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*Located at Pacific Northwest National Laboratory is the NUCON Vapor Abatement Unit (VAU) prototype where it will undergo bench-scale testing. For more details, read [KPP 4](#). (Photo courtesy of E. Morrey)*

Tank Operations Contract  
Chemical **Protection Program** Office Weekly Report  
October 26, 2017

## 1. CHEMICAL PROTECTION PROGRAM OFFICE (CPPO) ACTIVITIES STATUS

The CPPO finalized the draft Comprehensive Vapors Actions status dashboard update process. The dashboard is designed to monitor the progress of the draft Comprehensive Vapors Action Plan (CVAP) Key Performance Parameters (KPP) 1 thru 7. The Dashboard is updated monthly.

### CPPO Oversight and Tracking

The 117 Tank Vapors Assessment Team (TVAT) actions are captured in WRPS-PER-2014-0602. The three Office of Inspector General (OIG) actions are captured in WRPS-PER-2016-2433 thru 2435. The CPPO office tracks these vapor related problem evaluation requests (PERs), and is tasked with communicating PER resolutions. Sixty-one TVAT actions were completed during Phase I (FY16); their completions are documented in the ESTARS system. It is the project's intention to add the remaining recommendations from National Institute of Occupational Safety and Health (NIOSH), Department of Energy Office of Enterprise Assessment (EA-32), Center for Toxicology and Environmental Health (CTEH), and the Vapor Management Expert Panel (VMEP) to the PER system as soon as they are developed and time-phased for closure. The metric in **Figure 1** shows the difference between the number of TVAT and OIG corrective actions that have been completed and the corrective actions that are due.

**Figure 1**, below, depicts how WRPS met the FY2017 deadline to complete the first 66 actions. The remaining 54 actions, which are currently due at the end of FY2018, have been rolled into the draft CVAP and the dates adjusted accordingly. This will be the last time this specific metric will be published as the new CVAP Corrective Action metric will take its place.



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## Vapor Corrective Action Tracking

(Only Includes WRPS-PER-2014-0602 and OIG Actions)

Trending Fiscal Year 2017  
Month Ending October 2017

### Objective

To monitor corrective action completion based on their assigned due date.

### Measure

The difference between the total number of corrective actions completed compared to the total number of corrective actions due or baseline (BL).

The Baseline (BL) date is documented in E-Stars. Many actions (66) were assigned due dates in June 2017 to ensure coordination and validation of closure documentation.

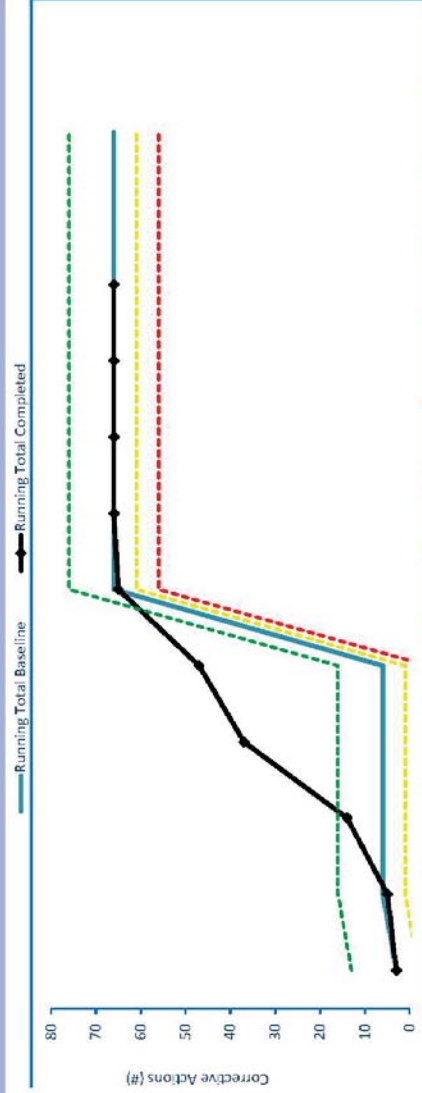
### Performance Thresholds

Advise	≤ BL-10
Declining	>BL-10 and ≤ BL-5
Meets	>BL-5 and ≤ BL-10
Exceeds	>BL+10

### Performance Data

Baseline Due (month)	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Oct-17	Nov-17	Dec-17
Number of Completed (month)	3	3	0	0	0	60	0	0	0	0	0	0
Running Total Baseline	3	2	9	23	10	18	1	0	0	0	0	0
Running Total Completed	3	6	6	6	6	66	66	66	66	66	66	66
Schedule Performance (#)	0	-1	8	31	41	-1	0	0	0	0	0	0

Running Total Baseline



### Specific Goal to Achieve

To complete all corrective actions on-time or before their due date.

### Leading Indicator Description

This is a lagging indicator relative to completed actions. However, this is a leading indicator for WRPS focus and attention relative to overall vapors management.

### Performance Indicator Information

PI Owner:	Rebecca Sams
Data Analyst:	Greg Hanson
Data Source:	PER/ESTARS

### Analysis

This metric includes only the actions associated with WRPS-PER-2014-0602 (TVAT) and WRPS-PER-2016-2433 thru 2435 (OIG).

All actions that were due in FY 2017 have been completed (Note: Action WRPS-PER-2014-0602.111 was completed/validated in June but not closed in PER system until July). The remaining 54 actions, which are currently due at the end of FY 2018, have been rolled into CVAP and dates adjusted accordingly.

### Action

Continue to status CVAP actions on a monthly basis utilizing a similar but different metric. This will be the last time this specific metric will be published.

