

**2003 Metropolis Works
Review of Root Causes,
Corrective Actions &
Common Cause Analysis
for Incidents on
9/9/03, 9/12/03, 9/30/03**

7
#2

1. Overview of Three Incidents & Root Causes
2. Pre-Start-Up Corrective Actions & Readiness for Start-Up
3. Summary of Long Term Corrective Actions
4. Review of Each Incident, Associated Root Causes,
Corrective Actions & Current Status of Completion
5. Progression of Plant Start-Up
6. Training Plan for Re-Start & Near Term
7. Attachments
 - a. Pre-Start-Up Check Sheet
 - b. Action Tracking List for Long Term Items

9-09-03

HF Burn to Maintenance Person (South Vaporizer)

Root Causes: Failure to Correctly Implement Management of Change
Failure to follow Special Work Permit Procedure
Failure to Exhibit a Safety First Culture (Production Priorities)
Failure to Follow Operating Procedures for Vaporizer

9-12-03

SbF5 Release (Taking a Product Sample)

Root Causes: Ineffective Training to Procedures for Relief Operator
(Work area scope too broad to maintain competence)
Failure to follow Sampling Procedure

9-30-03

UF6 Pigtail Flexible Hose leak

Root Causes: Inadequate Procedure in Place for Testing Flexible Hoses
No Procedure in Place for Clearing Line Restrictions
Failure to identify Pre-cursor Incidents through Corrective
Action Program

Management Changes:

- Plant Stand-Down for several weeks to complete necessary activities for Safety (9/9-11/10)
- Town Hall Meetings to explain Safety Priority & Procedure Adherence Involving MTW Plant Manager, Converdne CEO, and Corporate Business Leader (10/15, 10/16)
- Organizational Changes-Termination of Supervisor & Manager (Procedure Adherence)
- Pre-Start-Up Check List --Communication of Corrective Action Progress by Supervisors, Engineers & Managers
- Communicate in Safety Huddles expectations for safely handling small spills/releases/PPE
- Review Training Activities to Support Restart (See Detail Training Slide)

Verify Integrity of Current Processes & Procedures:

- **Enhanced Oversight of Management of Change (PT-101) Process**
- **Operating Procedures Review by Operators, Engineers and Supervisors, Manual Updates**
- **Review Operator Qualifications**
- **Revise Relief Operator Training Process**
- **Additional Safety Reviews of Maintenance Line Breaking Activities & Special Work Permits**
- **Job-Hazard-Analysis Reviews required and reviewed for all Maintenance Line Breaks**
- **PPE Reviews & Upgrades for Maintenance Line Break Activities (Increased Hood Usage)**
- **Management Oversight during start-up operations until operations are stable**
- **Periodic Management Observational Audits beyond start-up period**
- **A-Council Review of Root Causes & Corrective Actions (Union/Company Agreement)**

Material Conditions of Plant Facilities:

- **Review of Process Hazard Analysis (PHA's) for all PSM areas of plant by Corporate Experts**
- **Critical Piping Review- Corporate FMEA completed for PSM piping (10/01/03)**
- **A-Council Review of Root Causes & Corrective Actions (Union/Company Agreement)**
- **Daily Job Planning Meetings Involving Safety, Maintenance, Production & Engineering Representatives.**
- **Significant Facility Upgrades**
 - **A & B Reductor Replacements**
 - **Top & Bottom Hydrofluorinator**
 - **HF Liquid Piping Lines**
 - **Sulfuric Acid Piping Lines**
 - **Ammonia Piping Lines**
 - **Improved Rupture Disc Replacements**
 - **Washed Large Portion of UF6 Piping**

Training Activities to Meet Restart Needs:

- **MOC/PT-101 Training Session for Supervisors & Engineers (03)**
- **Special Work Permit On-The-Job training for Supervisors during Safety Line Break Reviews**
- **Operator Training on Procedure Changes resulting from Procedure Manual Reviews**
- **Restrict Relief Operators from operating units alone until they are trained to new Procedure**
- **In-Hand Procedures for unit start-up, continue until verification is complete & for Non-Routine Tasks**

Restart Oversight Process:

As with previous activities completed, the plant has committed to the following activity restrictions while tasks are performed:

- Normal plant procedures will be utilized for these activities
- An area supervisor will oversee these work activities.
- The plant will have on-site management level personnel overseeing activities conducting field procedural usage observations until operations are stable.
- The operators performing these tasks will have procedure in hand to assure compliance of the applicable procedure.
- Experience/trained individuals will perform the activities.
- Procedures have been reviewed/revised as appropriate actions for these activities.
- Training has been completed with revised procedures for these individuals.
- Situations that may occur that are not normally addressed by procedure will require the activity to be safely secured until the situation can be evaluated by the appropriate personnel. Contact your supervisor. This may require a PT101 to be issued to address the out-of-procedure scope of activities to assure that potential hazards are addressed per our plant procedures. Examples of this would include line blockages, sight glass operability/availability.

