Walk the Line
Industry Workshop

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AFPM Focused Improvement Group
IAH Airport Marriot, Houston TX
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Agenda

- Opening remarks & introductions – Jerry Forest, Celanese
- APS background and safety portal introduction – Lara Swett, AFPM
- Walk the Line – Jerry Forest
  - What is Walk the Line
  - How to roll out Walk the Line
- Roundtable exercise – all attendees
  - How is your company using Walk the Line?
  - What works, what doesn’t work?
  - What help do you need?
- Open discussion and questions – all attendees
- Path forward for industry
  - New topics and practice sharing documents
  - Tracking our progress
  - Next meeting

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APS Background – Safety Portal Introduction
Lara Swett

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What is Walk the Line?
Data indicates that between 25 – 40% of all loss of primary containment incidents in our industry have causes related to valve left open or improper line-up

The most fundamental thing that operators do is turn valves, start pumps, and line-up equipment. These tasks must be performed with 100% accuracy

Walk the Line (WTL) is providing the tools operators need to accurately line-up equipment and know with certainty where energy flows each time they touch equipment

Start WTL by setting a goal of zero line-up incidents
Walk the Line, addresses line-up incident causes with a 3 point strategy:

- Set the expectation for WTL and constantly reinforce (culture)
- Operational continuity with operational discipline
- Operational readiness

Walk the line goes beyond a root cause of “operator error” and attempts to determine why the error was made. WTL addresses the human reliability causes of line-up errors
Question:
Do I have to literally Walk the Line each time I make a move?

Answer:
If you don’t know where the energy will flow with 100% certainty, then YES.

Answer #2:
Walk the Line will help you understand the current operating state of the manufacturing unit without a physical walk down.
What’s Behind Walk the Line
A Conduct of Operations Model

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Definitions

► Conduct of Operations – concerns how work is done in a manufacturing unit to produce consistent results
► Operating Discipline – the tools operators use to produce consistent, repeatable results
► Operational Continuity – the things operators do between and among shifts to ensure consistent results
► Operational Readiness – the things operators do to ensure equipment is safe and ready for service

Discipline – To train someone to get repeatable results
How WTL Works: The Gumbo Theory

In order to make a really good gumbo:

- Start with a great recipe
- Check that you add the right ingredients the same way each time
- Enjoy consistent results!

The Gumbo Theory Applied to Making Chemicals...

- Develop & train on procedures, forms & checklists
- Check the work
- Get repeatable results!
Conduct of Operations & Discipline

Operators
DO Things

Engineers
CHECK Performance

Eng. & Mgrs.
ACT On Data

Managers
PLAN For Success

Consistency in Performance
Repeatability of Results

Operational Discipline

Management Discipline

Engineering Discipline
PERFORMANCE = f (WHAT, HOW, WANT)

Tell Operators WHAT To Do
- Define roles & responsibilities
- Procedures
- Dialog

Ensure they know HOW To Do It
- Education
- Experience
- Training

Help them WANT To Do It
- Right Tools
- Right Person/Right Job
- Rewards
Good Practices in Operational Discipline

Operators
DO
Things

- Show up Dressed/ PPE
- Shift Relief – from shift log
- Shift Log – use form
- Tailgate – relevant dialog
- Evaluation Rounds – operators evaluate equipment
- Sample Collection – evaluation
- And others

Each activity is *evaluated* through engineering and management discipline, *documented*, affected people are *trained*, and performance is *monitored*. 
Good Practices in Engineering Discipline

**Check**
- Daily Accountability Checks
  - Shift Relief
  - Shift Logs
  - Operating instructions
  - Evaluation Rounds

**Act**
- Abnormalities Reported
  - Key Performance Indicators
  - Safe Operating Limits
  - SOP/ MOC/ PSI
  - etc.

Eng. & Mgrs.
**ACT**
On Data

Engineers
**CHECK**
Performance

Engineering Discipline
Managers PLAN For Success

**WHAT**
- Daily review of incidents and act on data
- Procedures/ SOP’s define who does what
- Communication boards

**Act on Data**

**Plan for Success**

**Eng. & Mgrs. ACT On Data**

**How**
- Proper training

**WANT**
- Housekeeping
- Minimize distractions
- Let people know about a job well done
Conduct of Operations & Discipline

