



# Walk the Line Industry Workshop

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- ▶ 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



# APS Background – Safety Portal Introduction

Lara Swett

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# What is Walk the Line?

© Celanese

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

- ▶ 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..



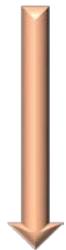
Start with a great recipe



Check that you add the right ingredients the same way each time



Enjoy consistent results!



## The Gumbo Theory Applied to Making Chemicals...

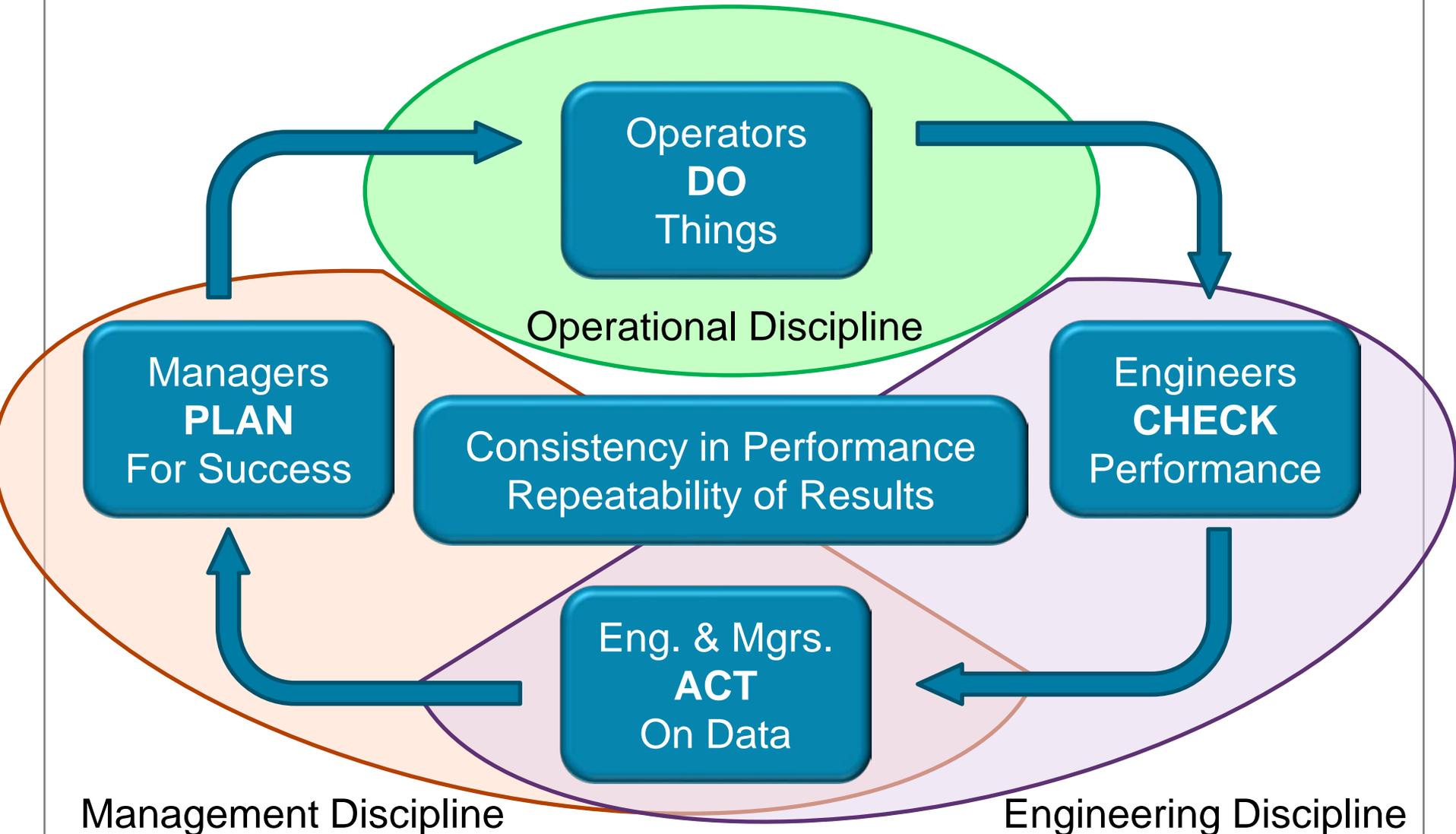
Develop & train on procedures, forms & checklists



Check the work



Get repeatable results!



