WAI
WASTREN ADVANTAGE INC

June 9, 2014

Ms. Laura O. Wilkerson
Contracting Officer's Representative
U.S. Department of Energy
Oak Ridge Office of Environmental Management
Post Office Box 2001
Oak Ridge, Tennessee 37831

Dear Ms. Wilkerson:

Subject: Contract No. DE-EM0000323 – Deferred Maintenance in Environmental Management Facilities

Reference: Letter dated April 29, 2014, from Laura Wilkerson to Robert McKay, same subject as above

The TRU Waste Processing Center (TWPC) is pleased to provide the enclosed initial extent of condition (EOC) review results assessing the adequacy of maintaining TWPC's safety-related equipment and systems. The EOC review information is categorized in accordance with the 30 mandatory factors identified in the referenced letter and provides an evaluation of trends, conclusions and corrective actions, when deemed to be appropriate. A twenty-four month period of data was analyzed in the assessment.

The analysis focused on TWPC's two credited safety significant systems (Fire Suppression System and Main Building Ventilation System) and one designated worker safety system (Breathing Air System). Additional life safety systems (exit signs, fire extinguishers, emergency lighting, public address systems, etc.) were also considered in the review. Overall, the data indicates that TWPC is allotting adequate resources to system and equipment maintenance, keeping critical structures, systems and components in a high state of operational readiness, maintaining current configuration control, and maintaining support system infrastructure.

There are three pending corrective actions that have been identified as a result of this review. The first one is to incorporate collection and trending of human performance data in the corrective action plan resulting from the Safety Conscious Work Environment surveys and assessment. The other two involve evaluation of the locks/tags and temporary modifications associated with the lay-up of the Supernate Treatment System in 2005. The system has been held in suspension pending start-up of the sludge treatment process in anticipation of re-purposing the equipment. Based on current technology, the plans no longer include reuse of this equipment. Therefore, the isolation and temporary

modifications will be re-evaluated for closure. These actions will be captured as management items in the TWPC Issues Tracking System.

TWPC agrees that maintaining safety-related equipment and systems is a key part of performing our work safely to protect the workers, the public and the environment. In light of the recent events at the Waste Isolation Pilot Plant, we are reminded that we must not lose focus on the need to strive for excellence in performance and continuous improvement in all we do at TWPC.

Should you have any questions or require additional information, please feel free to contact me at (865) 574-2853.

Sincerely,

RC McKay

Robert C. McKay
TWPC General Manager

RCM:RH:lg

Enclosure: TWPC Deferred Maintenance Extent of Condition Review Results

cc: S. Cange, DOE OREM
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File 3.2

TRU Waste Processing Center
Deferred Maintenance Extent of Condition Review Results

June 9, 2014

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1.0 SUMMARY

The Transuranic (TRU) Waste Processing Center (TWPC) is a multi-purpose non-reactor Nuclear Hazard Category 2 facility constructed by the Department of Energy (DOE) Oak Ridge Office of Environmental Management (OREM) to house treatment processes for high-alpha TRU waste. TWPC is located in Oak Ridge, Tennessee, adjacent to the Oak Ridge National Laboratory (ORNL). The TRU waste treated at TWPC has been predominantly generated by ORNL, managed by DOE-Office of Science, which, under agreement with DOE OREM, transferred the waste for storage, treatment and disposal. TWPC began treatment of supernate (liquid) recovered from ORNL's waste water treatment process storage tanks in 2004 and was completed in nine months. Since late 2005, TWPC has been processing containerized solid debris waste. Currently, TWPC receives contact handled (CH) TRU waste (i.e., surface dose rates < 200 mrem/hr) generally packaged in drums and large metal boxes. TWPC also receives remote handled (RH) TRU waste (i.e., surface dose rates > 200 mrem/hr) generally packaged in large concrete casks. The objective of TWPC treatment processes is to safely open, sort, segregate, treat, repackage characterize, certify and ship the waste received from ORNL to a disposal facility. The resultant waste streams from TWPC processes may be low-level radioactive or treated mixed hazardous low-level waste which is disposed at Nevada Nuclear Security Site. Waste which is TRU in its final form (i.e., > 100 nCi/g of alpha emitting radionuclides with half-life exceeding 20 years) is certified by the Central Characterization Project, managed by the DOE Carlsbad Field Office, for disposal at the Waste Isolation Pilot Plant (WIPP), in Carlsbad, New Mexico. The process lines at TWPC treating CH TRU waste are the CH Glovebox (CHGB) and the Box Breakdown Area (BBA). The CHGB receives up to 85-gal drums through an integral airlock for opening, sorting and segregating. During processing, any items that are prohibited by the disposal facility waste acceptance criteria (WAC) are segregated and/or rendered acceptable. The CHGB is maintained under a negative pressure and waste processing can be done ergonomically in minimal protective clothing. The BBA can accommodate drums larger than 85-gal, drums that are too heavy to be loaded into the CHGB, and large metal boxes. The BBA is a large stainless steel containment maintained under negative pressure into which operators enter in breathing air-supplied plastic suits. Containers are opened and the waste is removed for passing to the adjacent and connected CHGB for further processing, or is processed directly in the BBA.

RH TRU waste treatment processing is conducted in the Hot Cell using remotely operated manipulators. The Hot Cell offers the advantage for operators to treat the waste with minimal exposure in standard work clothing. However, processing using manipulators is tedious and time consuming, and is challenging ergonomically. During early RH TRU waste processing, TWPC determined that a very large percentage of the waste taken from the concrete casks was actually lower activity waste, considerably below 200 mrem/hr. In an effort to increase processing efficiency, TWPC constructed the Cask Processing Enclosure (CPE), which, similar to the BBA, allows operators to enter a negative-pressure containment in breathing air-supplied suits. The casks are trolleyed into the CPE enclosure through a series of airlocks and transferred to a large, motor-driven tilter device which mates to the top of the cask to a down-draft sorting table. The operators then directly access the waste for performing sorting, segregating and processing activities.

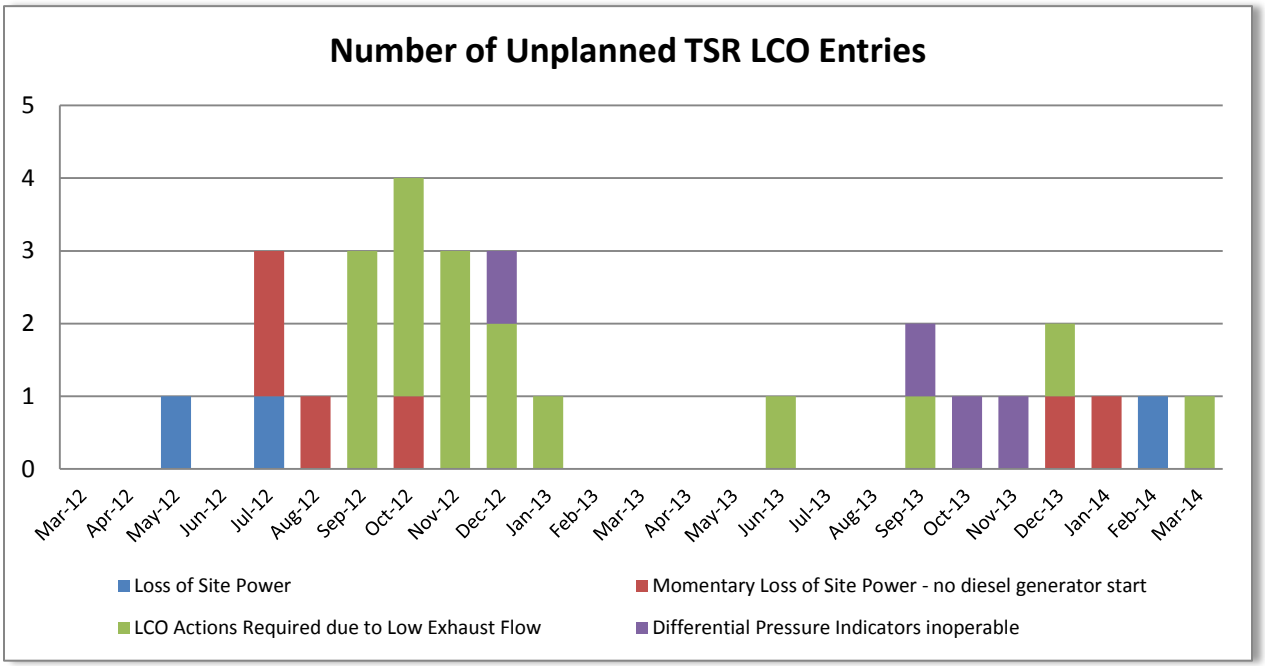
The safety-related systems employed at TWPC to protect the public, the worker and the environment include two active safety significant systems: the Fire Suppression System (FSS) and the Main Building Ventilation System (MBVS); and a designated worker-safety system which consists of two breathing air system (BAS) units, one for the BBA and one for the CPE. Additionally, TWPC maintains all required OSHA and NFPA life-safety systems, such as fire extinguishers, eye wash stations, communication systems, emergency lighting, etc.

As demonstrated in this extent of condition review, TWPC plans for and allocates adequate resources to maintain safety-related systems and equipment, and to keep critical structures, systems and components in a high state of operational readiness. TWPC maintains configuration control and support system infrastructure to ensure safety-related system reliability.

When available, the data used to support the extent of condition review was retrieved from electronic databases, such as the issues tracking system and the document control management system. Much of the data was obtained from a line-by-line review of hand-written operating logs for the 24 month period designated for assessment. The data was then plotted on a timeline to analyze for trends. Conclusions are provided from each analysis, and, where appropriate, corrective actions are identified, most of which are already completed or in progress.

2.0 EXTENT OF CONDITION FACTORS

2.1 Factor 1 – Number of Unplanned TSR LCO Entries



- Identify and analyze trends:

  – Of the 29 unplanned entries into limiting condition for operation (LCO) actions, four resulted from discovery of an inoperable High-Efficiency Particulate Air (HEPA) filter differential pressure indicator during rounds. In June of 2013, upgrades to the ventilation system controls allowed the differential pressure indicators to be removed as credited components and the associated LCO actions removed from the Technical Safety Requirement (TSR).

  – The remaining 25 unplanned entries into LCO actions were related to ventilation flow, either due to a loss of site power, a momentary drop in site power during which the delayed-start diesel generator did not actuate, or due to a drop in ventilation exhaust flow below required limits:

    - Loss of Site Power..... 3
    - Momentary Loss of Site Power – no diesel generator start..... 6
    - Actions Required due to Low Exhaust Flow..... 16

  – Data recovered from the narrative logbooks indicates that 9 of the 16 low exhaust flows occurred on the weekend or when the plant was otherwise unmanned and in STANDBY mode. The ventilation system has an automatic call-out system which contacts personnel to respond to the low flow condition, enter the LCO action, and complete recovery within the prescribed timeframe. When the plant is in OPERATION mode, the initial LCO action for low exhaust flow can be entered and recovered while processing operations continue, which is typically the case.

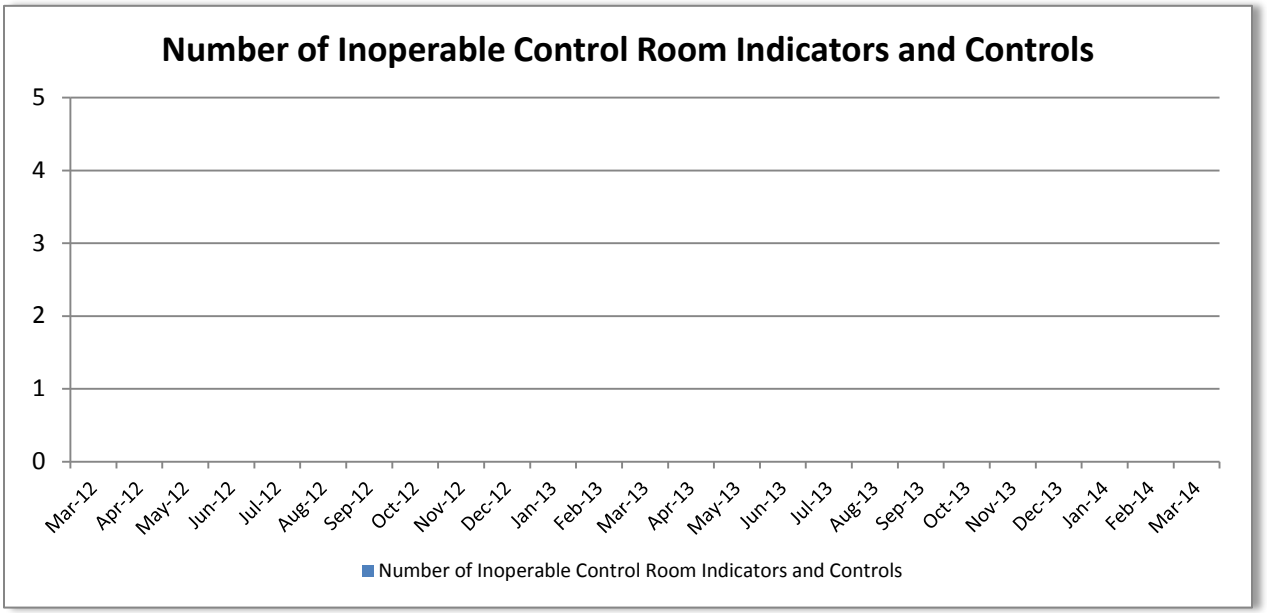
- Conclusions:
  - LCO action statements are entered as necessary to maintain compliance with technical safety requirements.

    NOTE 1: In addition to the automatic call-out feature, the Process Building Ventilation System has an alarm system that is monitored locally and at a remote central alarm station staffed 24/7 by ORNL.

    NOTE 2: In both of the loss of site power scenarios (Loss of Site Power and Momentary Loss of Site Power – no diesel generator start), power to ventilation fans is instantaneously secured and does not automatically restart upon restoration of either normal power or diesel generated power. Both scenarios require personnel response, entry into LCO actions and recovery of the ventilation system.

- Corrective actions:
  - None required.