**Operators**
- **DO** Things

**Eng. & Mgrs.**
- **ACT** On Data

**Managers**
- **PLAN** For Success

**Engineers**
- **CHECK** Performance

Consistency in Performance
Repeatability of Results

Operational Discipline

Management Discipline

Engineering Discipline
Set the Expectation to Walk the Line & Constantly Reinforce it

Develop a Culture of Walk the Line
Communicate, Communicate, Communicate

Corporate/ Plant Activities

► **Newsletters & e-mail** – to set the expectation, communicate goals, educate the organization on the tools
► **Training** – develop formal training programs for new hires, certification and recertification, and refresher
► **Toolbox tools** – to keep it fresh
► **Videos** – attention grabbers, keep it fresh

Unit/ Site Activities

► Train FLS on how to set the expectation and reinforce
► WTL can be reinforced each shift in:
  - Pre-job planning
  - Toolbox meetings
  - Commissioning talks
  - Field walk through
  - Operating instructions
  - Frequent dialog with operators throughout the shift

It takes time to change the culture
Newsletters help send a consistent message of what is important to the organization.

Set a regular schedule (e.g. every 2 weeks.) Develop the list of topics

Keep it to 1 page

Encourage the use at toolbox/tailgate meetings

Consider dedicated WTL bulletin boards
Training Packages

AFPM tools include 3 training templates

New Hire – Train operators on all of the tools used in WTL

Refresher – Have periodic refresher training, more frequently the first 3 years of the program

Certification & Recertification – programs should have WTL elements

Train on the WTL tools

Use AFPM tools as is, or as templates for your own training
AFPM tools include 10 Toolbox Topics

Engage operators in Lessons Learned Discussions

*What Would You Do* templates describe an incident with WTL causes. FLS and operators discuss. Afterwards, pre-defined suggestions for improvement are given.
AFPM has 2 Celanese videos posted on the safety portal
We all improve by sharing

Find creative ways to reinforce the expectation
Operational Continuity
Tools for consistent results

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A Day in the Life of an Operator

Operating Discipline Tools

1. Show up, outfit for work
   - Fully outfitted prior to relief

2. Make relief in the field
   - Use shift notes, checklists to cover WTL

3. Shift change meeting
   - Always has a WTL section for the days activities

4. Informal round
   - Operating instructions
   - Visual observation of relief topics WTL section in instructions

5. Issue permits
   - Discussion with maintenance on WTL topics for work & line-break

Operating Discipline Tools / Operational Readiness

1. Evaluate equipment
   - Evaluate open ends, equipment line-up, critical bleeders

2. Complete logs
   - Pre-defined WTL sections

3. Operate equipment
   - Two-way communication, line-labeling, and Walking the Line

4. Start-up equipment
   - Commissioning, startup procedures, independent verification

5. Make relief
   - Discuss the days activities, line-ups, and WTL situations

Introduce discipline into each task with pre-defined WTL checklists
AFPM Tools include Practice Sharing & Haz ID

- Takes place on the job, fully outfitted
- Be aware of noise and distractions
- Provide adequate time
- Use a checklist with a walk the line section
  - Describes activities that change the line-up
  - Discuss each item regardless of if it is affected or not
  - Discuss condition found and action taken

Proper shift relief provides an excellent picture of how the unit line up changed from the previous shift
Shift-Change Meetings

- Takes place at the same time/location each shift
- Discuss incidents from previous shift, highlight WTL causes
- Work activities for the oncoming shift are discussed with emphasis on critical line-ups, potential open-ended lines, and equipment startup activities – *Always* discuss operator line-up and WTL
- Use the same agenda – this helps introduce discipline

**PRACTICES SHARING**

*Shift Change Meeting*

*Purpose and Use:*
The goal of Walk the Line is to eliminate loss of primary containment incidents due to errors in equipment line-up including open-ended lines. These incidents most frequently occur during transient operating states including startup, and returning equipment to service. A main premise of Walk the Line is that improvement is seen when we build a culture that equipment must be lined up correctly 100% of the time. This is accomplished by setting the expectation and constantly reinforcing it.

