Docs
   - Action Tracking

2. Allocation to protection layers
   - CSFE LOPA, SIL Study
   - Facilitators
   - LOPA Docs
   - SIL Calls, Docs

3. SIS Safety Reg’d Spec
   - TUV-certified Functional Design
   - SRS Docs

4. SIS Design & Engineering
   - TUV-certified Detailed Design
   - Design non-SIL IPL’s and other risk-reduction measures

   - (e.g. Operator Alarms/Actions, BPCS interlocks)
   - Controls Design
   - IPL Design Specs

5. IEC-61511
   - IEC Requirements
   - Eng’g Services Deliverables

Emergency Response Standard Operating Procedures

- 4.0 EMERGENCY RESPONSE PLAN
  - 4.1 Fires and/or Explosions
  - 4.2 Hazardous Chemical/Vapor Release
  - 4.3 Confined Space Rescue
  - 4.4 Pipeline Incidents
  - 4.5 Bomb Threats
  - 4.6 First Aid
  - 4.7 Fence Line Monitoring
  - 4.8 Hazardous Materials Decontamination
  - 4.9 Hurricane/Severe Weather
  - 4.10 Severe Weather Checklists
  - 4.11 Injury/Illness Form
  - 4.12 Injury/Illness - Incident - Release Form

Cybersecurity Assessments

Personnel Safety Compliance
Integrated Control and Safety Systems

4 LOP Projects
5 Require ongoing Validation

Design non-SIL IPL’s and other risk-reduction measures (e.g. Operator Alarms/Actions BPCS interlocks)

Controls Design
IPL Design Specs

Stage 1
Stage 2

SIS Safety Req’t Spec
TUV-certified Functional Design
SRS Docs
Clauses 10/12

SIS Design & Engineering
TUV-certified Detailed Design
Design Specs / C&E / Test Docs
Clauses 10/12

SIS Implementation
TUV-certified & I&C Engineers
As-Built Updates to All Docs
SIL2/3 SIS, SW, Instruments
Clauses 14/15

Non-SIS Implementation
I&C Engineers
As-Built Updates to All Docs
BPCS, SW, Instruments
Clauses 14/15

Stage 1
Stage 2

Integrated Control and Safety Systems

LOP Projects

4 Require ongoing Validation

Process-Safety Protection Layers Prevent and/or Mitigate Process Hazards
Fire And Gas Systems For Process Industry

F&G components for the process area (1, 2, 3) - ISA TR 84.00.07

- Detect
  - Gas detectors
  - Flame detectors
  - Pull stations/Call points

- Control
  - Example - Safety Manager, HS-81
  - Suppression & Releasing

- Respond
  - Dry Powder
  - Expansion foam
  - Water Curtains
  - Annunciation Devices

F&G components for the process area 4
Control room and Admin building – NFPA 72

- Detect
  - Smoke detectors
  - Aspiration detectors
  - Pull stations/Call points

- Control
  - Example – XLS / Notifier
  - Suppression & Releasing

- Respond
  - Speakers
  - Beacons & Horns
  - ESD
  - LED Signs
  - Graphic Package

Both Prescriptive and Performance-Based Methods
Enable Real-time Decision Making for Worker Safety and Productivity
Connected Worker: Noise Exposure

Cloud Analytics

- Capture employee noise-exposure data
- Capture employee hearing-test data
- Quantify exposure across sites
  - Increase operational efficiency
  - Identify differences among sites
  - Identify ways to reduce risk

Cloud Data Consolidation

- Track employee exposure over time, job functions, etc.