## **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



- 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

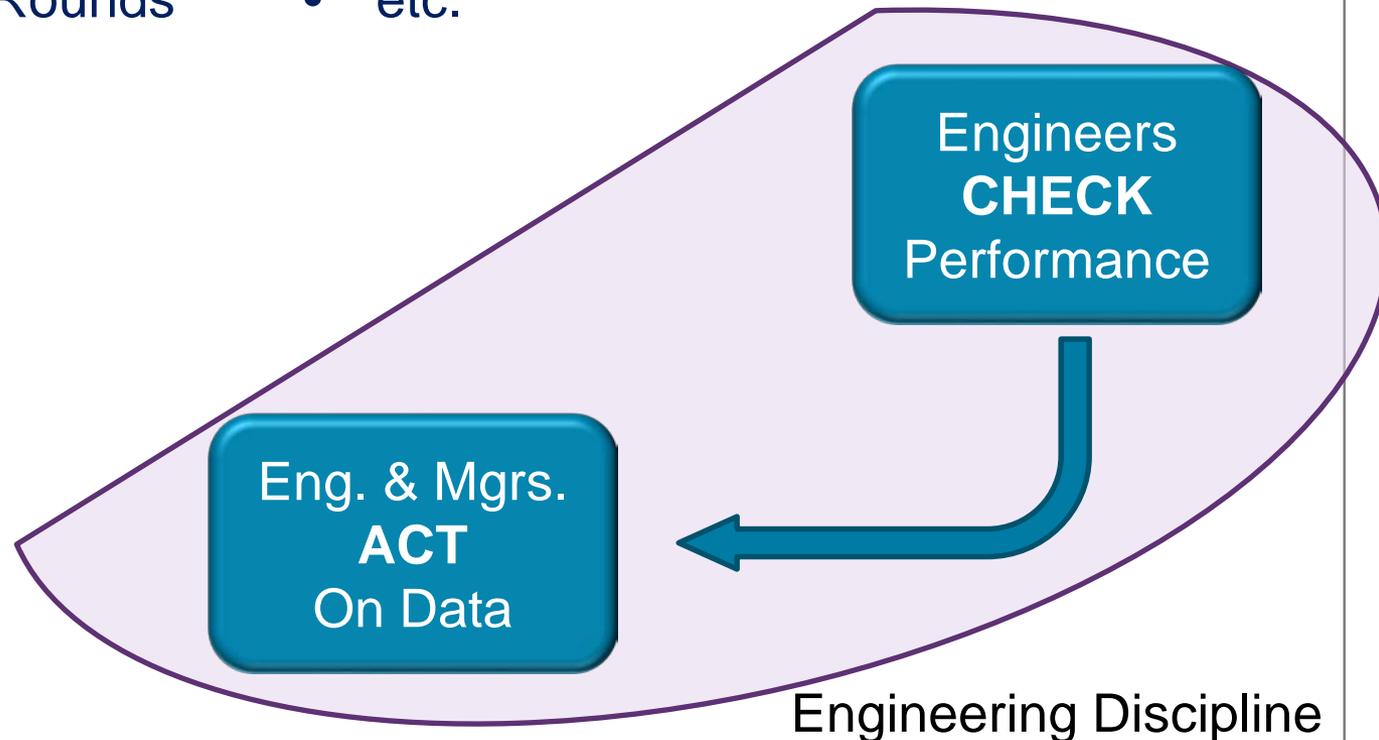
Each activity is **evaluated** through engineering and management discipline, **documented**, affected people are **trained**, and performance is **monitored**

## 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.



**Act on data**  
**Plan for Success**

## WHAT

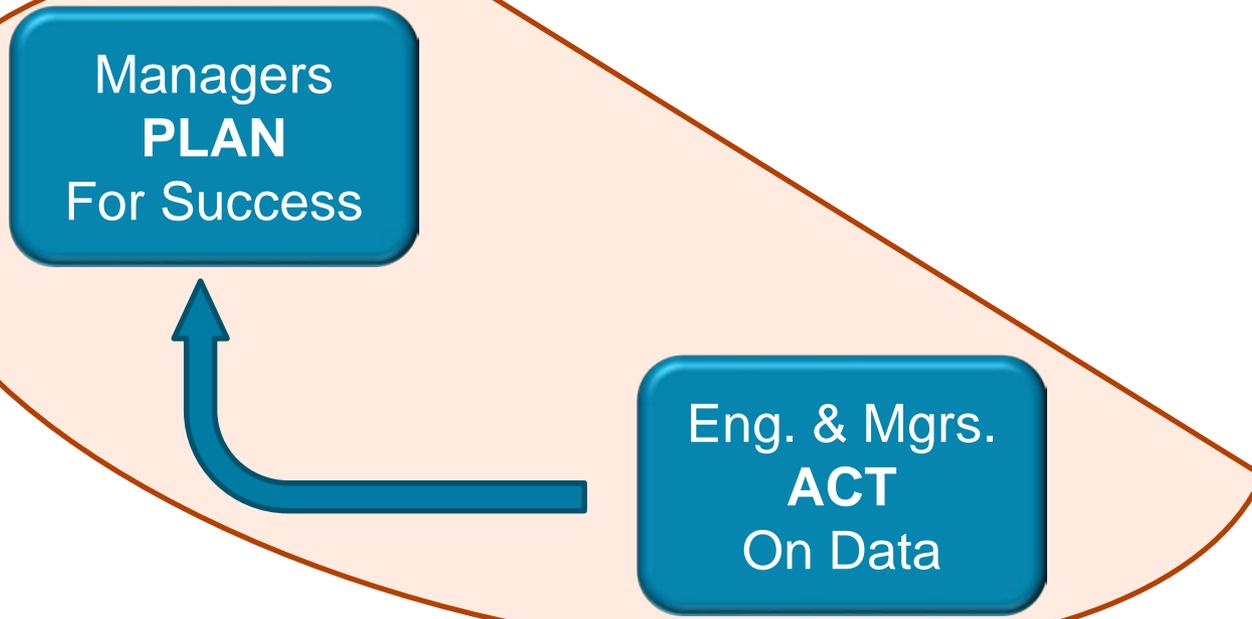
- Daily review of incidents and act on data
- Procedures/ SOP's define who does what
- Communication boards