This Practice Sharing Document describes an opportunity for the front line supervisor to set the expectation for accuracy in equipment line-up, and reinforce it each shift in the shift change meeting.

Shift change meetings are a perfect opportunity to open a WTL dialog between FLS and operators
Informal Rounds / Unit Walk Through

An informal round is a unit walk through that allows an operator to visually inspect items discussed during the shift change meetings.

1. Validate that sample station valves are closed and capped
2. Review P1 A/B valves and bleeders
3. Review P2 A/B valves and bleeders
4. Review P3 A/B valves and bleeders
5. Note T3 Reflux bypass valve position
6. Note T2 on line filter line-up and bleeder positions
7. Review T1 Nitrogen purge connection
8. Verify dike drain is locked closed
9. Review product tank manifold line-up

- Map the route
- Identify key items for inspection
  - Sample points
  - Critical bleeders
  - Filters/strainers
  - Frequently operated valves
- Include in SOP
- Include in Training
Operating instructions often give guidance to operators on preparing equipment for maintenance – a perfect time to highlight line-up

- Use a checklist
- Note special line-up situations, samples, equipment prep., startup, MOC, etc.; those items that could give rise to a WTL cause
- Unit personnel should give positive verification that they have read and understood instructions (initial/date)
Permits

- Issued in the field at the job site
- Discussion of WTL between maintenance and equipment owner
- Special attention to contractors and non-routine work
- Special attention to decontamination verification and first line-break
- Field verify isolation, valve positions, bleeders, etc.

Common sense permitting reduces WTL causes
Structure evaluation sheets so that:

- Physically evaluate open ends, valve positions, etc. that affect energy control
- Include notes for abnormal evaluation and what was done to correct
- Positive verification for all unit personnel
- Follow-up action for abnormal conditions

Map the Route – similar to informal rounds

Action is triggered with evaluation rounds - failure to take action normalizes deviation
### Shift Notes/ Shift Change

<table>
<thead>
<tr>
<th>Operator Shift Notes - Walk the Line Section</th>
<th>Yes</th>
<th>No</th>
<th>Description of Action Taken on Shift</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abnormal Line-ups</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equipment bypassed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equipment out of service</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Special samples taken</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unscheduled equipment outage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tests completed on shift</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MOCs/ PSSRs completed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Special operating instructions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abnormal transfers completed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emerging problems/ troubleshooting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other situations that changes equipment line-up</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Use a checklist – complete throughout the shift
- Note special line-up situations, samples, equipment prep., startup, MOC, etc.; those items that could give rise to a WTL cause
- Unit personnel should give positive verification that they have read and understood instructions (initial/date)

Shift notes are a record of what happened on shift and is a primary source of accurate information necessary for operational continuity.
Critical Bleeders

- Formal methodology to identify critical bleeders
- Clear identification
- Document inspection

Formal Plug Programs

- Free issue of plugs
- Formal documented inspection programs by operators
- Training

Spring Loaded Valves

- Consider engineered devices that ensure positive shutoff
- Consider oval handles

Equipment design can help reduce WTL causes
Formal line labeling can be part of operator training

- Formal program to label lines
- Direction of flow, material content, to and from location
- Pipe spec
- Other useful information
Abnormal Events Reporting

- Identify and list what constitutes significant and abnormal events & train operators on how to report
- Abnormal events should be recorded for operational continuity
- Provide operators with authority to act
- Examples
  - Near Miss/ incidents
  - Critical alarms, safety critical equipment
  - Bypasses, interlock, SIS activation
  - Incoming community calls
  - Other abnormal conditions & events
Operational continuity must include return to work

► Positive verification since last day reviewed for:
  – Instructions
  – Shift notes
  – Evaluation rounds
  – MOCs, bypass boards, PSSRs, and other

► Give operators time to review material on return to work

Help operators understand the current operating state of the unit
Paper or Computer for WTL Tools?