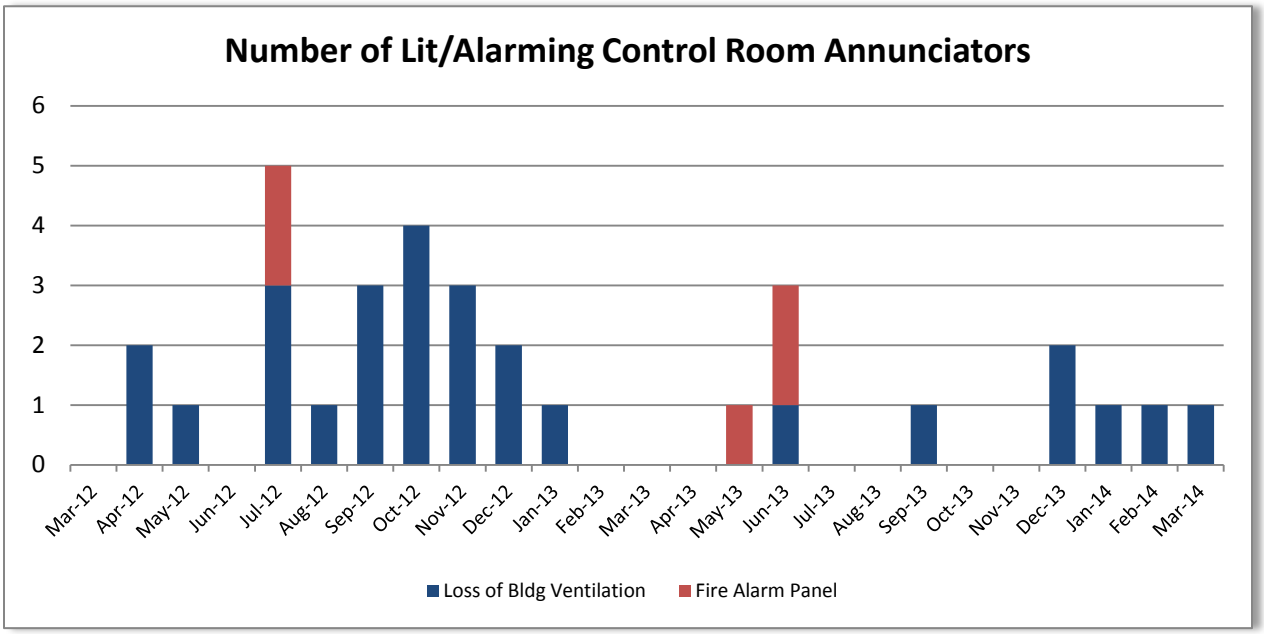
2.2 Factor 2 – Number of Inoperable Control Room Indicators and Controls



- Identify and analyze trends:
  - Although TWPC does not have a formally recognized "Control Room," there is a central station manned when the plant is in operation mode by the shift superintendents where the two credited safety significant systems (Fire Suppression and Building Ventilation) alarms are monitored. These alarms are also continuously monitored at the Central Alarm Station by ORNL emergency response personnel, and provide an automated call-out to designated shift superintendents. There have been no instances of inoperable indicators or controls in the past 24 months. All computer based (Programmable Logic Controller) alarms and controls are routinely scanned by the microprocessor and checked for an alarm condition. If an alarm condition exists after a scan then the microprocessor initiates an audible/visual annunciation.

- Conclusions:
  - Indicators and alarms are operating reliably.
- Corrective actions:
  - None required.

2.3 Factor 3 – Number of Lit/Alarming Control Room Annunciators



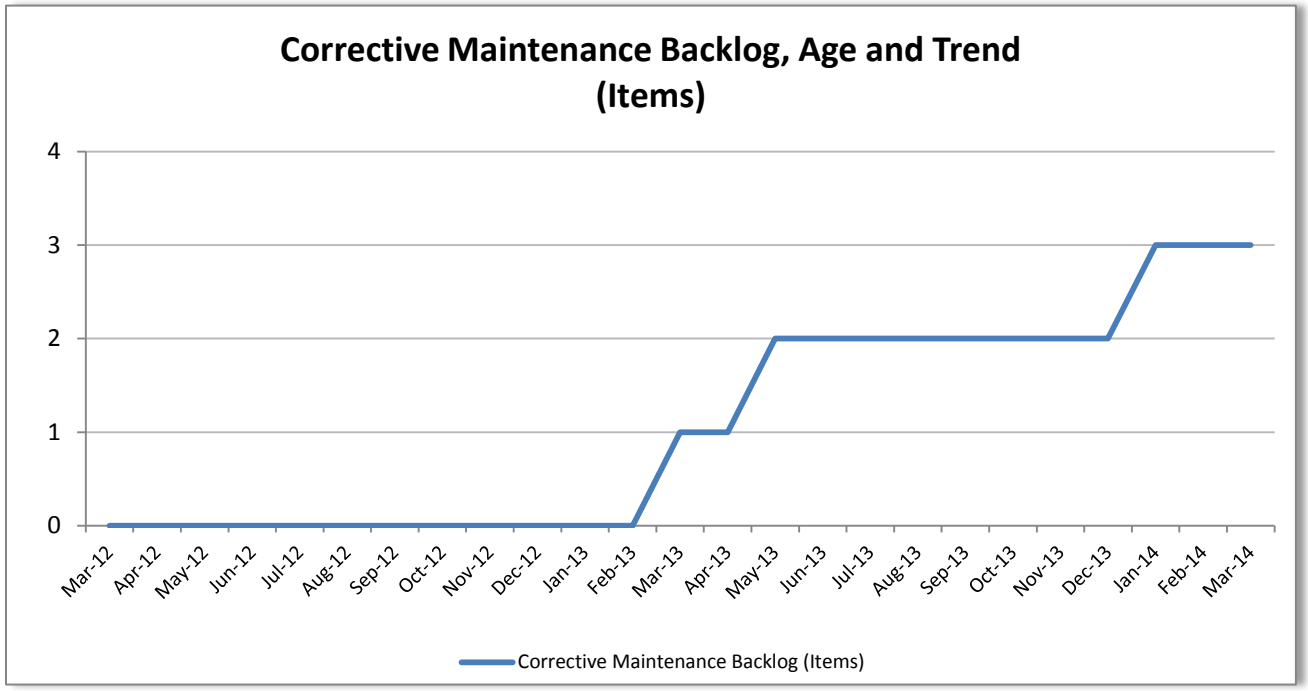
- Identify and analyze trends:
  - Although TWPC does not have a formally recognized "Control Room," the two credited safety significant systems (Fire Suppression and Building Ventilation) have alarm systems that are monitored locally and at a remote central alarm station staffed 24/7 by ORNL. Additionally, the systems have automatic call-out features to TWPC facility management staff when the facility is unmanned. Loss of Site Power results in a loss of main building ventilation and activation of alarms and a call-out.

    NOTE 1: Four of the Fire Alarm Panel actuations were supervisory alarms (i.e., resulting from a change in a monitored condition as opposed to system actuation); and one was associated with duct heater H-202 overheating event.

    NOTE 2: There were 27 alarms associated with main building ventilation. As indicated in Factor 1, there were 25 unplanned entries into TSR LCO actions as a result of main building ventilation. The remaining two were planned maintenance activities that required securing main building ventilation, and were therefore "planned" entries into the LCO actions in April of 2012.
- Conclusions:
  - All indicators, alarms (local and remote) and automatic call-outs are operating reliably.

- Corrective actions:
  - None required.

2.4 Factor 4 – Corrective Maintenance Backlog, Age and Trend



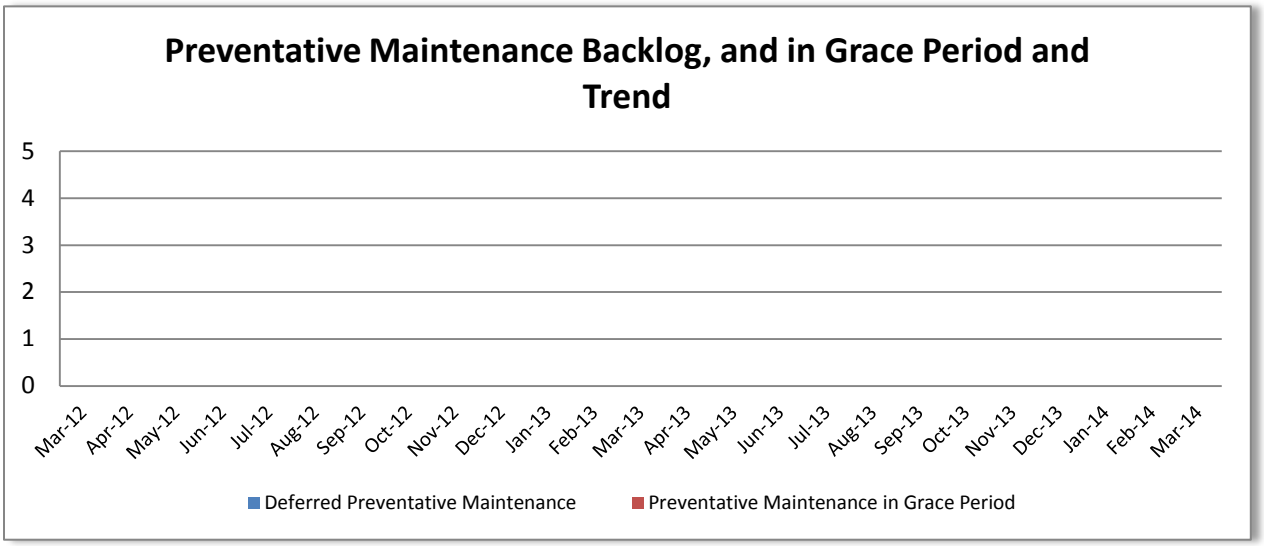
- Identify and analyze trends:
  - Total Corrective Maintenance actions implemented by procedures for the reporting period are 1099 with one action deferred. Those implemented include:
    - 490 for Site Support Areas
    - 609 for Waste Processing Areas
  - The deferred corrective maintenance procedure action:
    - May 2013 – troubleshoot and repair a minor leak on the back-up breathing air bottles at the response trailer that serves to support emergency evacuation of personnel on breathing air from the CPE. The leak was evaluated and determined to be extremely minor and inconsequential. It was routinely monitored until the repair was completed on April 29, 2014.
  - Total Corrective Maintenance Work Orders for the reporting period are 170 with the following two deferred per Operations direction:
    - March 2013 – CM-13-009: Replace existing upper windows on CPE Personnel Airlock Doors PD-35, PD-36, PD-38, and PD-39 with Poly Filer Pad and Woven Wire Fabric curtain configuration in accordance with Revision 1 of DCN-AR-004. Replace RD1-36 and RD1-38 Bi-Fold Door hinge sets as necessary in accordance with FCR-ME-363. (Remains outstanding and is being considered for deletion.)

- January 2014 – CM-14-005: Attach additional counterweight to roll down door at Glovebox Station #1 in accordance with DCN-ME-177. Adjust the band cylinder as necessary. (Remains outstanding for scheduling.)

- Conclusions:
  - Out of 1269 maintenance actions identified in the 24 month period, three non-critical repairs were evaluated and deferred until the work could be appropriately prioritized with operations. One of the three is being evaluated for cancelation.

- Corrective actions:
  - None required. TWPC remains diligent in evaluating and scheduling identified maintenance actions to ensure the facility processes and systems are performing safely and efficiently.

2.5 Factor 5 – Preventative Maintenance Backlog, and in Grace Period and Trend

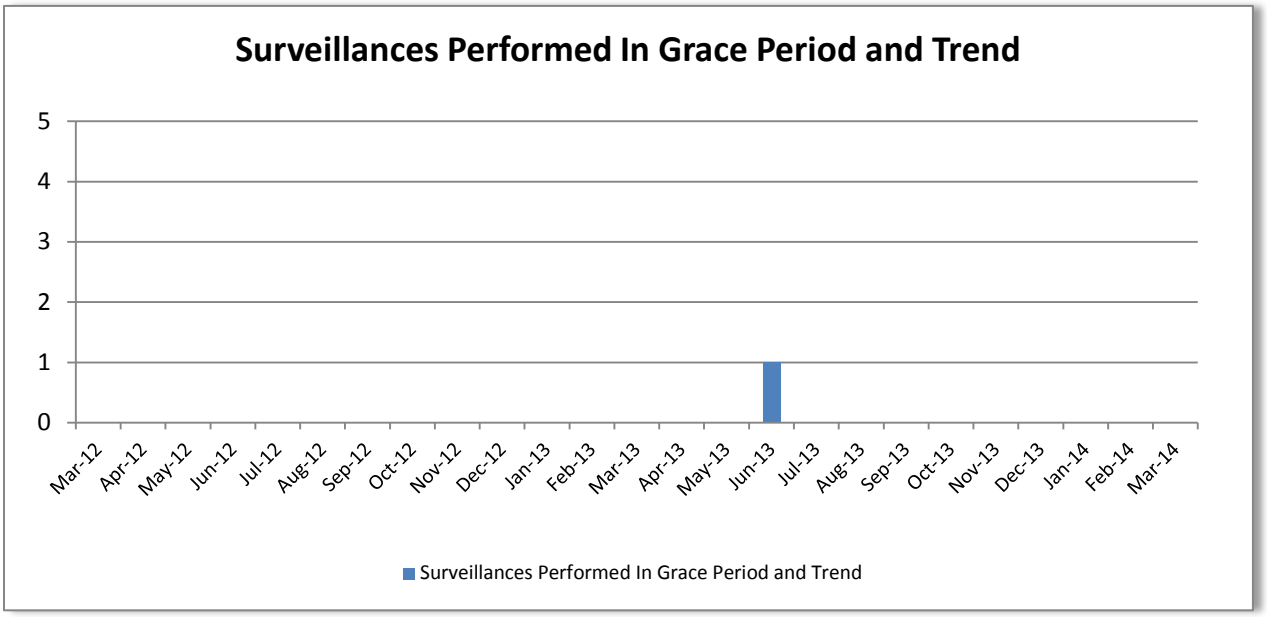


- Identify and analyze trends:
  - There were a total of 1,049 preventative maintenance actions for this reporting period. None have been deferred or remain open.

- Conclusions:
  - There are adequate resources to conduct preventative maintenance within the prescribed timeframes.