## How

- Proper training

## WANT

- Housekeeping
- Minimize distractions
- Let people know about a job well done

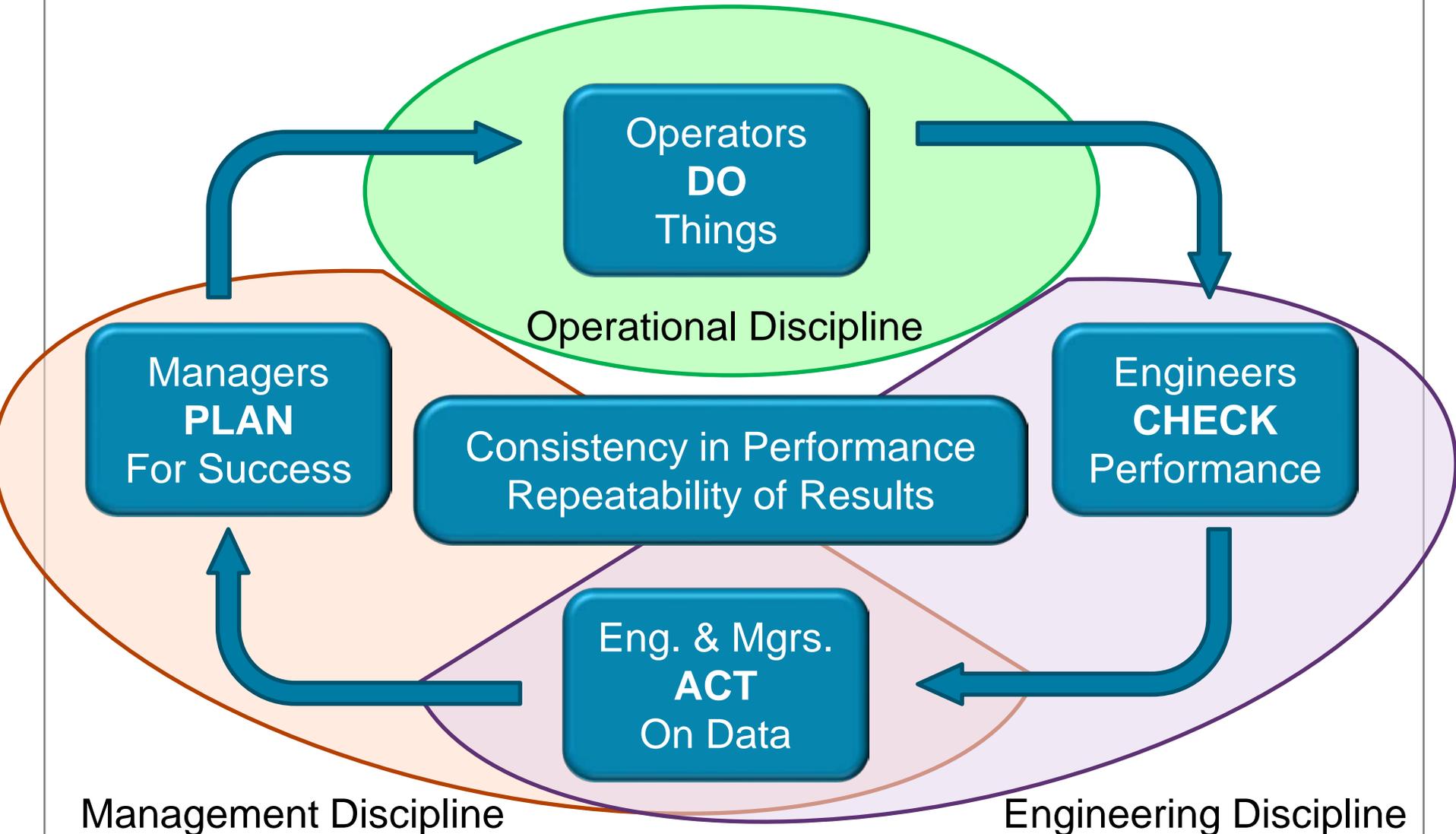


The diagram shows a cycle within a light orange, rounded shape. At the top left is a blue rounded rectangle containing the text 'Managers PLAN For Success'. At the bottom right is another blue rounded rectangle containing 'Eng. & Mgrs. ACT On Data'. A thick blue arrow starts from the bottom of the 'ACT' box and curves upwards to point at the bottom of the 'PLAN' box, indicating a feedback loop.

Managers  
**PLAN**  
For Success

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

Management Discipline





# **Set the Expectation to Walk the Line & Constantly Reinforce it**

Develop a Culture of Walk the Line

## 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**

## ADVANCING PROCESS SAFETY PROGRAM



Volume 1, Issue 5  
2Q 2016

### Walk the Line Newsletter: Operational Readiness



#### About Walk the Line

Walk the Line is an AFPM Practices Sharing program with the goal of eliminating line-up errors in industry. Did you know that 21% of the 2014 AFPM event sharing incident causes were related to Human Factors? These include: valves left open, open-ended lines, and line-up errors. This data also indicates that 13% of the process safety incidents occurred during start-up. The notable thing about this cause is that it is preventable.

Walk the Line attempts to go beyond an ending statement of "operator error" in the root cause analysis and determine why the error occurred. It focuses on 3 main elements:

- **Culture** – Has the expectation for 100% accuracy in line-up been made, and are operators trained on how to complete line-up?
- **Operating Discipline** – Have the right continuity of operations tools been developed that help operators understand the current operating state of the unit at all times?
- **Operational Readiness** – Do operators have the right tools to prevent line-up errors during changes due to transient operating states such as returning equipment from maintenance or startup?

This newsletter will focus on operational readiness tools.

**Note:** As with all of the practice sharing documents, the suggestions given should be evaluated for each situation where they are considered. These are not intended to be best practices. Rather, they are practices that have worked in appropriate applications.

#### Operational Readiness

Operational Readiness is the term used to ensure processes are verified to be "fit for service" when being started-up. You may ask... "Isn't that what a PSBR (Pre-Start-Up Safety review) is intended to do?" And you would be right for the case of a start-up following a modification that is implemented using the MOC (Management of Change) process. But there are many instances when we start-up a process that does not involve an MOC including routine maintenance, replacement in kind modifications, and administrative shutdowns.

Experience has taught us that the frequency of incidents is higher during process transitions such as startups. These incidents have often resulted from the physical process conditions not being exactly as they were intended for safe operation. Thus, it is important that the process status be verified as safe to start. Operational Readiness reviews ensure that the process is safe to start by examining issues such as:

- Equipment line-up
- Safeguard bypasses restored
- Bleed valves plugged
- Leak tightness
- Proper isolation, car seals in place

Operational readiness reviews of simple startups may involve only one person walking through the process with a simple checklist to verify that nothing has changed and equipment is ready to resume operation. More complex reviews or higher risk start-up situations might require different tools.

This Walk the Line newsletter will introduce several practice sharing documents that aid operators in reducing errors associated with Operational Readiness.

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

## 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

### Walk the Line Toolbox

#### What would you do?

##### Instructions:

- Take a look at the diagram, then read the scenario
- Let the employees think about the situation for a few minutes
- As a group, let the employees discuss what they would do to make the situation safer
- After the discussion, read some of the suggested solutions

Topic: Walk the Line, wrong operation, LOTO

A Cumene Unit Operator was preparing a control valve for maintenance by performing lock out tag out. The operator placed the control valve on hard bypass and closed both the up and down stream valves and placed chains and locks on the hand wheels. Intending to drain the control valve station he had just LOTO'ed, he opened a bleeder valve on a different control valve station that sits back to back with the control valve he had just locked out. The bleeder was initially plugged, however the blockage discharged, the hot material drained out, flashed and ignited. The resulting fire caused damage in excess of \$25,000 thus resulting in a Tier 1 process safety event.