**Computer**

Pros
- Easy to collect and analyze data
- Hand-held field devices easily programmed
- Content as good as the preparation and programming

Cons
- Hard to verify return to work review
- Might reduce critical thinking with copy/paste
- Do engineers/managers really get involved with review?

**Paper**

Pros
- Easy for review and return to work
- Operators must put critical thought into content

Cons
- Controlled copy should be kept and used as PSI
- Should be printed each shift
- Operators must be trained on proper completion (legibility, completeness, etc)

Consider hybrid computer/paper systems
“We already do that here”

► Watch out for the “We do that here” attitude
► Do you really have these practices in place?
► Do the practices include a Walk the Line discipline?
► Is training in place?
► Are the practices monitored for effectiveness?
► Does management follow-up on deficiencies?

Audit WTL (Conduct of Operations) practices that have been in place for a long time, and correct deficiencies
Operational Readiness
Equipment turnover to maintenance
Verification after maintenance
Independent verification after maintenance
Checklist SOP’s
Commissioning
  - P&ID walk-downs
  - Soap tests
  - He testing, solvent batching, etc
PSSR
MOC/ PSSR Tags
Other?

Provide the tools for safe equipment startup
Checklist SOP

Practices Sharing

Checklist Standard Operating Procedure (SOP)

The development and these should be reviewed and validated on a set schedule. Training on how to complete a checklist should become part of operator certification/recertification.

Any process that changes the way operators perform work should be reviewed in an MOC process.

References
Figure 1 shows an example set of tasks that might be included in a checklist SOP, along with the expected sign-off.

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Equipment Description/Bleeder</th>
<th>Flow Sheet</th>
<th>Line No.</th>
<th>Nominal Position</th>
<th>Position Found</th>
<th>Position Left</th>
<th>Initial</th>
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</thead>
<tbody>
<tr>
<td>P-255 Bleeders</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Pump suction bleeder (1/2&quot;)</td>
<td>001S</td>
<td>X-010</td>
<td>Closed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Pump discharge bleeder (1/2&quot;)</td>
<td>001S</td>
<td>X-011</td>
<td>Closed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Pump discharge pressure gauge bleed valve (3/4&quot;)</td>
<td>003S</td>
<td>X-020</td>
<td>Closed</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 1: Hypothetical Checklist SOP

Other Resources:

Search "Walk The Line" on the AFBM Safety Portal

<table>
<thead>
<tr>
<th>Revision</th>
<th>Date</th>
<th>Summary of Changes</th>
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<tr>
<td>Initial</td>
<td>March 2016</td>
<td>Initial Version</td>
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<tr>
<td>WTL Subgroup Review</td>
<td>May 2015</td>
<td></td>
</tr>
<tr>
<td>PSW and Legal Review</td>
<td>May 2015</td>
<td>Final Version</td>
</tr>
</tbody>
</table>

- Must be in hand when used
- Each step initialed as completed
- Deviation from SOP requires MOC
- Show as found/as left & other comments
- Independent verification can be used as double check
Example Commissioning Tool

Introduce discipline to startup activities with formal documented commissioning programs. Discipline drives repeatable results.

P&ID Walk-down

- Use highlighters
- Becomes part of shift relief
- Positive verification of correct line-up, bleeders, plugs, etc.
- Also used for decon
Independent Verification

Two eyes are better than one

- Identify when independent verification should be used
  - Critical line-up
  - Complicated line-up
  - High risk start-up
  - Bypass equipment, removing a bypass
  - Some LOTO situations
  - Critical SOPs or tasks
  - PRD and other safety system startup

Can you think of more?

Should be **independent** and must **verify**
How to Roll out Walk the Line
1. Analyze your LOPC data
   - Identify where operator line-up errors occur
   - Determine if your investigations go beyond “operator error” and attempt to identify why operators left valve open
     - Expectation set & frequently reinforced?
     - Operators trained?
     - Conduct of operations in place for continuity of operations?
     - Start-up and return from maintenance tools in place?