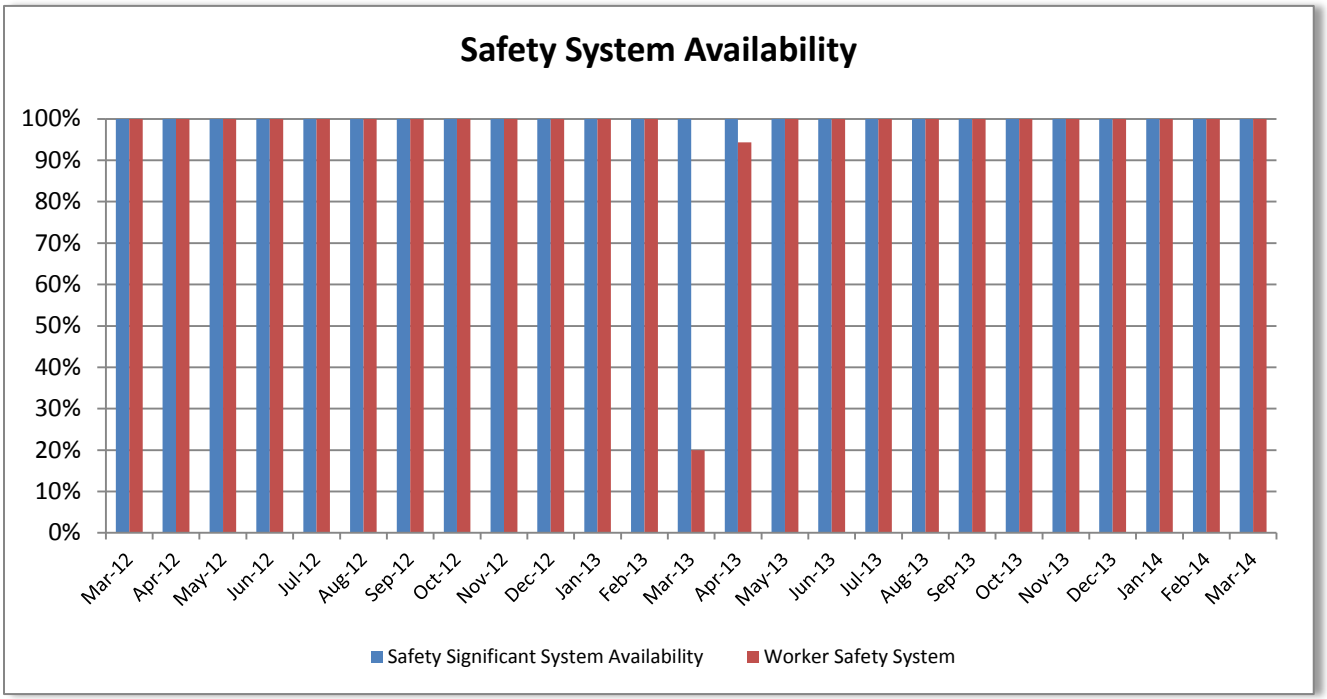
- Corrective actions:
  - None required.

2.6 Factor 6 – Surveillances Performed in Grace Period and Trend



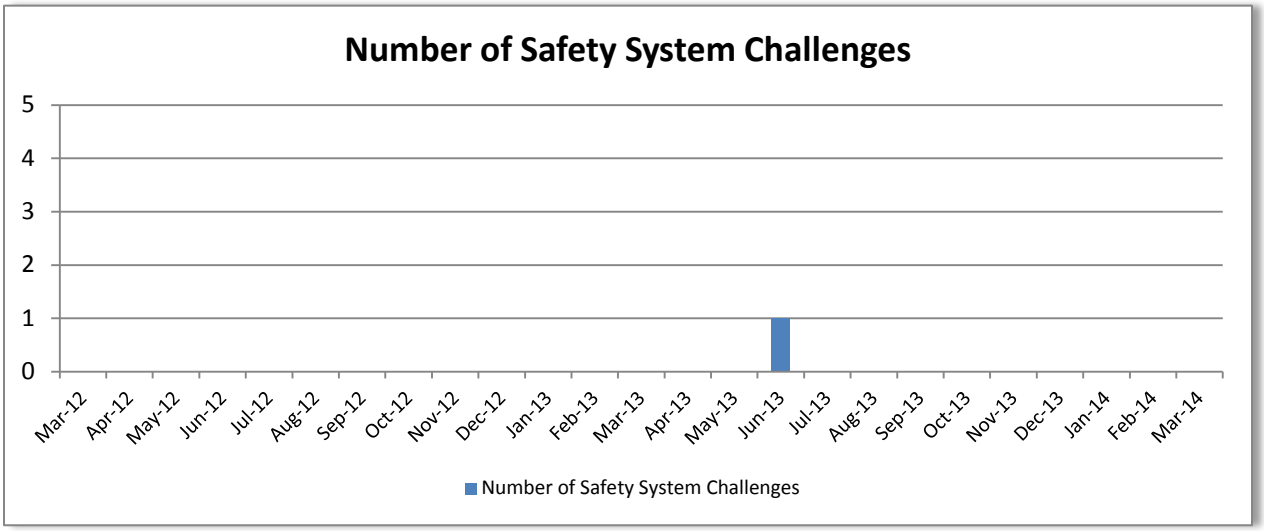
- Identify and analyze trends:
  - During the 24 month period, all but one of the surveillances were accomplished within the prescribed periodicity. One surveillance; TSR Surveillance Requirement 4.4.4, which was performed within the grace period. TSR Surveillance Requirement 4.4.4 requires the following: Calibrate or replace the Box Breakdown Area hood face exhaust air flow anemometer to ensure the instrument error is less than or equal to 12 fpm.
- Conclusions:
  - The appropriateness of the calibration methodology used on the anemometer was challenged. TWPC did not have an available replacement anemometer. As a result, the existing air flow anemometer remained in service until a replacement was obtained that could be calibrated using a different methodology and was replaced within the surveillance grace period.
- Corrective actions:
  - None required.

2.7 Factor 7 – Safety System Availability



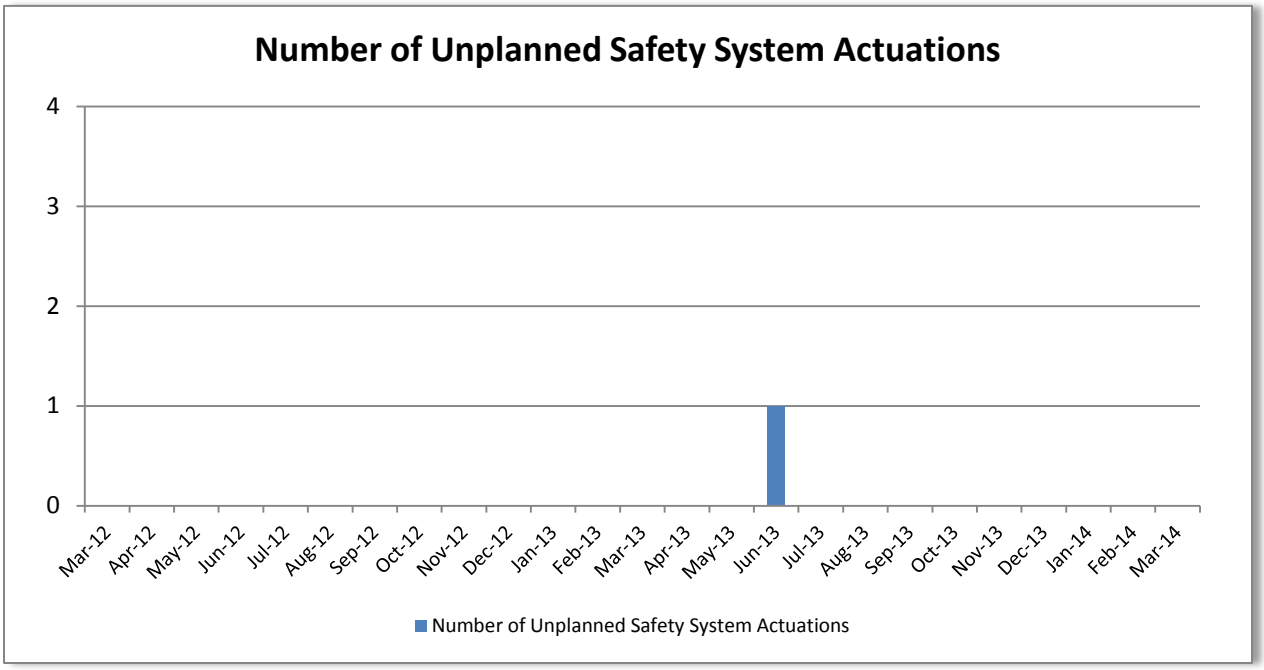
- Identify and analyze trends:
  - During the 24 month period, Safety Significant System Availability (Fire Suppression System and Main Building Ventilation) was 100% with the exception of planned maintenance outages. The Worker Safety System (Breathing Air System), with the exception of planned maintenance outages, was not fully available in March (20% available) and April of 2013 (95% available) while a redesign was implemented in response to a loss of breathing air event.
- Conclusions:
  - Safety System availability is maintained to support operations.
- Corrective actions:
  - None required.

2.8 Factor 8 – Number of Safety System Challenges (Number of times a safety system has been demanded to respond or be manually initiated)



- Identify and analyze trends:
  - There has been one safety system challenge in the past two years. On June 23, 2013, while the plant was in standby and unattended, a sprinkler head was actuated in Room 327 in response to overheating of duct heater H-202. The cause of overheating was the duct heater automatically re-energized after power was momentarily lost, while a tripped exhaust blower did not automatically re-energize. In addition, plant personnel did not respond to the automated loss of ventilation call out system in a timely manner, which enabled the build-up of heat from the energized heater with no air flow.
- Conclusions:
  - TWPC operations do not routinely result in unnecessary challenges to safety systems.
  - TWPC safety systems perform properly when challenged.
- Corrective actions:
  - As a result of this event, H-202 has been de-energized and placed out of service. Following an engineering and operations review, duct heater H-202 has been restricted from service as a device to supplement drying capacity for building ventilation.
  - TWPC has added more formality to the roles and responsibilities of shift superintendents on the designated response roster. This includes fitness for duty requirements and continuous monitoring of company-supplied mobile phones when in rotation as lead responder.
  - An extent of condition review was performed on other process building system devices designed with resistive heating elements and it was confirmed that they have appropriate interlocks with the ventilation system.

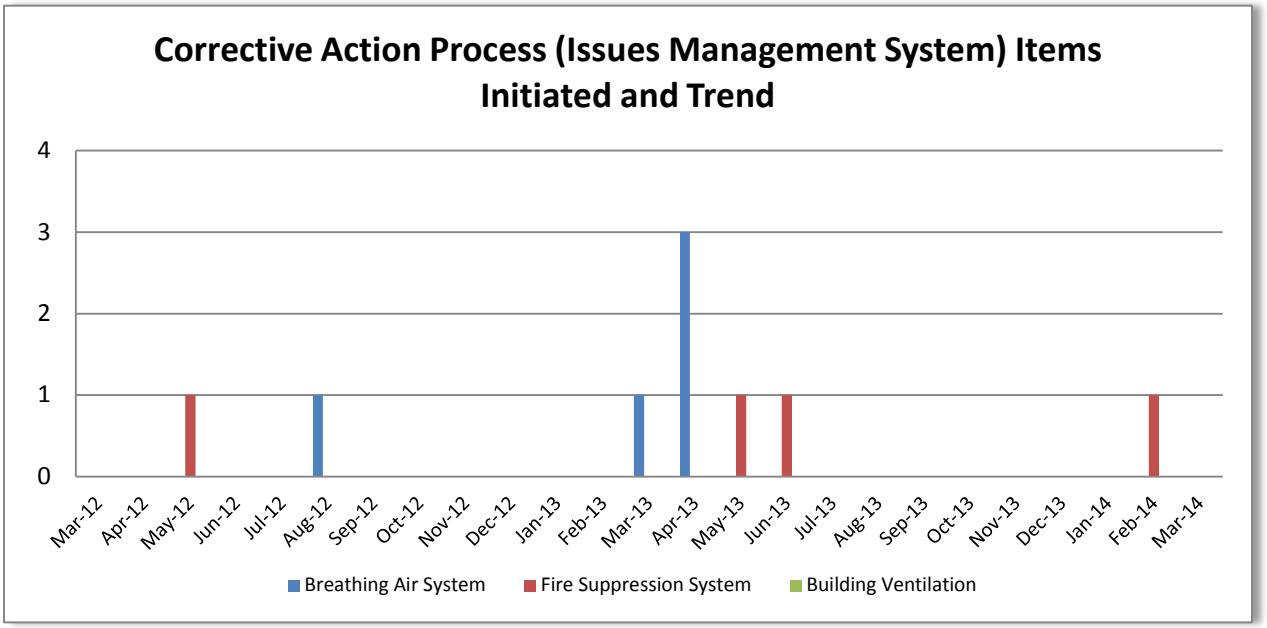
2.9 Factor 9 – Number of Unplanned Safety System Actuations



- Identify and analyze trends:
  - There has been one unplanned actuation of a safety system in the past two years. On June 23, 2013, while the plant was in standby and unattended, a sprinkler head was actuated in Room 327 in response to overheating of duct heater H-202. The cause of overheating was the duct heater automatically re-energized after power was momentarily lost, while a tripped exhaust blower did not automatically re-energize. In addition, plant personnel did not respond to the automated loss of ventilation call out system, which enabled the build-up of heat from the energized heater with no air flow.
- Conclusions:
  - TWPC operations do not routinely result in unnecessary challenges to safety systems.
  - TWPC safety systems perform properly when challenged.
- Corrective actions:
  - Duct heater H-202 had been repurposed from service as an evaporator heater to supplement drying capacity for building ventilation. (Corrective action completed.)
  - An extent of condition review determined that all other building duct heaters have integral interlocks to secure the heater upon loss of air flow. (Corrective action completed.)
  - H-202 duct heater was mechanically and electrically isolate and place out of service. (Corrective action completed.)

– TWPC has added more formality to the roles and responsibilities of shift superintendents on the designated response roster. This includes fitness for duty requirements and continuous monitoring of company-supplied mobile phones when in rotation as lead responder. (Corrective actions have been completed.)