Page 1

### Walk the Line Toolbox

#### What would you do?

##### Scenario

Wrong bleeder opened, identical control valve stations

- What is the experience level of the operator?
- Is the operator pressured for time/ production?
- Was the operator trained in LOTO?

##### Suggested Solutions:

- Clear line labeling helps the operator make decisions before operating valves.
- Constantly reinforce the message that operators must know with 100% certainty what will happen when they open a valve.
- Always use your senses – touch, sound, site. A line in service feels and sounds different from an out of service line.
- Walk the Line! –The control valve station is completely in the operators view. Before opening the bleeder, always verify the blocks (isolation valves are closed) are in place.
- Understand proper bleeder operation. A closed block valve can leak. Train operators on how to properly remove plugs to vent pressure, and how to open bleeders for quick close in case of leak through.
  - In this case, the operator could have reassessed the job before rodding out the bleeder. Had this operation been done on the correct CV station, there still could have been pressure behind the plug.

Incident taken from the AFPM Event Sharing Database

Page 2

AFPM Focused Improvement

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

**Open a dialog with Operators**

**AFPM has 2 Celanese videos posted on the safety portal  
We all improve by sharing**



**Find creative ways to reinforce the expectation**



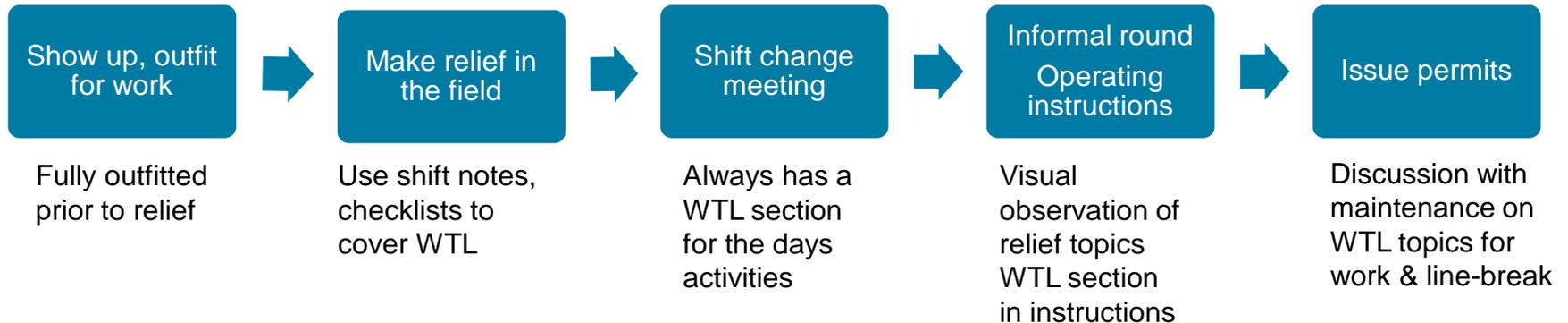
# Operational Continuity

Tools for consistent results

# A Day in the Life of an Operator

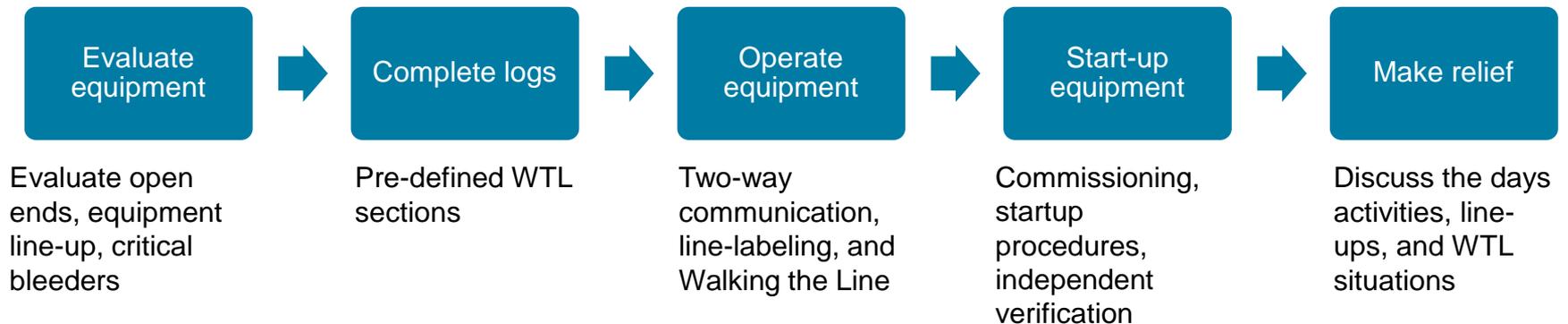


## Operating Discipline Tools



## Operating Discipline Tools

## / Operational Readiness



Introduce discipline into each task with pre-defined WTL checklists

# Shift Relief

## Operator Shift Notes - Walk the Line Section

	Yes √	No √	Description of Action Taken on Shift
Abnormal Line-ups			
Equipment bypassed			
Equipment out of service			
Special samples taken			
Unscheduled equipment outage			
Tests completed on shift			
MOCs/ PSSRs completed			
Special operating instructions			
Abnormal transfers completed			
Emerging problems/ troubleshooting			
Other situations that changes equipment line-up			

## PRACTICES SHARING



### Shift Change Communications (Shift Relief or Shift Handover)

**Purpose and Use:**  
Valves left open or improperly lined-up during normal operation, equipment commissioning, draining, and loading/unloading activities can lead to loss of primary containment (LOPC) events. These events and other line-up errors, especially those during returning equipment to service, can be where the last line of defense (safeguard) is a human action.

This Practice Sharing Document describes the use operator shift notes or a checklist to aid in continuity of operations communications that occur during shift change to help reduce the likelihood of a LOPC by this cause.