Set a Goal of Zero LOPC’s due to Walk the Line
2. Change the Culture

- Recognize that it takes 3 – 5 years to firmly establish a culture change
- Set the expectation for Walk the Line & constantly reinforce it
  - Educate FLS & operator mentors
  - Make WTL a part of daily tailgate discussion between FLS & operator on upcoming work activities
  - Include in operator training, certification & recertification
  - Use various communication tools to reinforce – newsletters, videos, emails, toolbox topics, etc.
3. Use the Tools
   - Modify WTL culture tools (toolbox topics and training tools) to match your organization
   - Based on your RCA results, pick and choose which Conduct of Operation tools and Operational Readiness tools will have the largest impact at your facility
   - Implement the changes described by the tools, and watch performance improve!
Small group / concentrated meetings

► Choose an overall Conduct of Operations plant coordinator
► Choose a team consisting of operators, unit engineers, and an FLS
► Set a schedule and devote time for reviews – could take 3 to 4 weeks depending on unit complexity
► Gather preparatory materials: P&IDs, SOPs, existing shift notes, logs, instructions, communication boards, meeting formats, etc
► Consciously define a typical operators day
  – For each activity define what tool is appropriate and design a WTL section
► Special attention given to Evaluation Rounds.
  – Complete a line item P&ID review
  – Map the process
► Train affected employees, include annual refresher training
► Daily verification that tools are used correctly
Conduct of Operations Rollout
Method #2

Workshops/ use tools as needed

► Survey sites/ units with conduct of operations gap analysis
► Conduct 1 day workshop on Walk the Line with instructions on how to use pre-defined tools
► Let individual sites/units pick and choose the tools that are best suited for their needs, based on RCA analysis
► Monitor progress
Celanese used a non-mandatory rollout letting sites pick and choose tools. It is an ongoing process.
**Results at Celanese**

**RESULTS**
- Average 40% LOPC reduction per year
  - Driven by walk the line
  - Improved RCA contributes
- Average 50% LOPC reduction per year for WTL causes since implemented
Change the Culture

- Set the expectation for operator line-up and constantly reinforce it
- Getting the word out at various meetings
- Keeping Walk the Line current by updating sites with monthly newsletters
- Toolbox guide-sheets to aid in Walk the Line conversations
- Walk the Line training aids
  - Training packages
  - Videos
  - Newsletters
  - Toolbox sheets

Operating Discipline Tools

- Practice sharing documents provide operator tools to help with line-up:
  - Shift Notes
  - Shift Handover
  - Operating Instructions
  - Evaluation Rounds
  - Open-End Audits
  - Design Improvements to prevent open ends

Operational Readiness Tools

- Practice sharing documents provide operator tools to help with start-up and returning equipment to service:
  - Maintenance / Operations Turnover
  - Verification after Maintenance
  - Independent verification
  - SOP practices
  - Commissioning practices
Walk the Line – APS Interface

• Modified **Operating Practices protocol** & scoring to include a Walk the Line Section

• Communicating Walk the Line practices throughout the year at the **network meetings**

**Practice Sharing**
- Toolbox guide-sheets
- Training tools
- Operating Discipline practices for shift notes, relief, instructions, rounds, & design practices
- Operational Readiness practices for op/maint turnover, commissioning, start-up

• Created a **new Haz ID document** on Walk the Line

• Modified **keywords** to include “WTL” and “Walk the Line” for easy access

**Additional APS tools for Walk the Line**
Round Table & Sharing
Please sit with participants from other companies
Choose a leader to report out to main group
Topics for discussion & sharing
  - How are we using WTL?
  - What tools are the most useful?
  - How did we roll WTL out?
  - How do we start? What help do you need?
Pick 2 or 3 highlights from the discussion to share with the larger group

Take ~45 minutes for the discussion
Path Forward
Path Forward

► Survey
  – Participation in industry improvement plan
  – Tools we use
  – Tools we would like to share
  – Tools we would like to see

► Participation in WTL video
► Next industry workshop
► 2017 conference paper(s) showing industry results
Walk the Line