2.10 Factor 10 – Corrective Action Process (Issues Management System) Items Initiated and Trend



- Identify and analyze trends:

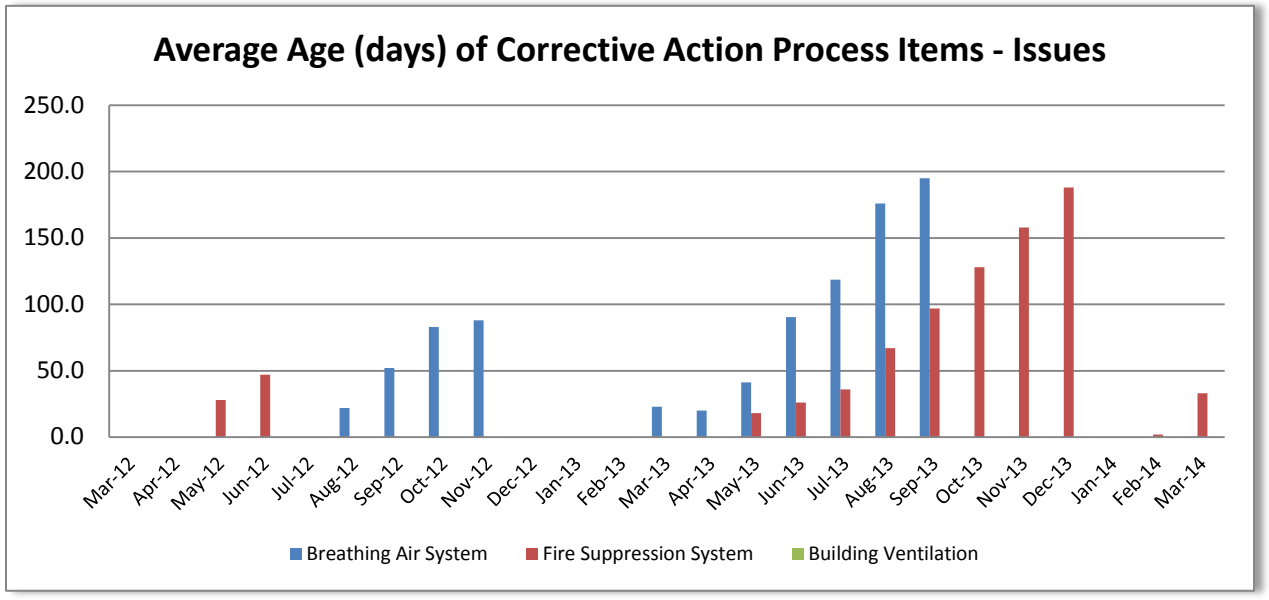
Issue	Opened	Closed	Description
Breathing Air Systems			
CAR-2012-037	8/9/2012	11/5/2012	Procedure violation, CH-P-OP-033, R11, Continuous Flow Breathing Air Purifier
IR-2013-004	3/8/2013	9/19/2013	Loss of Breathing Air Flow to the BBA
CAR-2013-005	4/15/2013	5/9/2013	Operations procedure for monitoring BAS parameters referenced the incorrect gauge
CAR-2013-006	4/24/2013	5/14/2013	Procedure Violation for RH-UET-OP-106, CPE Continuous Flow Breathing Air
CAR-2013-007	4/24/2013	7/25/2013	Less than adequate (LTA) procedure preparation, verification/validation (V&V), Page Change Notice (PCN) formatting and PCN distribution
Fire Suppression System			
CAR-2012-021	5/3/2012	6/19/2012	Wrong revision of valve line-up attachments from UT-UET-OP-517 in valve line-up binder
IR-2013-006	5/8/2013	5/16/2013	Fire Alarm (false fire alarm) received at the Control Point
IR-2013-009	6/25/2013	12/30/2013	Activation of Fire Suppression System
DR-2014-028	2/26/2014	(still open)	Deficient Commercial Grade Dedication (CGD) package associated with TWPC FSS

Several of the CARs generated address issues associated with procedure inadequacies. These noted conduct of operations issues have been noted and addressed through the addition of conduct of operations mentors and both classroom and on-the-job training improvements.

- Conclusions:
  - Issues are captured in the issues management system to document investigation, causal determination, and corrective action planning.
- Corrective actions:
  - Actions taken to strengthen TWPC's Conduct of Operations Program, specifically in the development, approval, and use of procedures. Actions are complete and notable improvements are realized.

2.11 Factor 11 – Average Age of Open Corrective Action Process Items (Both Open Issues and Open Corrective Actions)

2.11.1 Average Age of Issues



- Identify and analyze trends:

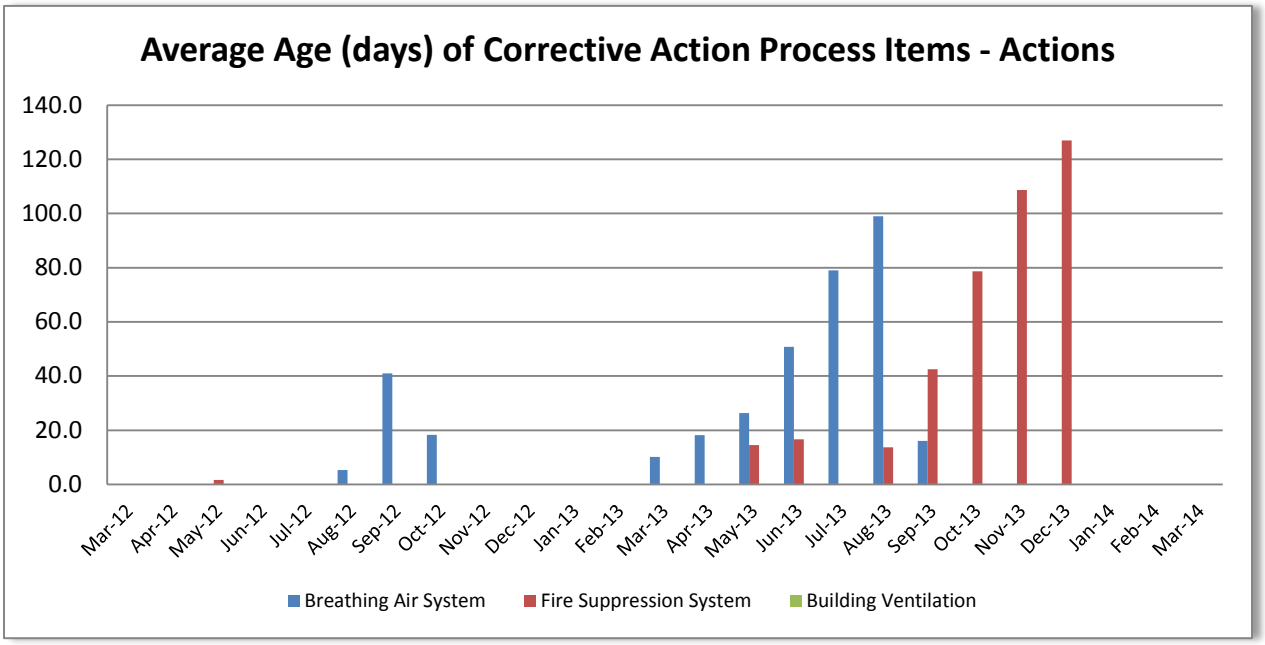
Issue	Opened	Closed	Age (days)	Description
Breathing Air Systems				
CAR-2012-037	8/9/2012	11/5/2012	88	Procedure violation, CH-P-OP-033, R11, Continuous Flow Breathing Air Purifier
IR-2013-004	3/8/2013	9/19/2013	195	Loss of Breathing Air Flow to the BBA
CAR-2013-005	4/15/2013	5/9/2013	24	Operations procedure for monitoring BAS parameters referenced the incorrect gauge

Issue	Opened	Closed	Age (days)	Description
CAR-2013-006	4/24/2013	5/14/2013	20	Procedure Violation for RH-UET-OP-106, CPE Continuous Flow Breathing Air
CAR-2013-007	4/24/2013	7/25/2013	92	LTA procedure prep, V&V, PCN formatting and PCN distribution
Average days open - Breathing Air System			83.8	
Fire Suppression System				
CAR-2012-021	5/3/2012	6/19/2012	47	Wrong revision of valve line-up attachments from UT-UET-OP-517 in valve line-up binder
IR-2013-006	5/8/2013	5/16/2013	8	Fire Alarm (false fire alarm) received at the Control Point
IR-2013-009	6/25/2013	12/30/2013	188	Activation of Fire Suppression System
DR-2014-028	2/26/2014	(still open)	33	Deficient attributes of the TWPC FSS engineered design features
Average days open - Fire Suppression System			69.0	(Not counting DR-2014-028)

No apparent trends are noted.

- Conclusions:
  - Issues are captured in the TWPC issues management system to document investigation, causal determination, and corrective action planning. Response to some issues requires significant technical analysis, demands significant management resources and time to determine appropriate corrective actions and actions to prevent recurrence. TWPC commits the appropriate amount of time and resources to development, tracking and closure of effective corrective actions.
- Corrective actions:
  - None required.

2.11.2 Average Age of Actions



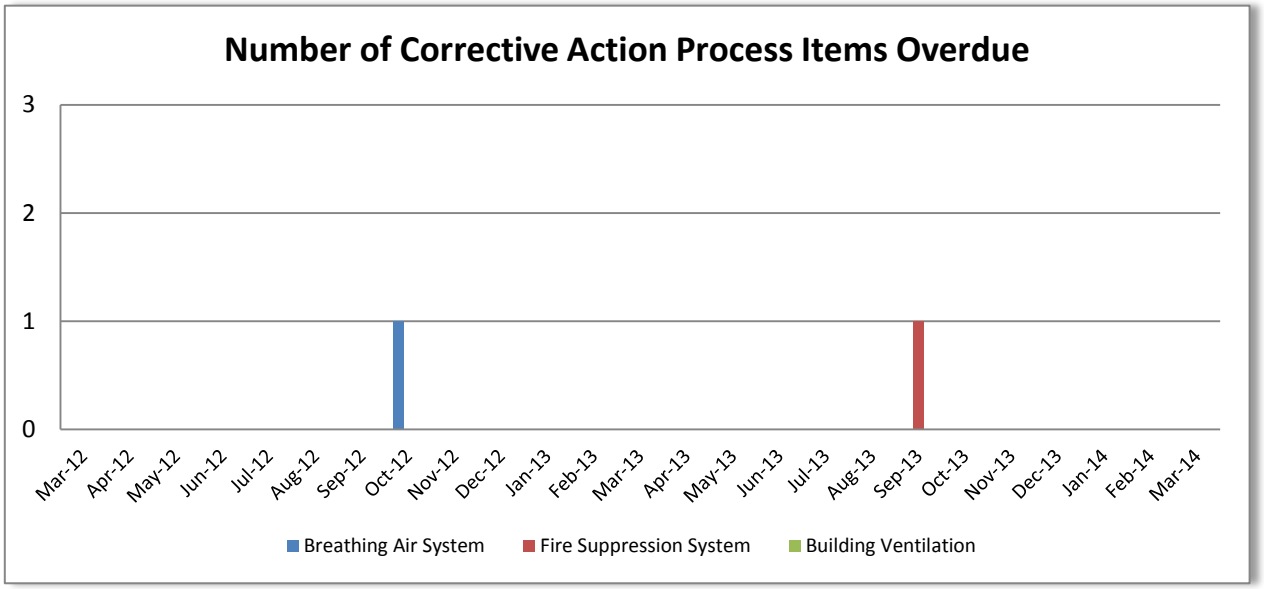
- Identify and analyze trends:

Issue	Avg. days to Close Actions	Description
Breathing Air Systems		
CAR-2012-037	13.0	Procedure violation, CH-P-OP-033, R11, Continuous Flow Breathing Air Purifier
IR-2013-004	34.1	Loss of Breathing Air Flow to the BBA
CAR-2013-005	7.7	Operations procedure for monitoring BAS parameters referenced the incorrect gauge
CAR-2013-006	9.0	Procedure Violation for RH-UET-OP-106, CPE Continuous Flow Breathing Air
CAR-2013-007	39.9	LTA procedure preparation, V&V, PCN formatting and PCN distribution
Average days open - Breathing Air System	20.7	
Fire Suppression System		
CAR-2012-021	1.7	Wrong revision of valve line-up attachments from UT-UET-OP-517 in valve line-up binder
IR-2013-006	1.0	Fire Alarm (false fire alarm) received at the Control Point
IR-2013-009	43.0	Activation of Fire Suppression System
DR-2014-028	(open)	Deficient attributes of the TWPC FSS engineered design features
Average days open - Fire Suppression System	15.2	(Not counting DR-2014-028)

No apparent trends are noted.

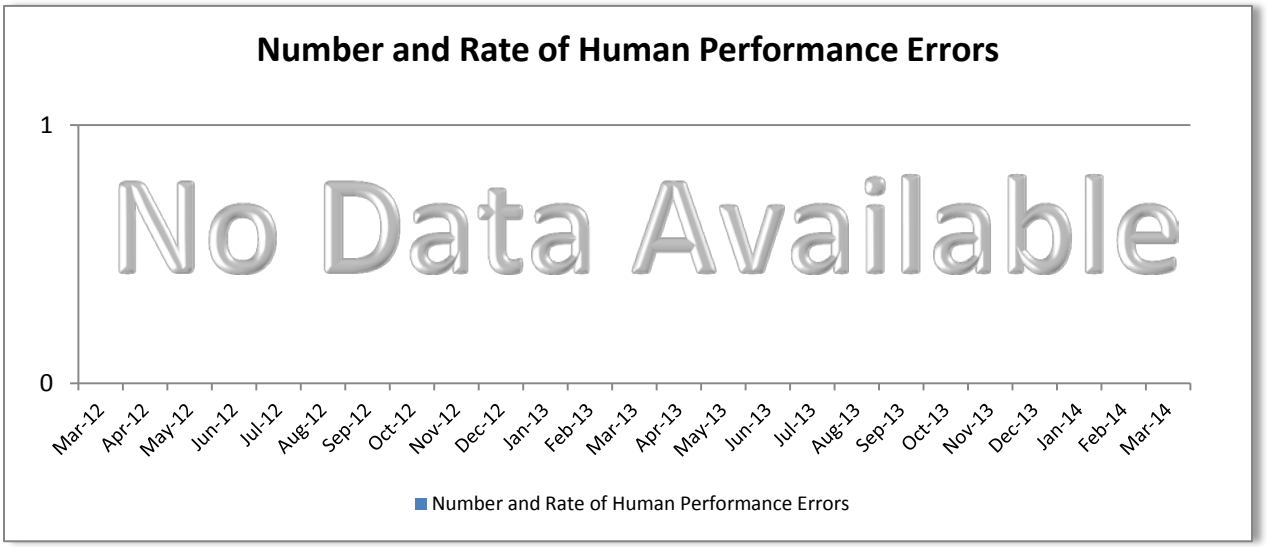
- Conclusions:
  - Corrective Actions are captured and tracked to closure in the issues management system. Time to complete determined actions is often influenced by the complexity of the issue. An independent review of closure evidence is typically conducted by the TWPC Quality Assurance organization.
- Corrective actions:
  - None required, as program is working as intended.