Practice Sharing Documents are meant to share information on Process Safety practices in order to help improve Process Safety performance and awareness throughout industry. The goal is to capture and share knowledge that could be used by other companies or sites when developing new Process Safety practices or improving existing ones. The Practice being shared has been used by an industry member, but this does not mean it should be used or that it will produce similar results at any other site. Rather, it is an option to consider when implementing or adjusting programs and practices at a site.

BY THEMSELVES, THE PRACTICE SHARING DOCUMENTS ARE NOT STANDARDS OR RECOMMENDED PRACTICES. THEY ARE NOT INTENDED TO REPLACE SOUND ENGINEERING JUDGMENT. THEY DO NOT PRECLUDE THE USE OF ALTERNATIVE METHODS THAT COMPLY WITH LEGAL REQUIREMENTS. A SUBJECT MATTER EXPERT SHOULD BE CONSULTED PRIOR TO DETERMINING WHETHER A PRACTICE SHARING DOCUMENT CAN BE USED IN ANY SPECIFIC SITUATION.

**Scope:**  
The scope of shift change communications closely follows that of operator shift notes and should be used as a guide for shift relief.

All batch and continuous manufacturing units can benefit from the establishment of a practice of using a written checklist or a form in operator shift notes in shift change communications.

This practice describes the use of structured checklists in operator shift notes that describe common changes to valving and equipment line-up that can lead to a loss of continuity of operations between and among shifts (hereby described as a "Walk the Line" section). The form or shift notes are used as a structured reminder to the operator to cover those situations in relief that could lead to an incident caused by changes in equipment line-up. This structured communication helps future shifts better understand the current operating state of the manufacturing unit.

This practice only describes a Walk the Line section of shift change communication and does not cover other aspects of a good shift relief program.

- Description:**
- Shift Handover takes place on the job after the oncoming operator is certified for work.
  - The location is on the job, in an area protected from the environment and excessive unit noise.
  - Adequate time is given to provide a thorough handover report to the oncoming shift.
  - The content elements of the operating shift log are the outline for the handover report.
  - Process Safety and plant EHS and/or security concerns are emphasized.
  - Each element of a Walk the Line section is discussed regardless of whether the activity was performed on the previous shift.

## 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

## HAZARD IDENTIFICATION



### Procedures, Tasks, and Administrative Systems:

#### Shift Handover

#### Purpose and Use:

The Process Safety Hazard Recognition documents serve to help facilities identify potential risks associated with work practices, safety practices, refinery process equipment, and technology. Hazard Recognition documents are meant to:

- Improve process safety awareness with a focus on higher potential risks.
- Provide information and ready reference guides for potentially overlooked and not widely known process safety hazards.
- Share lessons from industry related incidents and near misses.

#### Scope:

#### Category: Procedures, Tasks, and Administrative Systems

#### Shift Handover

#### Examples of Inherent Concerns and / or Hazards:

- Each hazard associated with shift handover is related to poor communication that could lead to human error and improper or lack of response leading to or creating a process safety incident. Examples include:
  - Improperly notified outgoing or incoming employees could leave the unit vulnerable to response to unit conditions during shift handover
  - Inadequate or improper shift handover locations could lead to distractions or poor communication between employees
  - Inadequate or improper communication could lead to human error resulting in process safety incidents
  - Inadequate time or tools given for shift handover could lead to communication shortcuts or exclusions
  - Exclusion of topics during handover could lead to inadequate communications
  - Lack of discussion of key operations and maintenance activities during shift and planned for the oncoming shift could lead to a loss of continuity of operation
  - Lack of knowledge of management of change (MOC) and PSRR enacted on shift leads to a lack of understanding of the potential risks associated with the change
  - Inadequate supervisor turnover could result in lack of key information on one or more related units
  - Inadequate field turnovers can result in incidents involving permitted work.

#### Potential Hazards

**Improper outfitting during shift handover** Outgoing and oncoming personnel not properly outfitted for duty during shift handover, and when in transit to and from the shift handover location, including normal PPE and communication equipment, are not in a position to respond to unit emergencies or abnormal situations that could arise. This leaves the operating unit vulnerable to response during that period.

#### Inadequate or improper handover location

Inadequate or improper shift handover location could lead to distractions for the employees providing relief and for other employees.

- Some locations in the operating unit may be too noisy or have other distractions that hinder communication
- Some control room locations used for shift relief may prove to be a distraction for other workers (e.g., outside operators making their way to a board operator).

#### Due on the next page

This hazard recognition document is a generic, non-comprehensive synthesis of inherent concerns and / or hazards for this topic. It in no way alters any legal requirements. It is not intended to replace sound engineering analysis or etc.

Revisions made 7.2.2013

- 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 – *A/ways* discuss operator line-up and WTL
- Use the same agenda – this helps introduce discipline

## PRACTICES SHARING

### Shift Change Meeting



Walk the Line

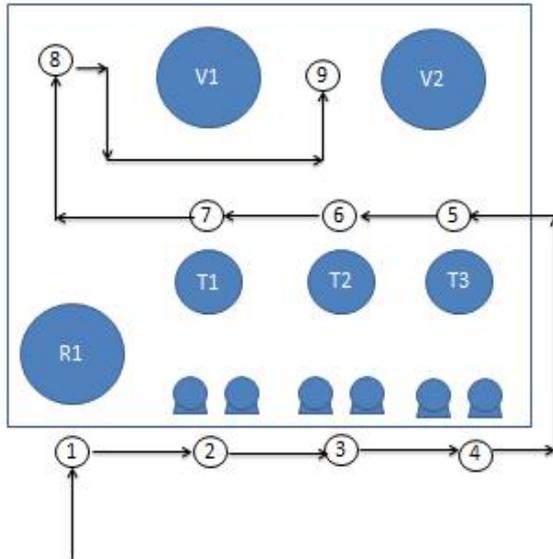
#### Purpose and Use:

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

"B" Operator Informal Unit Walk Through Route



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

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

## Practices Sharing



### Operating Instructions

- The instructions should be used to communicate any projects, MOC's, special operating instructions, unit tests, special bypass of equipment or safety systems, and any other notable events that will occur in the operating unit.
- Support group requests for plant tests or special equipment line-ups go through the trained and designated instruction writer.