PRE-START-UP

- Review & Revise Operating Procedures (Unit Operators, Engineers, Supervisors) Approve via PT-101 MOC Process..
- Corrected Manuals with Updates
- Prepared list of manual changes and presented to Operators to validate changes made.
- Final Manual Revision to Yellow Copy Manuals
- Review Current Operator Qualified Status (Annual Certification/Testing/OJT)
- Train Operators to Final Manual Revisions (Sign-Off Sheet)
- Procedures In-Hand for Start-Up Operations until Stable Operations are confirmed.
- Management Oversight of Start-Up Operations
- Check-Sheets or Procedures will be used for complicated/hazardous/non-routine tasks
- Relief/Breaker/OT Operators may remove themselves from OT list if uncomfortable with training level & Understanding of Unit to be worked until re-validation takes place.
- If Qualified Operators are not available the Unit must be secured in a safe mode until a Qualified Operator is available.

Additional Pre-Start-Up Training Required

- Plant Wide Training on Procedural Adherence Policy (See Revised Policy HR-4)
Procedural Adherence--all policies and procedures must be followed.
 - If a procedure is found to be incorrect or is not understood by the operator, the following actions should be taken:
 1. Stop performing the task and secure process
 2. Contact Supervisor Immediately
 3. Determine Resolution.
 4. All changes and modifications must comply with MOC process.
- Plant Wide Training on Start-Up Training Process (Safety Huddles)
- Plant Wide Training on Procedure In-Hand Expectations (Safety Huddles)

Near Term Validation Process to be Completed After Start-up

- Train Operators through Operation Manuals using Validation Check List Referencing procedures in detail.
- Have Operators sign off Validation Check List once training is completed for each procedure.
- Mark on Validation Check List tasks excluded from this training due to infrequent use. Training will be covered for these tasks prior to work being performed.
- Develop Check-Lists for additional complicated/hazardous tasks in the non-UF6 side per PD-4.

Long Term Action Items Summary Honeywell

Evaluate Training Program Enhancements:

- **Review Industry Best Practices for Enhancing Training Program
(Explore INPO Assistance in Training)**
- **Re-Organize Training Group (Staff Increase of 2 Trainers)**
- **Improve Qualified Operator Verification Process**
- **Train Peer-Trainers in effective training skills**
- **Improve Human Performance Tools (Review “STAR” Program for applicability)**

Safety Review & Involvement:

- **Add One Safety Technician to staffing**
- **Corporate Safety Employee Safety Survey with Corporate Follow-up action items**

Operation Manual Updates:

- **Document Control System Upgrade--Computerize Procedures & Make Available to Print**

Maintenance Reliability Program Upgrades

- **Add One Piping Expert to increase piping integrity program**
- **On-going commitment Safety Action Item Completion**
- **Formalize Equipment Maintenance PM/Inspection Process**

Upgrade Corrective Action Program

- **Continue TOP Participation (Union/Salaried Incident Investigations)**
- **Complete New Computerized Incident Reporting System (Improved Timely Communication)**
- **Review Incidents for trending using Newly Combined Database**
- **Review & Upgrade Internal Review Process to Ensure Effectiveness of Corrective Actions
(Consider initiating an Executive Safety Review Board to review Corrective Action Effectiveness)**
- **Establish a Procedure for Periodic Corrective Action Item Reviews**

Guidelines/Expectations for procedure in hand usage are as follows:

- Operator will know the tasks and be familiar with the procedures prior to performing work activity.
- Operator will understand potential consequences of actions planned to perform (HS&E/Equipment Damage/Production Risk).
- Operator reads, understands and follows the steps of the procedure.
- For Complicated or Hazardous Tasks, Operator will use actual procedure or Check Sheet in hand while performing tasks, completing tasks per procedural requirements (step by step). In-Hand Procedures are not necessary for simple tasks with less than 5 steps.
- Operator will contact his/her supervisor if steps in procedure do not accomplish desired results, have inconsistencies or are not in the appropriate order (assumed problems with procedure--must clarify with supervisor and/or engineer).
- If the operator is not able to have procedure in hand due to protective clothing required or for some other reason, the appropriate sections of the procedure will be reviewed in advance of being completed and the procedure will be in close proximity to be utilized as a reference. The key in this case is that the employee understand the procedure for the task they are performing and be able to quickly locate and show the procedure that is currently in use.
- Operator performs procedurally controlled activities with a questioning attitude to ensure that the procedure is adequate and correct for the activity.
- Operator is responsible for notifying his supervisor if the job exceeds their understanding/ability/experience.