2.12 Factor 12 – Number of Corrective Action Process Items Overdue



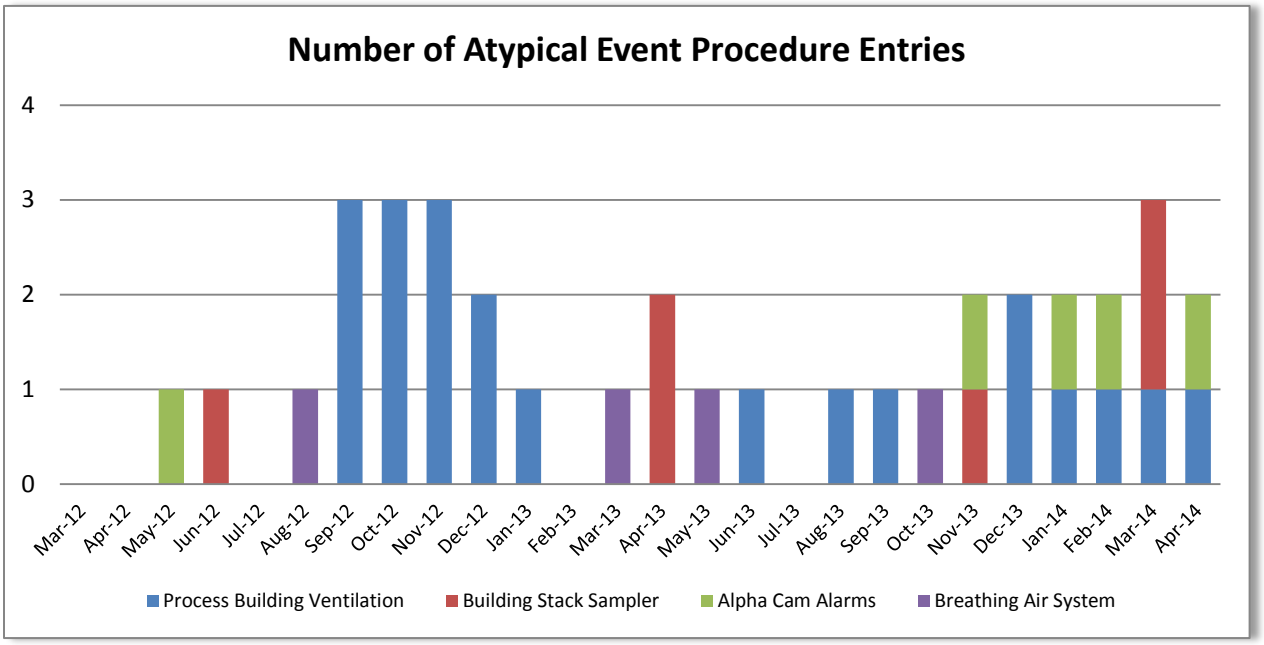
- Identify and analyze trends:
  - During the two year reporting period, there were two overdue actions associated with issues in safety systems: one associated with a Breathing Air System issue (CAR-2012-037) was overdue by 9 days; and one associated with a Fire Suppression System issue (IR-2013-009) was overdue by 11 days.
- Conclusions:
  - TWPC places necessary management attention and applies adequate resources to support timely closure of actions associated with safety-related systems. TWPC management directs appropriate attention to issues tracking and timely closure.
- Corrective actions:
  - None required.

2.13 Factor 13 – Number and Rate of Human Performance Errors



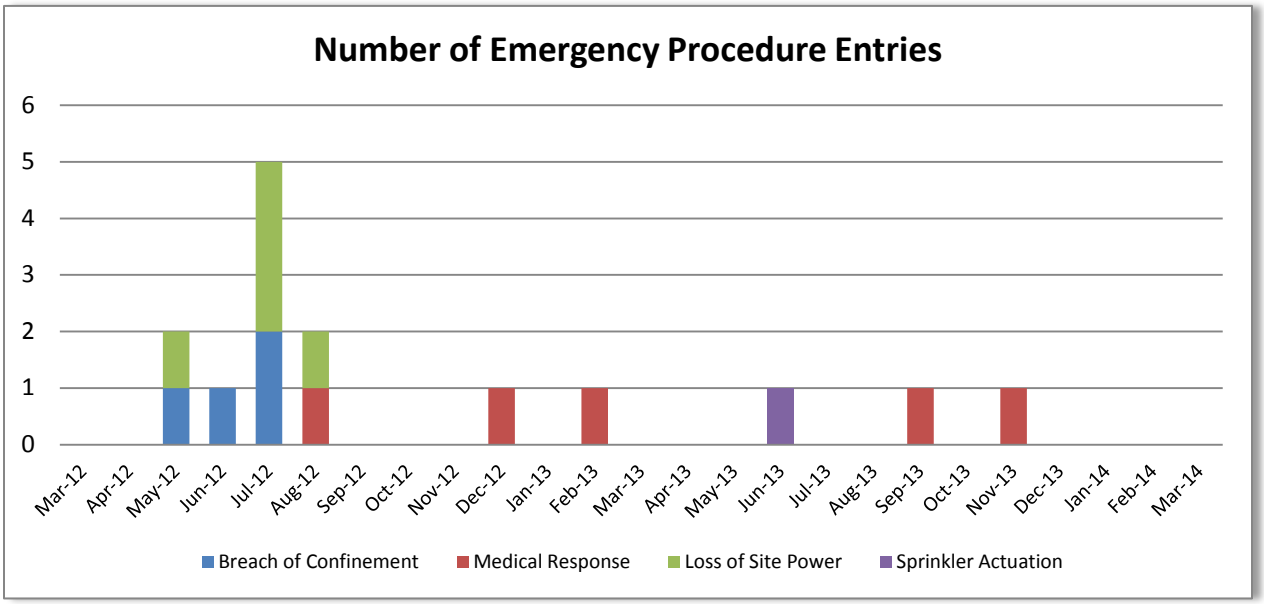
- Identify and analyze trends:
  - TWPC recognizes Human Performance Indicators as one of several causal determination methods in their recently revised and implemented Deficiency Reporting procedure. However, TWPC has just recently started tracking and trending Human Performance Errors.
- Conclusions:
  - TWPC provides training and discusses Human Performance Indicators and Error-likely Precursors in pre-job briefs. The results of recent Safety Conscious Work Environment (SCWE) surveys and assessments indicate that improvements to TWPC's "reporting culture" as warranted. TWPC is taking action to improve the manner in which human performance data is collected and trended.
- Corrective actions:
  - Improvements to the collection and trending of human performance data will be captured as a corrective action to the recent SCWE assessment results.

2.14 Factor 14 – Number of Abnormal Procedure Entries



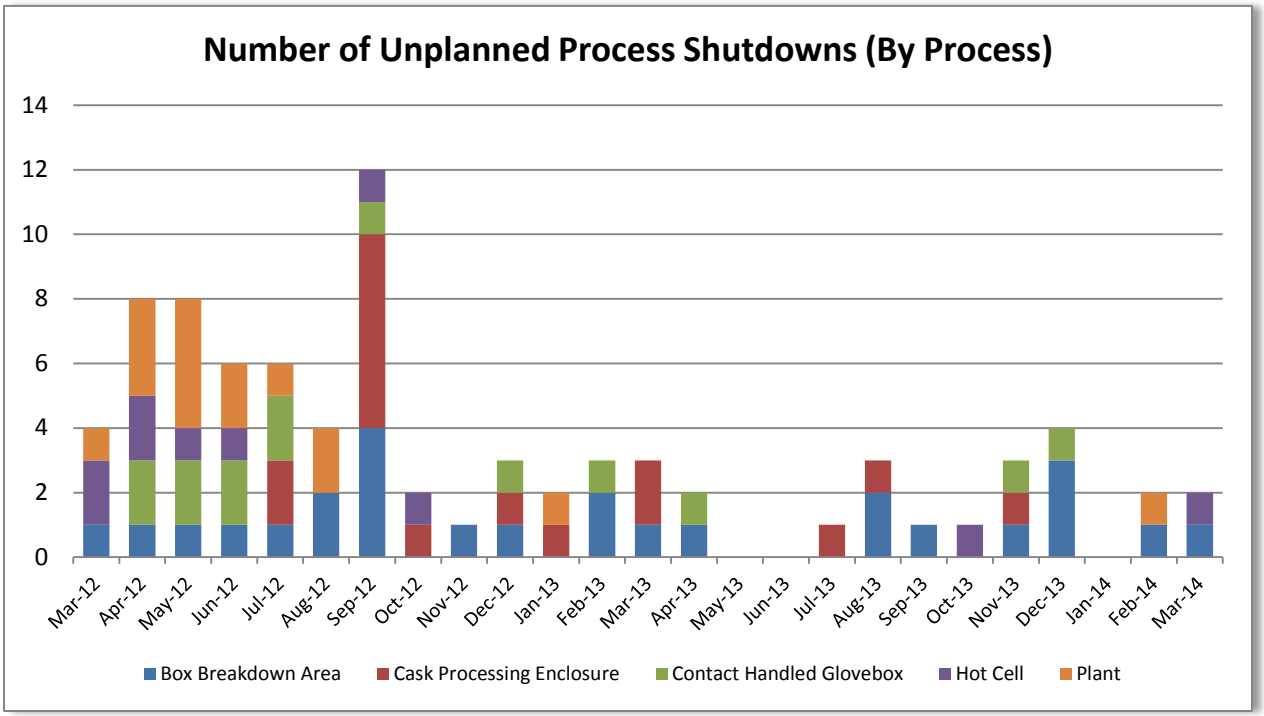
- Identify and analyze trends:
  - The 36 entries into the Atypical Events Procedure can be broken down into 4 categories:
    - 21 process building ventilation;
    - 6 building exhaust stack sampler equipment;
    - 5 alpha cam alarms - four of which turned out to be equipment related issues; and
    - 4 breathing air system - one of which resulted in an expedited egress.
  - In August of 2013, loss of site power was re-categorized from an emergency event to an atypical event. Three process building ventilation system issues can be attributed to loss of power after that date, which had a minor impact on the slightly increasing trend in entering the Atypical Event Procedure.
- Conclusions:
  - The relatively steady trend in entering Atypical Events Procedure is indicative of a good response process in an operating plant with a low threshold for and evaluating events.
- Corrective actions:
  - None required.

2.15 Factor 15 – Number of Emergency Procedure Entries



- Identify and analyze trends:
  - Five of the 13 emergency events occurring between May 2012 and August 2013 were related to loss of site power events. In August of 2013, loss of site power was re-categorized from an emergency event to an atypical event. Discounting the loss of power events, emergency procedure entries have averaged less than once every two months, with a notable decline in the past year (three total).
- Conclusions:
  - The 15 emergency events can be broken down into three categories:
    - Loss of power (5);
    - Medical response (5); and
    - Breach of confinement [i.e., CAM alarm] (4).
  - Additionally, the sprinkler system actuation resulted in an Unplanned Safety System Actuation and a Safety System Challenge with respect to this Extent of Condition inquiry. Of the five medical responses, two were personal illnesses and three resulted in first aid or no attention required.
- Corrective actions:
  - None required.

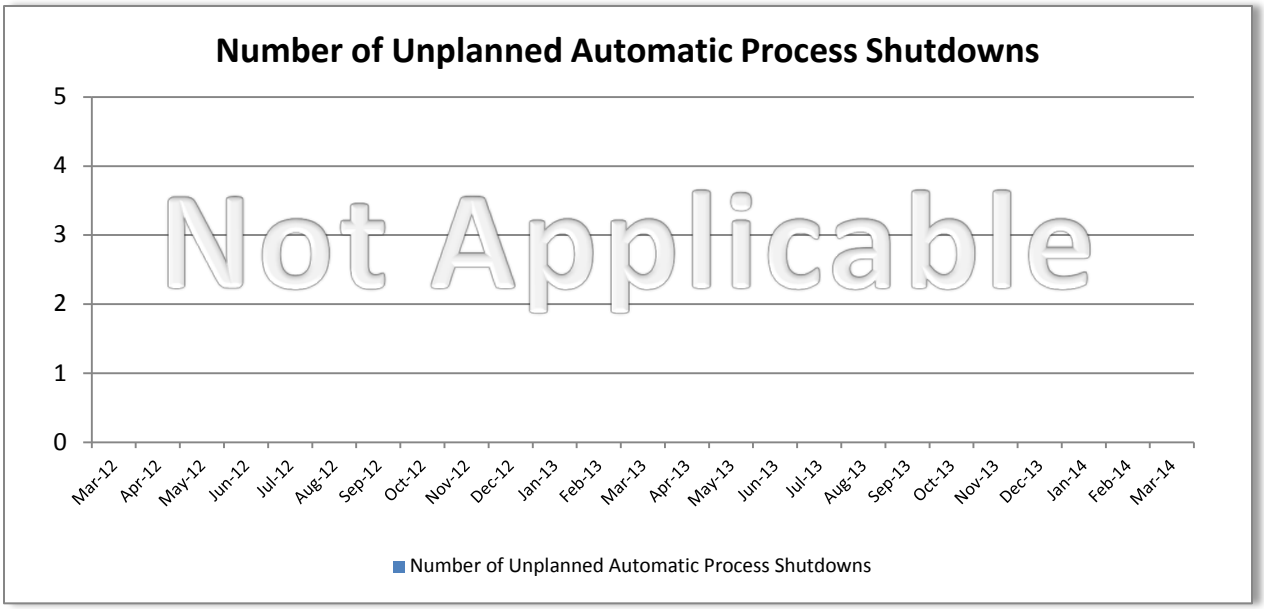
2.16 Factor 16 – Number of Unplanned Process Shutdowns



- Identify and analyze trends:
  - 51 of the 81 unplanned process shutdowns were 1/2 day responses to transient conditions (e.g., airhead spikes, holes in gloves, ventilation adjustments, discoveries in waste matrix, etc.). Of the remaining 43, 16 required corrective maintenance, taking anywhere from 1 to 16 days to complete. There is a declining trend in the number of unplanned shutdowns, as 59 occurred during the year from March of 2012 through February of 2013, while only 22 occurred in the one year period since.
- Conclusions:
  - While there is a declining trend, TWPC waste processes remain susceptible to unplanned shutdowns. Although TWPC has exceeded its plant life expectancy by several years, TWPC maintains a cadre of highly skilled and cross-trained maintenance technicians with exceptional capabilities to repair electrical and mechanical systems. This high level of skill and ability to respond quickly has minimized the time lost due to transient conditions. In addition, TWPC maintains a highly effective preventative maintenance program and implements an effective predictive maintenance program on rotating equipment.
  - The TWPC processing schedule anticipates a certain amount of process downtime into its baseline to account for unanticipated events and “discoveries” in the waste matrix that interrupt operations. In that sense, these shutdowns are not necessarily “unplanned” for, but are included here for a complete analysis.

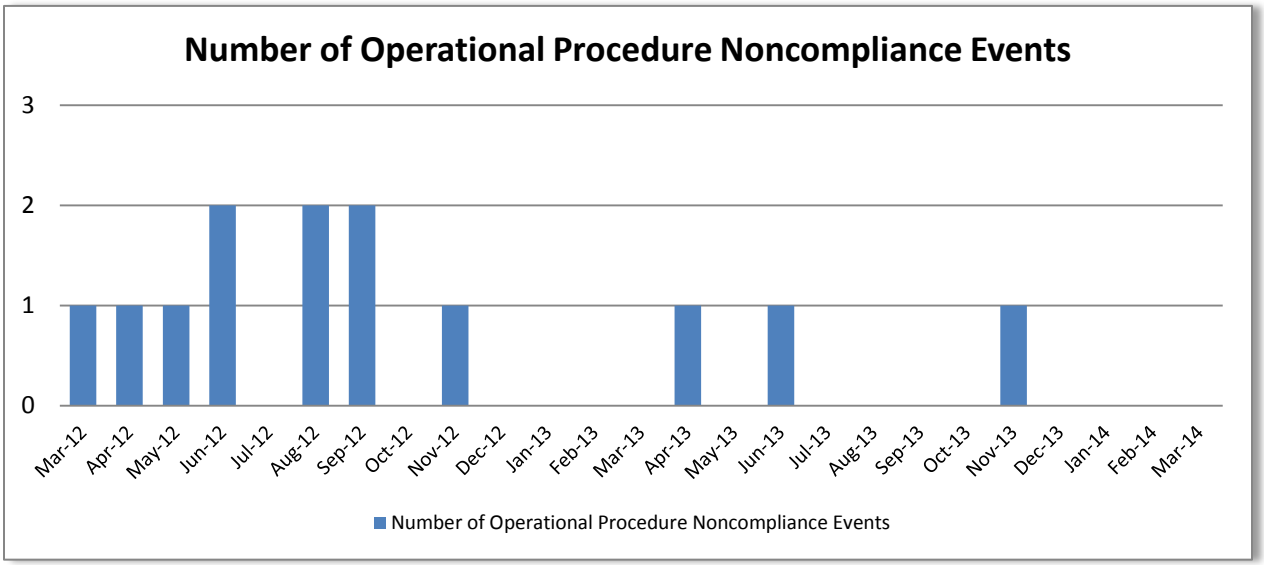
- Corrective actions:
  - Continue working to minimize impacts resulting from unplanned process shutdowns. (Continuous improvement item.)