Real-time dashboards

4 LOP Projects

5 Require ongoing Validation
Personnel Safety – Compliance Management

Opportunity

• Ensure employees & contractors are ready for the job

Solution

Work Order for hot work, confined space, heights, etc.
Employee & Contractor Personnel badge in at job site

Cloud-based Compliance Manager

Match job-task PPE & Training requirements to those of assigned personnel

Value

• Real-time validation of worker readiness at permit sign-off
  - Check assigned PPE fit for use based on RFID scan and records
  - Check employment-training requirements for assigned job
Personnel Safety – Organizational Readiness

- Confirm individuals are qualified for job
- Track overall equipment inventory & readiness
- Aggregate multi-site data
  - Identify best practices
  - Reduce enterprise risk
  - Reduce non-productive time

- Real-time dashboards
- Equipment-inspection requirements & records
- RFID-tagged Equipment Assignment
- Employee-training requirements & records
- LOP Projects
  - Require ongoing Validation

Cloud Analytics
Cloud Data Consolidation

LOP Projects
5

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Plant Security

REMOTE ASSETS
Pipeline/Land/Marine Extended Boundaries

INTELLIGENT VIDEO
Surveillance & Assessment Process / Security

INTEGRATED ENTERPRISE-WIDE ICSS & SECURITY MANAGEMENT

PERIMETER
Deterrent/Visual Boundaries

PERIMETER
Intruder Detection Monitoring

LIGHTING
Deterrent/Visual Surveillance

ACCESS CONTROL
Smart Cards & Biometrics Accountability

Integrate LOPs Via Experion Integration Suite
End-to-End Cyber Security Solutions

- Current State Analysis
- Secure Design and Optimization
- Zone & Conduit Separation
- Policy and Procedures
- Firewall, Next Gen Firewall
- Intrusion Detection & Prevention
- Access Control
- Industrial Patching & Anti-Virus
- Industrial Application Whitelisting
- End Node Hardening
- Portable Media/Device/USB Security

- Backup and Recovery
- Incident Response Planning
- Incident Response: On Site & Remote
- Forensics & Analysis
- Continuous Monitoring
- Compliance & Reporting
- Cyber Security Risk Manager
- Security Information & Event Management (SIEM)
- Awareness & Training

- Assessments & Audits
- People Process Technology
- Endpoint Protection
- Situational Awareness
- Response & Recovery
- Architecture & Design

Additional Disclaimers As Needed (Consult Legal)
**Plant & Personnel Safety - Reduce Risks and Costs to ALARP(1)**

1. **External factors**
   - Regulations, Incidents, Corp Goals

2. **Drive Corporate HSSE/PSM(2)**
   - Do Site Risk Assessments

3. **In order to…**
   - Identify Top Risks

4. **Which then…**
   - Develop LOP(3) Projects at Sites

5. **After Which**
   - Assessments Prioritize Risks for Reduction

- **Step 2 is when you get in early on Projects!**

- **Assessments Prioritize Risks for Reduction**
  - Compliance Monitoring
  - Maintains Risk Reduction

- **And In Spite of All This…Incidents Occur and We Must Respond!**

(1) As Low As Reasonably Practicable

(2) Health, Safety, Security, Environmental / Process Safety Management

(3) Layers of Protection

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**Key Topics**

- DCS/SIS
- Process Fire & Gas
- Connected Worker PPE
- Compliance Management
- Site Security
- Cyber Security
- Emergency Response
- Training
- Temporary Situations
  - Turnaround Safety/Security
  - Startup/Shutdown
  - Post-Incident Analysis
- And more…

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## Typical Emergency Response Organization