HF Burn (South Vaporizer)

Honeywell

<u>Root Cause Identified</u>	<u>Corrective Action</u>	<u>Status</u>
<ul style="list-style-type: none"> • Failure of Management of Change to recognize need for new PT-101 	<p>Train Supervisors & Engineers on PT-1 Procedure & PT-101 Process with Periodic Review.</p>	*Started 10/9/03
<ul style="list-style-type: none"> • Failure to Properly Apply Special Work Permit Procedure to the Individual Job. 	<ul style="list-style-type: none"> -Interim <u>Safety Review</u> of all maintenance <u>line break processes</u> (Heightened State of Awareness)during outage and during start-up period of each unit. Change to periodic audits when Management is confident that work permits are being completed properly. -Implement a uniform work permit system across the entire plant (Tag-link System) to improve accuracy of the permitting process. -Add PT-101 Checkbox to Special Work Permit -Disciplinary Actions Taken for failure to follow procedures -Revise Special Work Permit Procedures-clarify requirements -Provide training on revised Special Work Permit Procedure 	<p>*Ongoing</p> <p>Long Term</p> <p>In-Process</p> <p>*Complete</p> <p>In-Process</p> <p>In-Process</p>
<ul style="list-style-type: none"> • Failure to follow procedure by leaving AHF in the Vaporizer when opening. 	<ul style="list-style-type: none"> -New Policy on Procedure Adherence.(Work Rules & Cardinal) -Communicate Management Expectations in Town Hall -Revise line break procedure to forbid work on open vessel containing Liquid HF or other PSM Chemical unless in Standard Operating Procedures--PT-101 MOC Required. 	<p>Complete</p> <p>Complete</p> <p>In-Process</p>
<ul style="list-style-type: none"> • Failure to Exhibit a Safety First Culture (Production Priorities) 	<ul style="list-style-type: none"> -Plant Manager Town Hall Meetings to explain that Safety concerns come before production needs. -Plant Procedure Adherence Policy (Plant Work Rules) 	<p>*Complete</p> <p>*Complete</p>

Secondary Causes

- P&ID Not Trusted/Used
- Safety Handbook was not followed in selection of PPE
- Checksheets/Package not provided for special jobs.

Corrective Action

- Review P&ID's with Instrument Tech's & Engineers in MOC
- Review, Revise and Retrain on Safety Handbook PPE procedures (all employees).
- Audit Checksheets/Procedure Package to ensure Operators/Maintenance follow proper process/scope.

Status

*In-Process
In-Process

In-Process

{ * = Required Pre-Start-up}

<u>Root Cause Identified</u>	<u>Corrective Action</u>	<u>Status</u>
<ul style="list-style-type: none"> • Failure to Properly Train Relief Operator 	-Review & Upgrade Training for Relief Operators	On-Going
	-Reduce Number of Relief Jobs from 7 to 3	*Complete
<ul style="list-style-type: none"> • Failure to follow Procedure for Sampling SbF5 	-Updated/Revise Training Policy to Ensure Competent Operators.	In-Process
	-Only Competent Operators allowed to run unit alone during training period.	*Complete
	-Review & Update Procedures	*Complete
	-Train Operators on Procedures Changes	*Complete
	-Procedures In-Hand Start-up	*Complete
	-Town Hall Meetings explaining Adherence	*Complete
	-Policy for Procedure Adherence (Work Rules & Cardinal)	*Complete
-Relief Operators pair up with Qualified Operators until Competent in Unit.	*Ongoing	
-Management Oversight during Start-up until Stable Ops.	Complete	

Secondary Causes

- Sight Glass Difficult to Read

Corrective Action

Repair/Replace Sight Glass & other Critical Equipment for Safety & Operations

Status

Complete

Install Necessary Equipment to Make Load Cells Operational to validate readings.

In-Process
Long-Term

- Scrubber Failed to completely Handle the Release.

Repair Spray Jets
Add to periodic PM Schedule
Add daily checks by Operators to ensure effectiveness

Complete
Complete
Complete

<u>Root Cause Identified</u>	<u>Corrective Action</u>	<u>Status</u>
• Failure to provide an appropriate procedure to leak check pigtail connections prior to use.	Add procedure for negative pressure check of pigtail connection.	Complete
	Train operators on new procedure	Complete
	Procedure-in-hand for start-up of this process to ensure adherence.	Complete
• Failure to provide a procedure for clearing blockages for Control valve WIC 404.	Involve Supervisor during blockage issues or other abnormal activities. Institute new procedure to explain this requirement.	Complete
• Blockage in Line	Replace WIC 404 with larger valve to reduce blockage issues. Research in more detail.	In Process

Secondary Causes**Corrective Action****Status**

- Failure to Identify Pre-Cursor events through incident tracking system.

Improve Incident Report Trending/Evaluate Enhancements for corrective action program.

In Process



10/10/03 Sampling Plant

Environmental Protection Facility (EPF)

10/17/03 SbF5

10/19/03 IF5

10/20/03 Fluorine Plant De-Hydro G&H

10/23/24 Fluorine Plant De-Hydro D & E

10/26/03 SF6

11/03/03 FMB (Ore Prep & Green Salt, Hydrofluorination)

11/10/03 FMB (Fluorination, Cold Trapping & Distillation)

- Completed Significant Management Changes
- Verified the Integrity of Current Processes & Procedures
- Verified & Upgraded Plant Material Conditions
- Ensured Management Oversight through the Start-Up Process