2.17 Factor 17 – Number of Unplanned Automatic Process Shutdowns



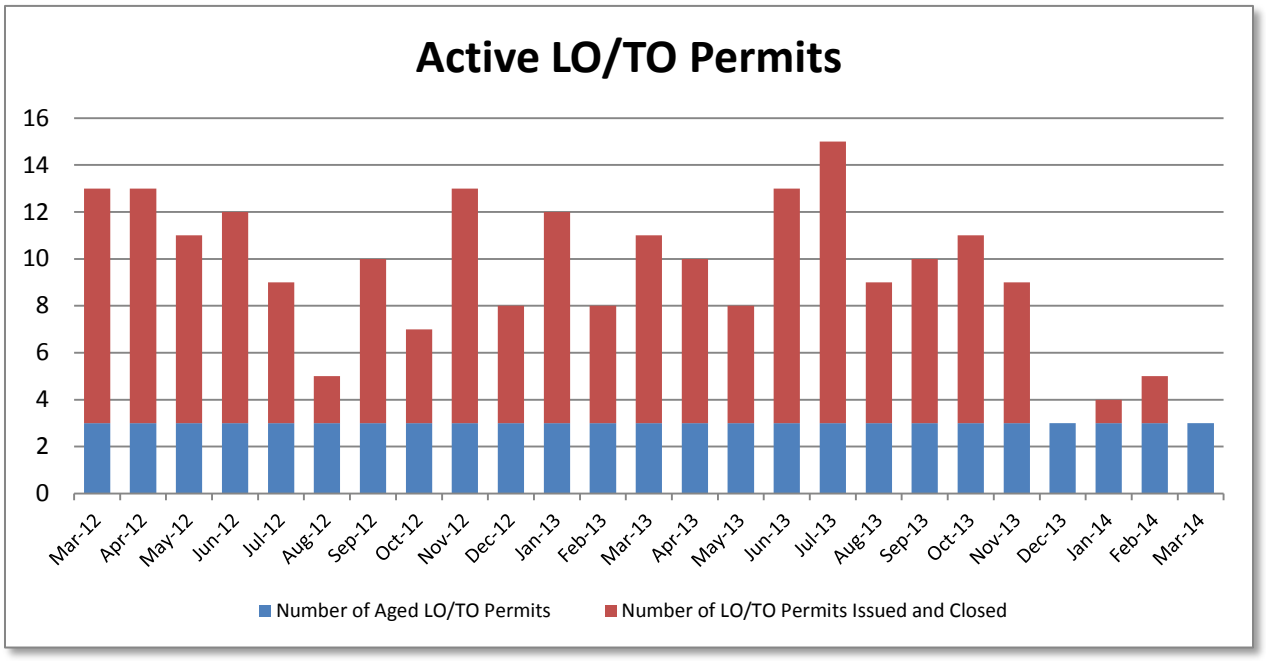
- Identify and analyze trends:
  - There are no processing systems (CH Glovebox, Box Breakdown Area, Hot Cell, and Cask Processing Enclosure) that have automatic shutdown features.
- Conclusions:
  - None.
- Corrective actions:
  - None required.

2.18 Factor 18 – Number of Procedure Noncompliance Events



- Identify and analyze trends:
  - As a result of a series of procedure noncompliances in calendar year 2012, TWPC recognized a need to take action and embarked on a substantial effort to upgrade procedures and procedure use. New categories of procedure use were defined, and procedures with steps critical to plant and personnel safety were elevated to "Use-Every-Time," which are required to be in-hand and followed step-by-step. Recently, the trend in procedure non-compliances has been declining.
- Conclusions:
  - The effort to improve procedures and procedure use, along with increased management attention, and substantially increased worker involvement in procedure development and revision have been effective in reducing the number of procedure non-compliances.
  - In October of 2013, three Conduct of Operations (COO) mentors were added to the staff and have had a significant impact on rigor of compliance across all elements of Conduct of Operations, including procedure compliance.
- Corrective actions:
  - Continue to upgrade procedures and implement in-hand requirements where applicable. Involve workers heavily in procedure development, revision, and verification and validation. (Continuous improvement item.)
  - Continue to work to strengthen all elements of TWPC COO, especially procedures use and compliance. (Continuous improvement item.)

2.19 Factor 19 – Number and Age of LO/TO Hanging

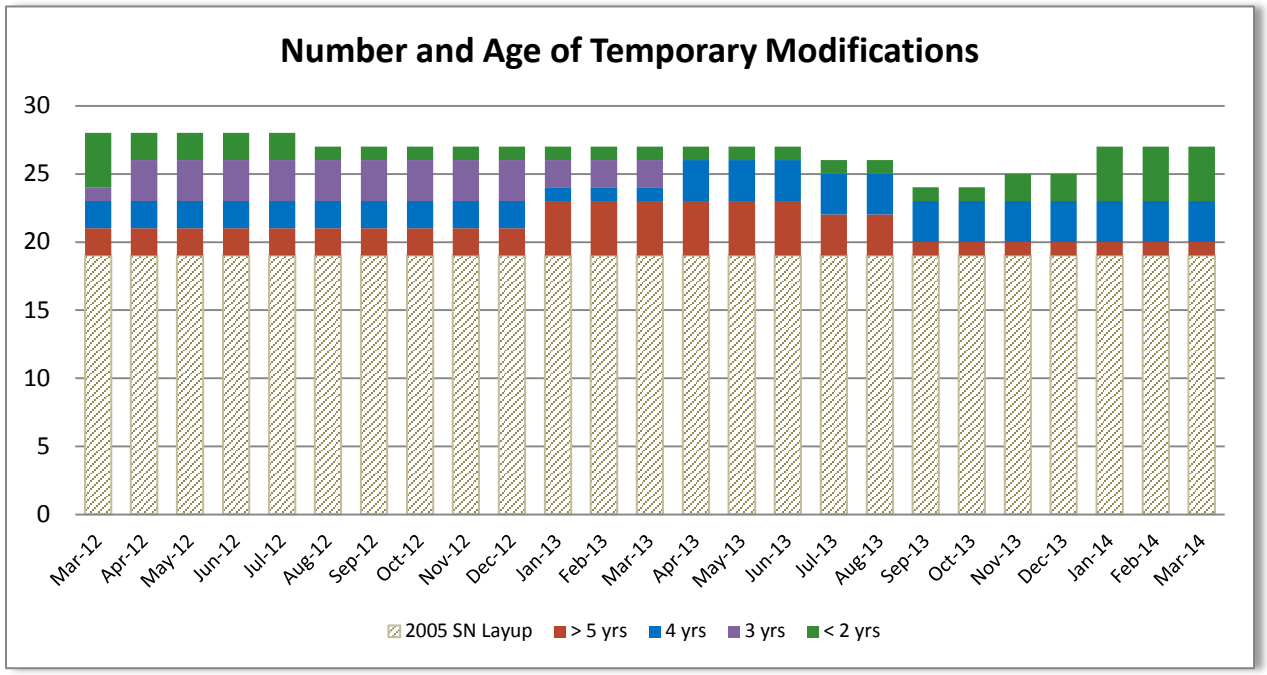


- Identify and analyze trends:
  - TWPC has three active lock-out/tag-out (LO/TO) permits that were hung for an extended period of time (7 to 9 years) prior to March 2012. The LO/TOs are associated with the isolation and nitrogen layup of the supernate system before 2005. As of August 30, 2013, it has been determined that the supernate system will not be required to support the upcoming sludge processing project. The nitrogen blanket layup can be secured, and where accessible, these locks and tags can be removed. The number and title of the three permits are as follows:
    - 03-014 - Sludge Processing Equipment; Separates contaminated system from clean unused supernate system.
    - 04-077 - Back Flow Preventer #2; Used as conduit for nitrogen supply to the mothballed Supernate system.
    - 05-001 – Supernate (SN) N2 Lay Up (PDI-011, 12, and 13 HEPA Banks); This is the boundary isolation for the nitrogen layup of the supernate system.
- Conclusions:
  - TWPC has hung 177 LO/TO during 2012 and 2013, primarily in support of maintenance activities. These LO/TO permits generally close within one day.

- Corrective actions:

  – The LO/TO permits that are still active for equipment that has been placed in long term lay-up should be terminated and replaced with caution tags where possible due to ALARA concerns. The locks that cannot be accessed due to dose concerns will be annotated in the log book as inactive.

2.20 Factor 20 – Number and Age of Temporary Modifications



- Identify and analyze trends:

  – There are 19 temporary modifications that were implemented in support of laying up the supernate system in 2005 as indicated as the cross hatched portion of the bar chart above. The supernate system has been held in suspension pending start-up of the sludge treatment process in anticipation of re-purposing the equipment. As of August 30, 2013, based on current technologies and plans for sludge processing, it has been determined that the supernate system equipment will not be used.

  – The data shown in the colored bars above the cross hatched portion of the bars represent the nine additional temporary modifications in effect at the beginning of the evaluation period (March 2012). As indicated, two were older than 5 years at the time (red bar), two were 4 years old (blue bar), one was 3 years old (purple bar) and four were less than 2 years old (green bar). As the months pass during the period of evaluation, increases in the individual age bars indicates an anniversary month as the modification aged another year. A decrease in an individual age bar indicates a temporary modification of that age was closed the previous month.

  – In addition to the 19 temporary modifications implemented for supernate system layup, a total of nine temporary modifications were open at the beginning of this evaluation period (March 2012) of which five were closed during the period and four remain open:

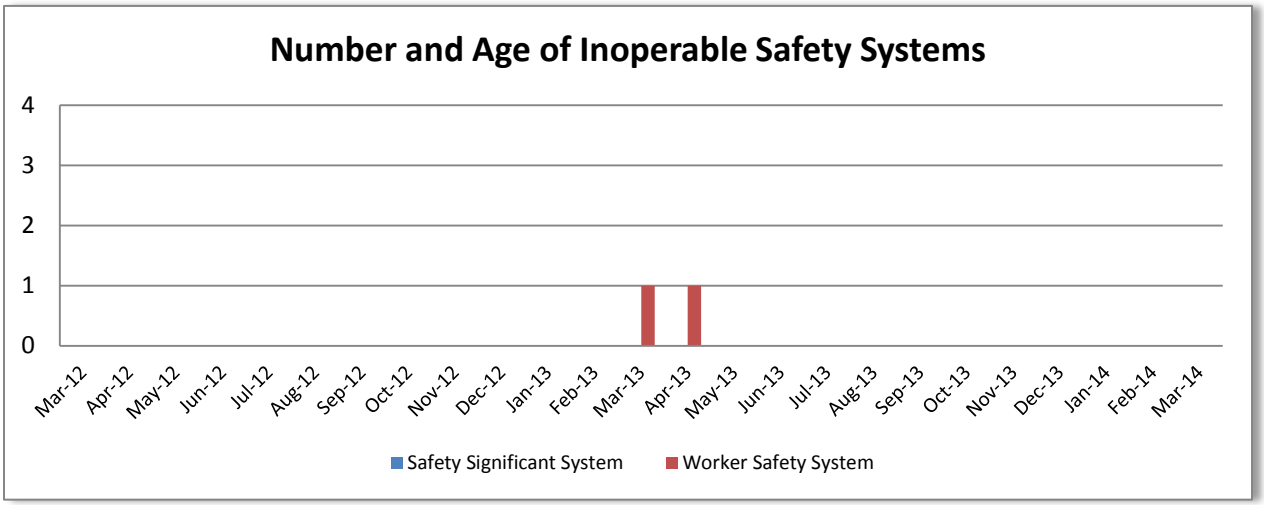
Title	Date Opened	Date Closed
Double Horseshoe Shim for FCV-103A9	9/24/2004	8/20/2013
T-411 & Associated Piping Removal	2/21/2005	8/20/2013
Install Lexan Door on Station # of the Glovebox Drum Out Station	12/11/2007	6/13/2012
Removed Hoists from JIB-828 and C-Gantry	1/21/2008	Open
Remove Filter Housing from Supernate Mini-Glovebox and Discard	1/19/2009	Open
Remove Nuisance Alarm PDIT-213A	4/1/2009	Open
Remove Sludge Seal Water Tank for Lid Extraction Tool Replacement	4/28/2009	Open
Install Temporary Electrical Power to 7880Y Computer Room	1/6/2011	7/18/2012
Install Pressure Relief Valve at Multi-Purpose Bldg. FSS	10/12/2011	7/19/2013

- During the 24 month period of this evaluation, an additional four temporary modifications have been implemented:

Title	Date Opened
Replace BBA BAS Regulators with Room 321 BAS Manifold Regulators	8/8/2013
Modified Inlet Air Damper for AC-193	11/15/2013
Fabricate and Install Lexan Door in RTR-7 at the Door for the Inlet Conveyor	1/23/2014
Replace Hot Box Heater #4 at Contact Handled Marshalling Building	1/23/2014