#### Implementation

To implement consistent operating instructions, the designated instruction writer must be chosen and trained. This is typically chosen by position as: area foreman, shift superintendent, production superintendent, area engineer, technical operator, or other similar position familiar with all aspects of the unit operation. Designated back-ups should be pre-determined and trained in how to leave instructions.

A company, site, or operating unit also needs to determine if the instructions are given electronically or manually written. There are advantages and disadvantages to both. This practice advocates the use of a structured form that includes a Walk the Line section. Use of this type of form introduces repeatability and discipline into the instruction process.

#### References

Figure 1 shows an excerpt example from an operating instruction form. The standard template describes situations that the operator might encounter for future shifts. The person leaves instructions on what the operator should watch out for with regard to line-up, open bleeders, or other Walk the Line type errors. Note, there is overlap in a pre-defined Walk the Line operating instruction, operator shift notes, and operator shift handover list. The overlap is intentional to reinforce situations that lead to open ended lines and line-up error.

Instructions - Walk the Line Section			
Description	Yes ✓	No ✓	Action Taken on Shift / Notes
Abnormal line-ups			
Equipment bypassed			
Equipment out of service			
Unscheduled equipment outage			
Special samples taken			
Tests completed on shift			
MOC/PSRs completed or ready			
Special operating instructions			
Abnormal transfers completed			

Note: This hazard recognition document is a generic, non-comprehensive synthesis of inherent concerns and / or hazards for the related topic. It in no way alters any legal requirements. It is not intended to replace sound engineering analysis or judgment.



HAZ004-000

- 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 that they have read and understood instructions (initial/date)

Operating instructions often give guidance to operators on preparing equipment for maintenance – a perfect time to highlight line-up

- ▶ 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

C-1 BLOWERS					V 2
WHICH	OIL	NOISE,	BELT	COUPLING	K. O.
JNNING	LEVELS	VIBRATION	CONDITION	& BELT	POT
✓ / S	IB & OB	TEMP (FEEL)	OK	GUARDS	VISUAL
✓ / B	> 75 %	✓ / X	✓ / X	IN PLACE	INSPECTION
/					
/					
/					
/					

### 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

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

- 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)

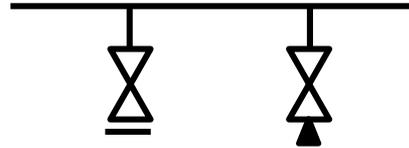
Shift notes are a record of what happened on shift and is a primary source of accurate information necessary for operational continuity

## 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

## Practices Sharing

### Line Labeling



- o An example label might be green for chlorine and read "CS: From P-201 to HE-202 >>"
- Produce an MOC on this change in labeling to surface potential hazards of mislabeling
- Map out the unit in sections and develop a schedule for labeling; have operators map and label lines as part of the learning process
- Conduct a PSSR with detailed field review to ensure the labels are applied correctly.
- Consider putting inspection of critical labels on operator evaluation rounds
- Revalidate and refresh labels at a defined frequency, recommended at no more than each year

#### References

Figure 1 shows an example of a line labeling.



Figure 1: Line Labeling

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

## HAZARD IDENTIFICATION

Walk the Line

Operator Line-up

AFPM  
American  
Fertilizer  
Manufacturers

**Purpose and Use:**  
The Process Safety Hazard Identification documents serve to help facilities identify potential risks associated with work practices, safety practices, refinery process equipment, and technology. Hazard Identification documents are meant to:

- Improve process safety awareness with a focus on higher potential risks;
- Provide information and ready reference guides for potentially overlooked and not widely known process safety hazards; and
- Share lessons from industry related incidents and near misses.

**Scope:**  
Category: Procedures, tasks, administrative systems, operator training  
Equipment line-up is an essential, fundamental task performed by operators. This document includes hazards associated with failure to understand with 100% accuracy equipment line-up during normal operations, changes in operating state, transient or upset conditions, and various startup conditions including starting up new equipment, returning equipment from maintenance, and start-up from a warm or down state. The scope of this document falls within the AFPM Focused Improvement Subgroup, **Walk the Line** practices sharing program.

**Examples of Inherent Concerns and / or Hazards:**

- Loss of primary containment (LOPC) due to:
  - a. Open ended lines
  - b. Vessel overflow
  - c. Releases from relief devices (PRD's)
  - d. Missing or improperly installed equipment
  - e. Lack of safety systems or operating procedures because the equipment was improperly commissioned or did not have an operational readiness review for various startup conditions or process changes
  - f. Introduction of material into equipment that was either not designed or not prepared to handle it – e.g. LPG introduced into unpressurized equipment whose metallurgy was not designed for the resulting low temperature and introduction of hot (above 212 °F) material into equipment containing water
- Inadvertent mixing leading to possible reactivity hazards, runaway reactions, or other undesirable reactions

Each of the following hazard situations could lead to possible LOPC or inadvertent hazardous mixing with a broad range of consequences depending on the material released, including injury, toxic exposures, fire/ explosion, damage to equipment and/or the environment and negative community impacts.

	Potential Concerns	Potential Hazards
1.0	Failure to understand equipment line-up during normal operations	During the course of normal operations, operators are tasked to line-up equipment for transfers, redirection of flow, intentional mixing of streams or prevention of mixing, sampling, and other miscellaneous tasks to produce finished products. Situations to consider for normal operations that could lead to LOPC or inadvertent hazardous mixing are:

Formal line labeling can be part of operator training

- ▶ 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**

## 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***

## 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.

V-255 Bleeder and Associated Equipment							
Item No.	Equipment Description/ Bleeders	Flow Sheet	Line No.	Normal Position	Position Found	Position Left	Initial
	P-255 Bleeders						
1	Pump suction bleeder (1/2")	0035	X-010	Closed			
2	Pump discharge bleeder (1/2")	0035	X-011	Closed			
3	Pump discharge pressure guage bleed valve (3/4")	0035	X-020	Closed			
4							