<table>
<thead>
<tr>
<th>Corporate Leadership</th>
<th>Site ERT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Corp HSE</strong></td>
<td><strong>Crisis Manager</strong></td>
</tr>
<tr>
<td>VP HSE</td>
<td><strong>Environmental EOC Management Team</strong></td>
</tr>
<tr>
<td>VP Ops &amp; HSE</td>
<td><strong>Incident Commander</strong></td>
</tr>
<tr>
<td>VP HSE</td>
<td><strong>Security EOC</strong></td>
</tr>
<tr>
<td>Director HSE</td>
<td><strong>Decon Team Leader</strong></td>
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<tr>
<td></td>
<td><strong>Control Point</strong></td>
</tr>
<tr>
<td><strong>Site Mgmt</strong></td>
<td><strong>Entry Team Leader</strong></td>
</tr>
<tr>
<td>VP HSE</td>
<td><strong>Control Point</strong></td>
</tr>
<tr>
<td>Plant Manager</td>
<td><strong>Safety Control Point</strong></td>
</tr>
<tr>
<td>Site Manager HSE</td>
<td><strong>Safety Control Point</strong></td>
</tr>
<tr>
<td>Operations Manager</td>
<td><strong>Offsite Emergency Services (Fire, EMS)</strong></td>
</tr>
<tr>
<td><strong>Site Team</strong></td>
<td><strong>Decon Team Control Point</strong></td>
</tr>
<tr>
<td>Emergency Response Team</td>
<td><strong>Control Room</strong></td>
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<tr>
<td></td>
<td><strong>Control Room</strong></td>
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<tr>
<td></td>
<td><strong>Control Room or Control Point</strong></td>
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<tr>
<td></td>
<td><strong>Backup Team Control Room or Control Point</strong></td>
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<tr>
<td></td>
<td><strong>Government</strong></td>
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<td></td>
<td><strong>EOC</strong></td>
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<tr>
<td></td>
<td><strong>Decon Team Control Point</strong></td>
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<td></td>
<td><strong>Control Room</strong></td>
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<td><strong>Media Release</strong></td>
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<td><strong>Preparation EOC</strong></td>
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<td></td>
<td><strong>Records/Boards</strong></td>
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<tr>
<td></td>
<td><strong>EOC Management Team</strong></td>
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<tr>
<td></td>
<td><strong>Medical Officer</strong></td>
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<tr>
<td></td>
<td><strong>Medical Office</strong></td>
</tr>
</tbody>
</table>
Leadership Wants Better Visibility And ERT Needs More Effective Response!

Typical Emergency Response...

<table>
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<tr>
<th>Corporate Leadership</th>
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<tbody>
<tr>
<td>VP</td>
<td>Crisis Manager EOC Management Team</td>
</tr>
<tr>
<td>Site Mgmt</td>
<td>Communications EOC Management Team</td>
</tr>
<tr>
<td></td>
<td>Environmental EOC Management Team</td>
</tr>
<tr>
<td></td>
<td>Incident Commander EOC Management Team</td>
</tr>
<tr>
<td></td>
<td>Security EOC Security Personnel</td>
</tr>
</tbody>
</table>

- **Checklist A** - MTW-CHK-EPIP-0003A, Crisis Manager Responsibility Checklist
  - **Checklist B** - MTW-CHK-EPIP-0003B, Incident Commander Responsibility Checklist
  - **Checklist C** - MTW-CHK-EPIP-0003C, Communication Officer Responsibility Checklist
  - **Checklist D** - MTW-CHK-EPIP-0003D, Security Officer Responsibility Checklist
  - **Checklist E** - MTW-CHK-EPIP-0003E, Environmental Officer Responsibility Checklist
  - **Checklist F** - MTW-CHK-EPIP-0003F, Entry Team Leader Responsibility Checklist
  - **Checklist G** - MTW-CHK-EPIP-0003G, Control Room Officer Responsibility Checklist
  - **Checklist H** - MTW-CHK-EPIP-0003H, Safety Officer Responsibility Checklist
  - **Checklist I** - MTW-CHK-EPIP-0003I, Medical Officer Responsibility Checklist
  - **Checklist J** - MTW-CHK-EPIP-0003J, Plant Emergency or Alert Security Officer Actions (YELLOW)
  - **Checklist K** - MTW-CHK-EPIP-0003K, Site Area Emergency Security Officer Actions (RED)

4.0 **EMERGENCY RESPONSE PLAN**

4.1 Fires and/or Explosions
4.2 Hazardous Chemical/Vapor Release
4.3 Confined Space Rescue
4.4 Pipeline Incidents
4.5 Bomb Threats
4.6 First Aid
4.7 Fence Line Monitoring
4.8 Hazardous Materials Decontamination
4.9 Hurricane/Severe Weather
4.10 Severe Weather Checklists
4.11 Injury/Illness Form
4.12 Injury/Illness - Incident - Release Form
Emergency Response With Command & Control Suite

Command Wall Gives Visibility And Command Station SOPs Improve Response
We Live in Your World

- We are the **ONLY** Automation Supplier that owns, operates and licenses process plants
- We deal with the same risk issues you do
- We help write the safety standards (e.g. NFPA, ISA, IEC, NERC)
- We can test our offerings internally

We Have a Truly Unique Perspective!