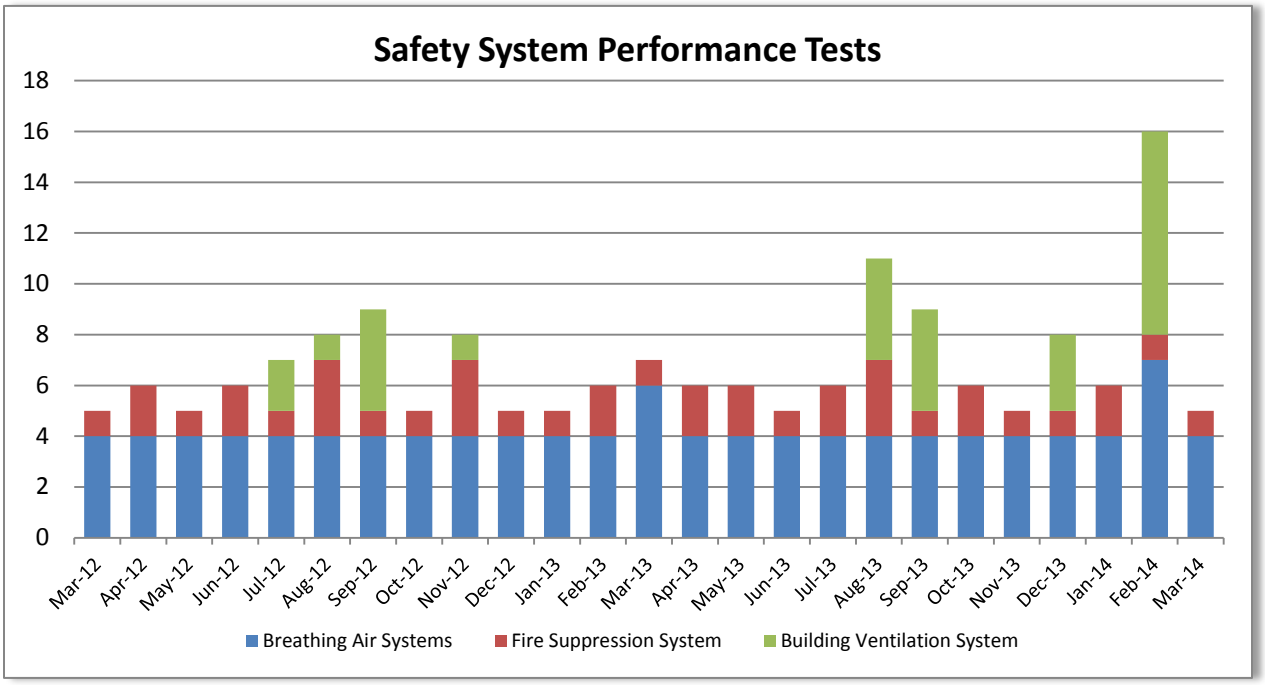
- Conclusions:
  - As a result of the August 30, 2013 sludge decision, temporary modifications implemented to suspend the supernate system until required for sludge processing are being re-evaluated for permanent change and closure.
  - Facility management actively manages temporary modifications by reviewing open temporary modifications monthly for potential closure.
- Corrective actions:
  - Evaluate supernate system and other longer term temporary modifications for closure, and develop/implement appropriate actions.

2.21 Factor 21 – Number and Age of Inoperable Safety Systems



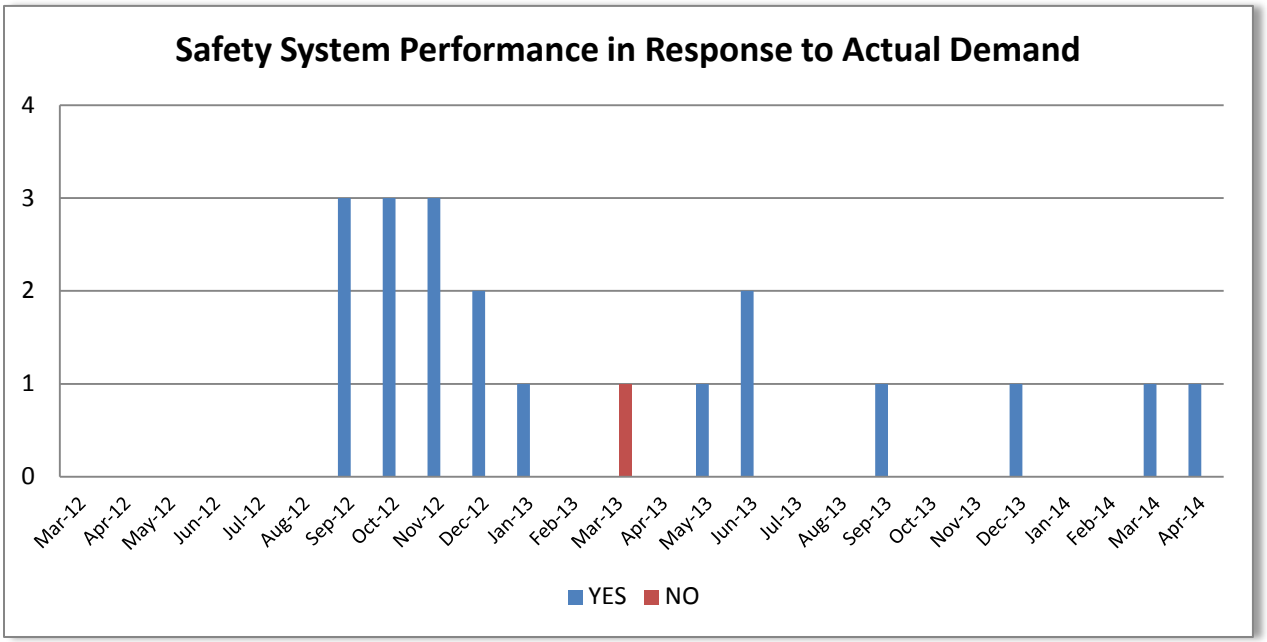
- Identify and analyze trends:
  - During the 24 month period, Safety Significant Systems (Fire Suppression System and Main Building Ventilation) have been fully operable with the exception of planned maintenance outages. The Worker Safety System (Breathing Air System), with the exception of planned maintenance outages, was not fully available in March and April of 2013 while a redesign was implemented in response to a loss of breathing air event. The breathing air systems were out of service for 16 days in March 2013 and 2 days in April 2013.
- Conclusions:
  - Safety Systems are maintained operable to support operations.
- Corrective actions:
  - None required.

2.22 Factor 22 – Safety System Performance (Successful or Not) When Tested



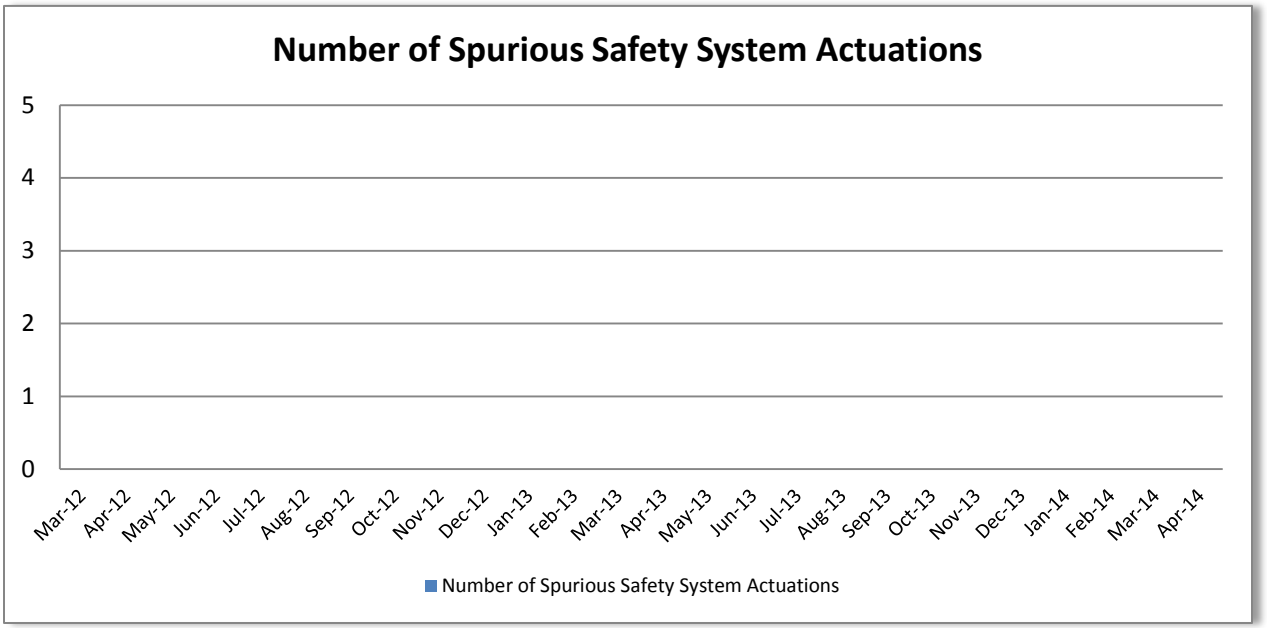
- Identify and analyze trends:
  - All performance tests on the safety significant systems (Fire Suppression and Process Building Ventilation), and on the worker safety system (Breathing Air System) have been satisfactory. Calibration of carbon dioxide monitors, replacement of sensor cells or humidity indicators are accomplished as needed as a routine part of the maintenance.
  - There were two instances of minor repairs were made during the tests: In September 2013, loose bolts on a flow indicating transmitter for building ventilation needed to be tightened, and in February 2013, a pressure sensing valve on the breathing air system required repair. Performance tests were satisfactory following the minor repairs.
  - All routine inspections and tests of emergency lighting, fire extinguishers, eyewash stations, public notification systems, AEDs, etc., are successful or immediately remediated.
- Conclusions:
  - TWPC provides adequate resources to ensure that safety systems and worker safety systems are inspected and tested to ensure full operability.
  - TWPC safety systems and worker safety systems respond when tested or when challenged.
- Corrective actions:
  - None required.

2.23 Factor 23 – Safety System Performance (Successful or Not) in Response to Actual Demand



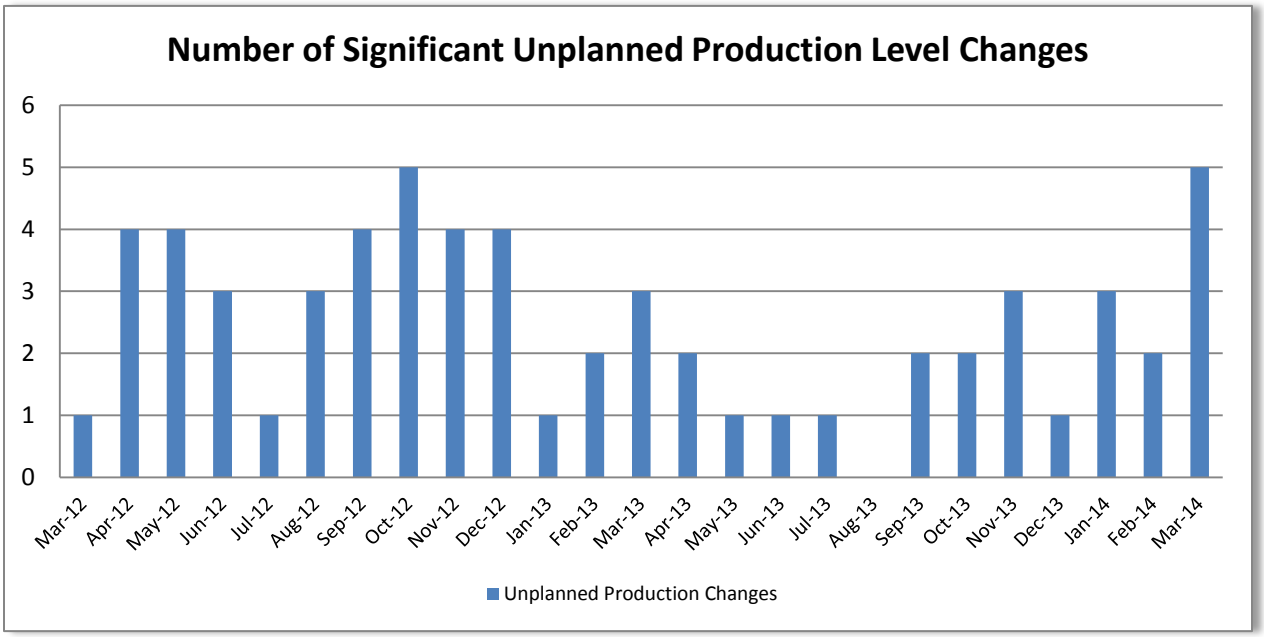
- Identify and analyze trends:
  - The 20 instances for safety system performance can be broken down into three categories:
    - process building ventilation excursions (18);
    - fire suppression system response to H-202 heater temperature excursion (1); and
    - the loss of breathing air (1).
  - With respect to the process building ventilation excursions, ventilation system functioned as designed to maintain negative pressure in the process building. With respect to the H-202 heater temperature excursion, the fire suppression sprinkler system activated as designed.
- Conclusions:
  - Of the 20 instances recorded over the two year period, all safety systems responded as required, except for the failure of the Breathing Air System to respond to a loss of breathing air supply. The failure revealed a latent error in design which was evaluated and subsequently corrected.
- Corrective actions:
  - None required.

2.24 Factor 24 – Number of Spurious Safety Systems Actuations



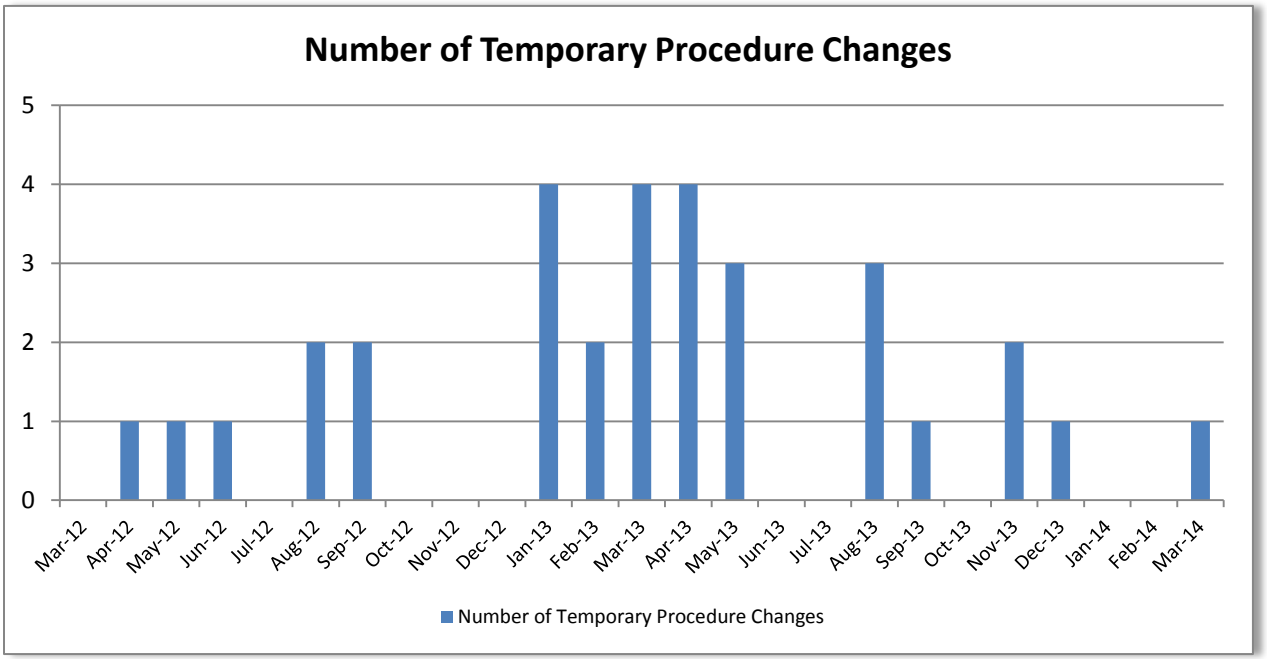
- Identify and analyze trends:
  - There were no spurious safety system actuations.
- Conclusions:
  - Safety systems worked as designed.
- Corrective actions:
  - None required.