Figure 1: Hypothetical Checklist SOP

#### Other Resources:

Center for Chemical Process Safety, Guidelines for Risk Based Process Safety, American Institute of Chemical Engineers, Hoboken, New Jersey, 2007.#

Search "Walk The Line" on the AFPM Safety Portal

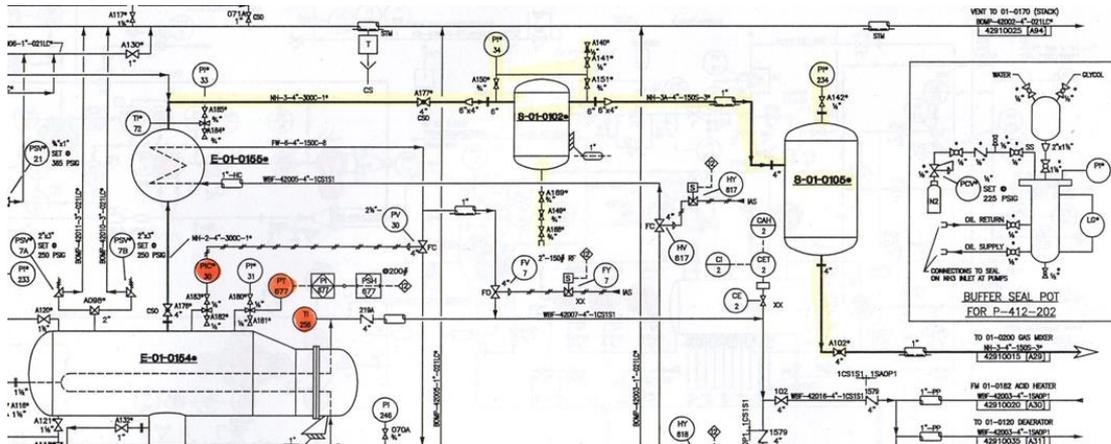
Revision	Date	Summary of Changes
Initial	March 2016	Initial Version
WTL Subgroup Review	May 2016	
PSW and Legal Review	May 2016	Final Version

- 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



## P&ID Walk-down



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

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

## 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!

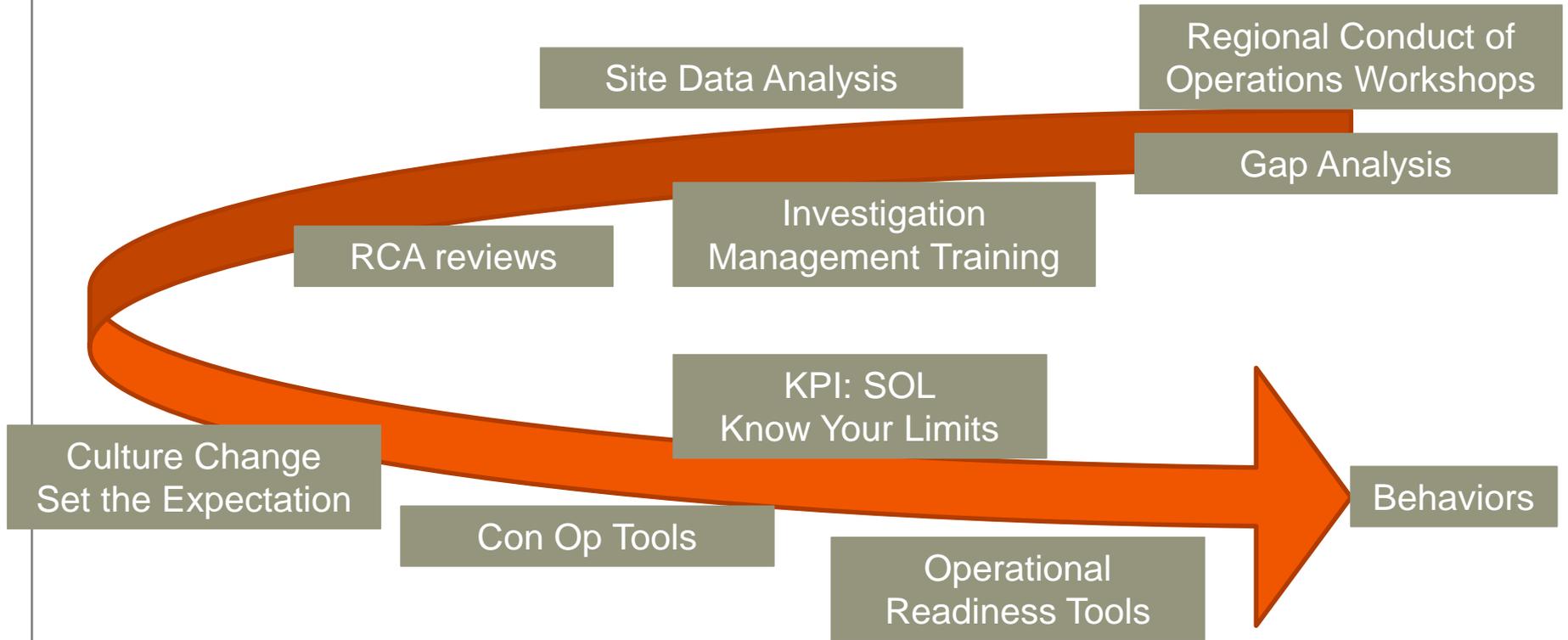
## Small group / concentrated meetings

- ▶ 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

## Workshops/ use tools as needed

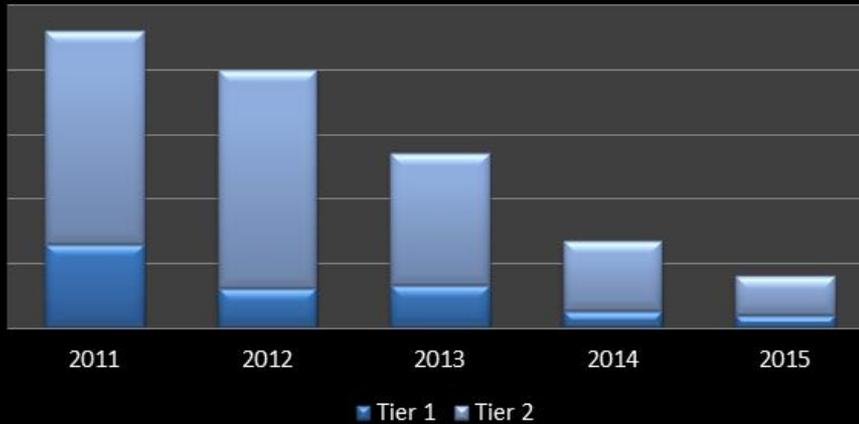
- ▶ Survey sites/ units with conduct of operations gap analysis
- ▶ Conduct 1 day workshop on Walk the Line with instructions on how to use pre-defined tools
- ▶ Let individual sites/units pick and choose the tools that are best suited for their needs, based on RCA analysis
- ▶ Monitor progress