2.25 Factor 25 – Number of Significant Unplanned Production Level Changes



- Identify and analyze trends:
  - The recent increase in unplanned production level changes is predominantly due to the challenges in the final remaining legacy contact handled TRU waste containers. Each container represents a unique challenge requiring additional planning and analysis. TWPC has also diverted resources to facilitate the return of CCP to the site to restart certification. Prior to the Hot Cell Outage which started in February of 2013, there were 11 production level changes in the Hot Cell due to degraded performance of the PaR® manipulator. After the outage in July 2013, which focused on improving the operability and maintainability of the PaR®, there have been only two instances.
  - Another significant contributor to unplanned delays is issues with the Remote Drum Opener (RDO) operation in the BBA. Twenty-one instances of delays have been identified since October 2012, including punctured drums with high LEL/LFL head space gas samples and issues with performance of the RDO device itself.
- Conclusions:
  - TWPC is challenged with routine interruption to process operations, which is indicative of the technical and management challenges faced in processing high hazard waste at TWPC. Generally, TWPC has accounted for these types of unforeseen disruptions in the baseline and process schedule, and has always recognized that the most difficult to process waste remains as we approach the completion of legacy CH TRU waste processing which is more than 95% complete at the time of this analysis.
- Corrective actions:
  - Continue to learn from past process interruptions and discoveries and incorporate learning into forward planning to improve waste operations. (Continuous improvement item.)

2.26 Factor 26 – Number of Temporary Procedure Changes

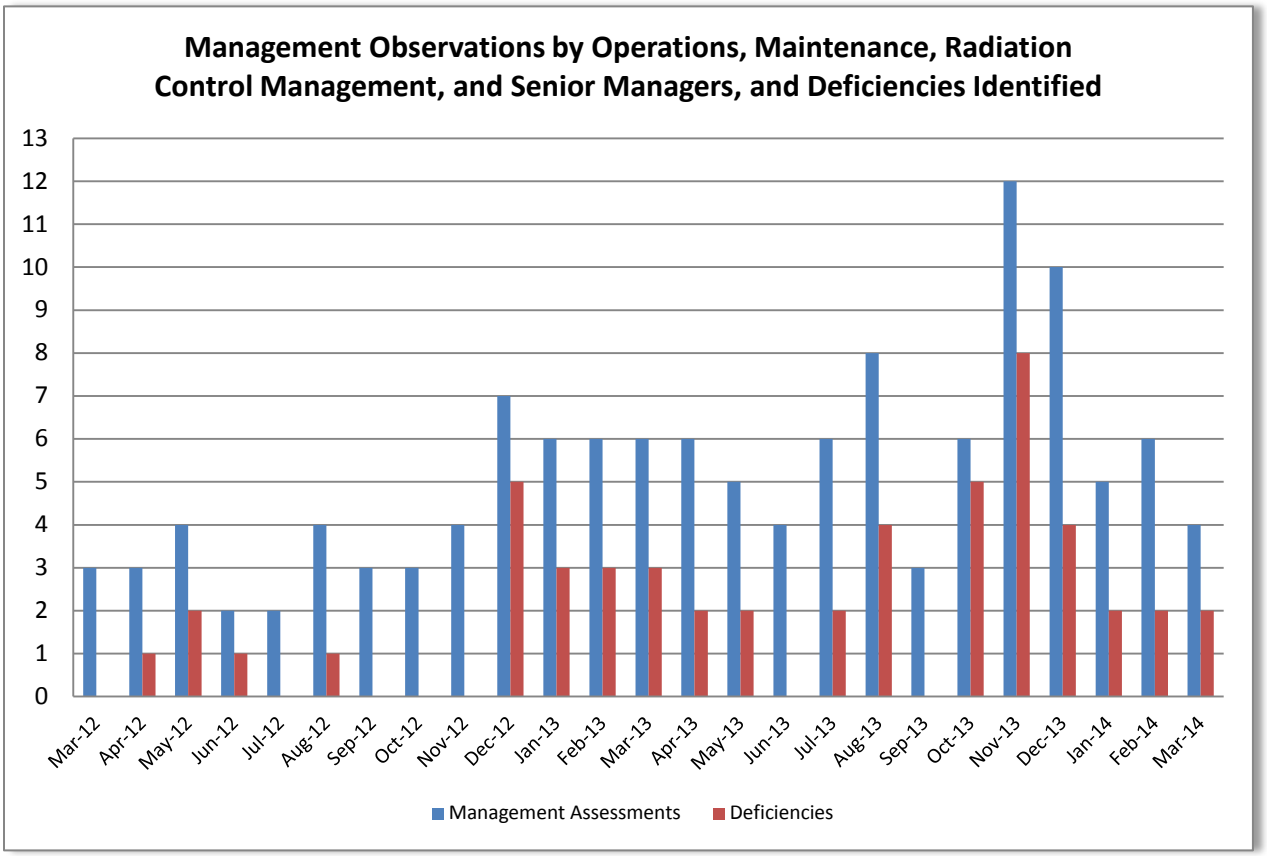


- Identify and analyze trends:
  - The number of temporary procedure changes (PCN) is not necessarily a negative indicator. PCNs indicate an active questioning attitude when personnel are unable to follow procedures as-written, or in response to unanticipated changed conditions. The validation and verification process should result in a procedure that can be followed through anticipated conditions and changes. There is an increase in the rate of PCNs in early 2013 that tapers off going forward.
- Conclusions:
  - The increase in rate of PCNs in early 2013 is indicative of the increased attention placed on procedure compliance and emphasis on workers stopping whenever a procedure could not be followed verbatim. The reduction in the rate of PCNs going into 2014 is indicative of the improved, worker-focused V&V process. Only three of the PCNs remain active; the remainder have been incorporated into permanent procedure revisions.
- Corrective actions:
  - Continue proactive V&V of all operating procedures, as well as encouraging operators to stop work and change procedures when they cannot be followed verbatim. (Continuous improvement item.)

2.27 Factor 27 – Number of Grievances

- Identify and analyze trends:
  - All employees of TWPC are non-union.
- Conclusions:
  - None.
- Corrective actions:
  - None required.

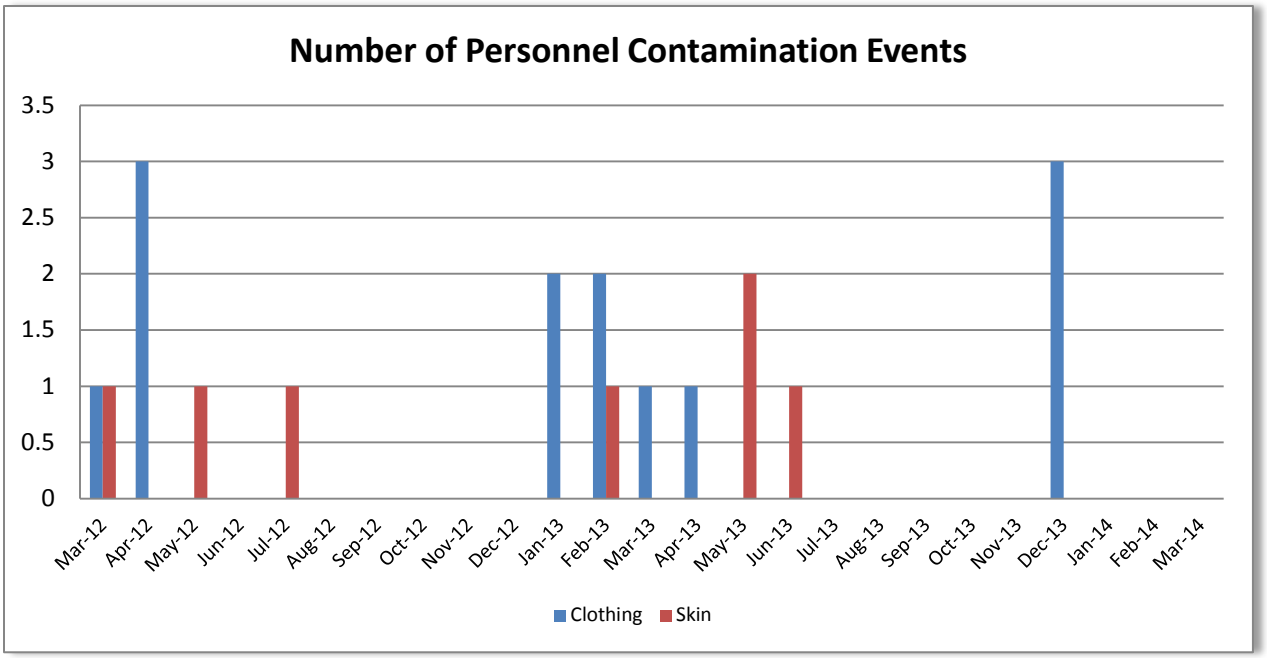
2.28 Factor 28 – Management Observation System Data, Number of Observations by Senior Managers, Number of Management Observations that Identify Deficiencies and Result in Corrective Action



- Identify and analyze trends:
  - Represented in the data above are management assessments performed by Operations, Maintenance and Radiation Control management personnel, Senior Management Walk Through results, and monthly zone inspections conducted by the Director of Safety, Health and Quality and the Director of Operations. Zone inspections, which started in January of 2013, typically generate a punch list of roughly 20 items per month, providing work crews with a list of action items for contingency work. These have been rolled up and represented as two "issues" - housekeeping and equipment - per inspection.
  - The trend indicates a general increase in the number of observations conducted, as well as the number of deficiencies identified.
- Conclusions:
  - TWPC management routinely walks down operation's waste processing and waste storage areas. Additionally, there are weekly RCRA inspections of all processing and storage facilities by management during which any identified deficiencies are corrected prior to the next business day.

- Corrective actions:
  - None specifically required as the program is working as intended and enhances facility safety and availability.

2.29 Factor 29 – Number of Personal Contamination Events

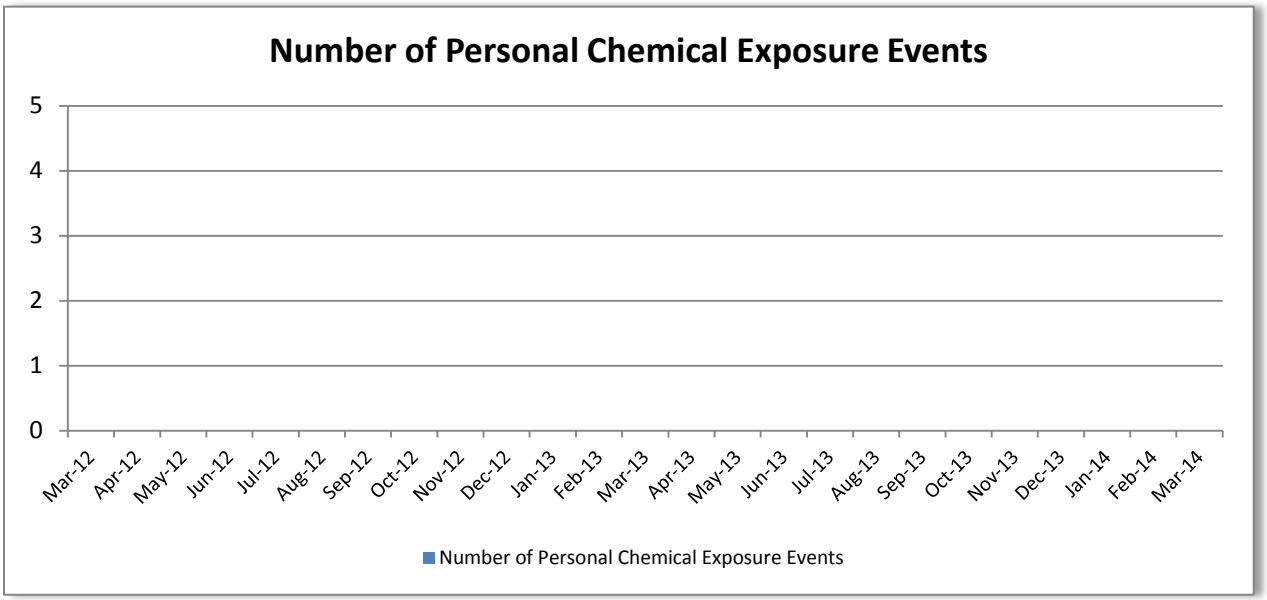


- Identify and analyze trends:
  - The majority of the skin contaminations (5 of 7) happened while performing maintenance activities during a manned entry inside the CHGB (1), glove bag work repairing the PAR (1), or during manned entries into the Hot Cell during an outage (3). The remaining two skin contaminations were associated with CHGB operations. The majority of the clothing contaminations (10 of 13) were from particles embedded into footwear with multiple events being experienced over a brief period of time. The source of particles for the March through April 2012 period (4 in Room 231) was identified, the source for the January through March 2013 events (3) and the December 2013 events (3 in the 30T Crane Bay) were not identified. The other three clothing contaminations happened while performing maintenance activities, CHGB entry (1) and Hot Cell outage (2).

- Conclusions:
  - Performing maintenance activities in high contamination areas wearing PAPRs and disposable coveralls increases the risk for a skin contamination when compared to entries in supplied-air anti-Cs. The water resistant disposable coveralls worn during the CHGB maintenance were not effective against the oil based hydraulic fluid. One noteworthy fact is that with the numerous supplied-air entries in the BBA and CPE, there has not been a single skin contamination.

- Corrective actions:
  - The belt mounted PAPRs used during the Hot Cell outage and involved with three skin contaminations have been replaced with face mounted blowers. For activities with an oil based contaminant, disposable anti-C clothing that is resistant to oil based substances is now required. (Corrective actions completed.)
  - TWPC radiation protection training and practical qualification modules were revised and upgraded in 2013. All operations, maintenance, and radiological protection personnel were retrained and went through practical demonstrations for donning, doffing, and drills for upset conditions requiring emergency egress from supplied air suits and included donning and doffing demonstrations for full-face respiratory protection masks into Respirator Training.

2.30 Factor 30 – Number of Personal Chemical Exposure Events



- Identify and analyze trends:
  - TWPC has not experienced a chemical exposure event.
- Conclusions:
  - TWPC has not experienced a chemical exposure event.
- Corrective actions:
  - None required.