# How Celanese Rolled Out WTL

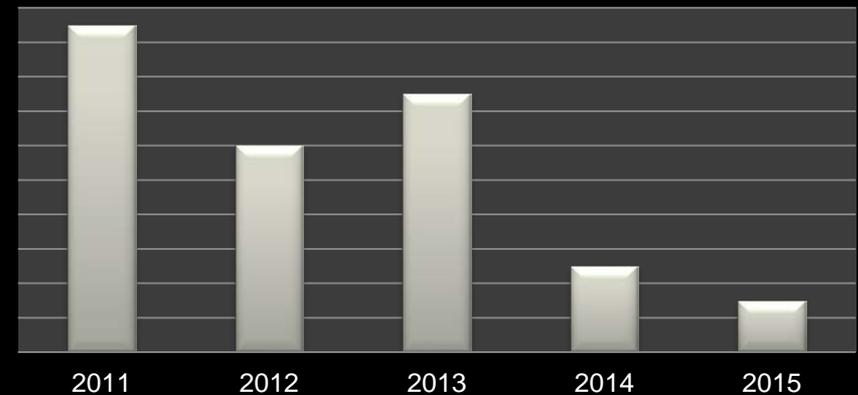


**Celanese used a non-mandatory rollout letting sites pick and choose tools. It is an ongoing process.**

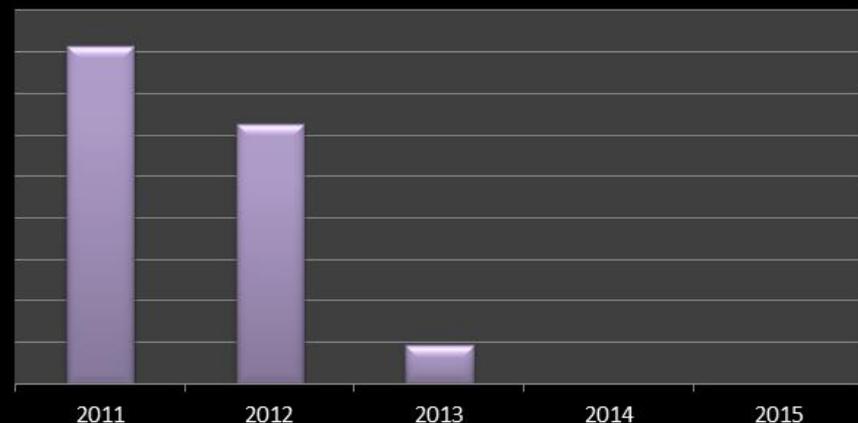
## Process Safety Incidents



## Walk the Line Primary Cause



## LOPC: Lack of Info for Cause



## 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

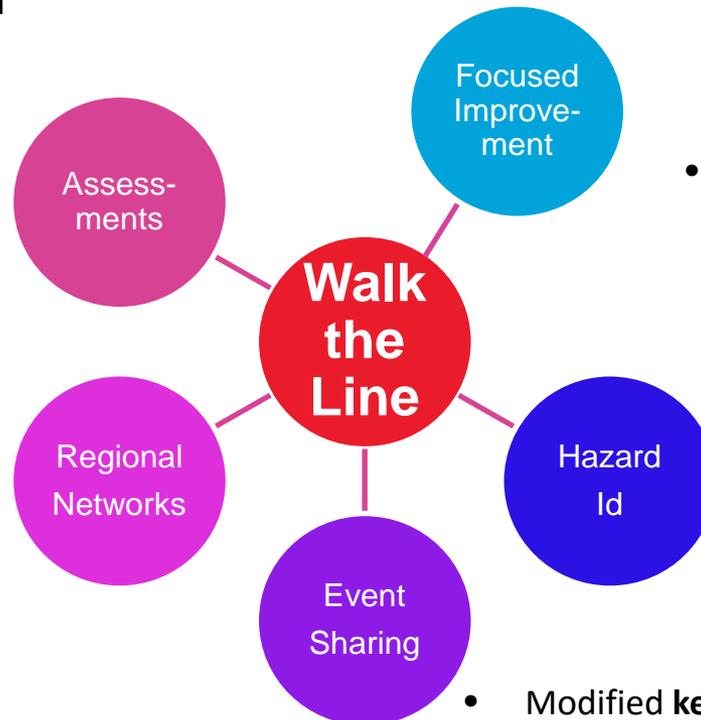
## Operating Discipline Tools

- 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

- 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

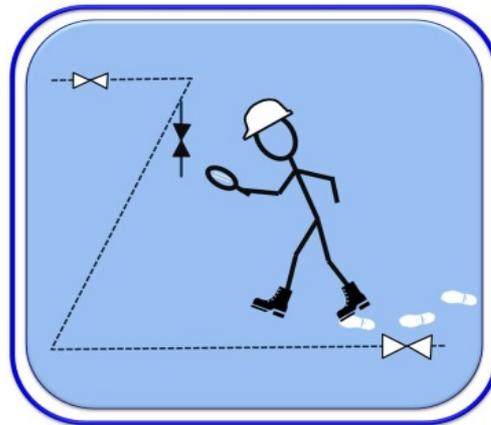
**Take ~45 minutes for the discussion**



# Path Forward

- ▶ 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**