Additional Info: None

### Action Status Summary by Assignee

Department	Open	Closed	Total	Overdue
Vapor Technology Solutions	3	13	16	0
ESH&Q	10	3	13	0
Organic Studies	0	2	2	0
Tank Farm Projects	0	1	1	0
TFP Project Management	3	5	8	0
CPPO	1	12	13	0
Chief Technology Office	7	1	8	0
Industrial Hygiene	30	29	59	0
<b>Totals</b>	<b>54</b>	<b>66</b>	<b>120</b>	<b>0</b>

Figure 1. Vapors Corrective Action Status



## 2. COMPREHENSIVE VAPOR ACTION PLAN Key Performance Parameters

### KPP 1. Engagement and Effective Measurement

#### ✦ Chemical Protection Engagement: Center for Toxicology and Environmental Health (CTEH)

CTEH team members are developing CPPO Notebook presentations covering chemicals such as nitrous oxide, mercury, and ammonia, as well as topics like OEL development, and IH program fundamentals.

#### ✦ Chemical Protection Engagement: Communications

“Six Hanford workers have declined precautionary medical evaluation after reporting odors outside of TX Farm” read the all employee email issued on October 18, 2017. The email described how “[t]he employees were preparing to perform electrical maintenance at the time of reported odors and were not in an area that requires use of a supplied-air respirator.”

An all employee email updated the odors report on October 19, 2017, reporting that access was restored to the area near TX Farm, and that “...industrial hygiene technicians collected air samples and results were less than the action level of chemicals evaluated.” Furthermore, “[n]one of the six workers experienced symptoms...”

An all employee email announced that the Office of Enterprise Assessments follow-up assessment of the Hanford tank farms vapor issues is scheduled from October 30 to November 16, 2017.

The CPPO Notebook published last week is titled *Chemical Vapors Protection Program FY17 Accomplishments*. This week’s CPPO Notebook is titled *IH and Occupational Exposure Limits (OELs)*.

#### Hanford Vapors Website Updates

- CPPO Weekly Report: Oct. 19, 2017
- AP Stack Weekly Report (Dec. 14-21, 2016)
- AP Stack Weekly Report (Jan. 4-11, 2017)
- AP Stack Weekly Report (Jan. 11-18, 2017)
- AP Stack Weekly Report (Jan. 18-25, 2017)
- VMDS Weekly Report (March 29 - April 5, 2017)

**Key Performance Parameter 1**  
Establish a comprehensive vapor management communication plan, engagement processes, and effectiveness measurements.

### 3. KPPs 2 and 3. IH Technical Basis and IH Program

#### Develop New or Revised Chemicals of Potential Concern (COPC)/Occupational Exposure Limit (OEL)

**Last update 10/19/2017:** WRPS completed the update of RPP-22491, *Industrial Hygiene Chemical Technical Basis*, and developed institutionalizing documents that provide a disciplined and rigorous process to periodically review IH data to identify new or changing information regarding tank vapors. The new information is analyzed in light of current scientific and regulatory information to determine if a new chemical of potential concern (COPC) should be identified. This analytical process determines if a regulatory Occupational Exposure Limit (OEL) exists for the newly identified COPC. Furthermore, the process determines when a new Hanford Tank Farm OEL (HTFOEL) should be created. New documents and procedures developed during FY2017 to maintain and institutionalize the technical basis include:

- TFC-PLN-174, *Chemical Vapors Technical Basis Plan* (New)
- TFC-ESHQ-S\_IH-C-67, *IH Chemical Vapor Technical Basis Maintenance* (New)
- TFC-ESHQ-S\_IH-C-66, *COPC to COC Evaluation Process* (New)

WRPS and its subcontractors completed a Chemical Vapors Requirements Flow Down and GAP Analysis (GAP). Based on the GAP analysis, WRPS developed an IH Manual and developed or revised documents and procedures to institutionalize the chemical vapors aspects of the IH program. The IH Manual (with specific focus given to institutionalizing the Chemical Vapors elements), and the seventeen revised/new implementing documents and procedures, are routing for approval through the WRAP process. These changes will be fully implemented in FY2018.

#### Key Performance Parameter 2

Maintain Industrial Hygiene Chemical Vapor Technical Basis and the chemicals of potential concern (COPC). Institutionalize a disciplined and rigorous process for updates to include new scientific findings and enhanced understandings of potential exposures.

### Health Process Plan

**Update:** Scheduled for review by WRPS's Internal Review Panel and External Expert Panel are the following drafted studies by PNNL:

- *Proposed HTFOELs for Chronic Exposures – COPCs with Regulatory Guidelines*
- *Proposed Occupational Exposure Limits for Furans*
- *Proposed Risk-Based Approach for Nitrosamine Chemical of Potential Concern*
- *Proposed Acute Exposure Concentration Limits for COPCs with Regulatory Guidelines*
- *Proposed HTFOELs for Chronic Exposures - Nitrile Class COPCs and 2,4-Dimethylpyridine*
- *Assessing the Potential for Chronic or Acute Health Effects from Exposure to COPC Mixtures*
- *Recommendations for Sampling and Analysis of Hanford Waste Tank Vapors*
- *Hanford Tank Vapors FY 2017 Chemicals of Potential Concern Update*

#### **Key Performance Parameter 3**

Maintain Industrial Hygiene Program and institutionalize vapor program requirements, best practices and program parity, and complete necessary training to support full implementation at the beginning of FY2018.

### Parity Implementation with Established Programs

**Last update 10/19/2017:** WRPS made strides in improving parity with other well established programs such as the radiological controls program. WRPS Industrial Hygiene Programs implemented the Enhanced Chemical Hazard Awareness Training (CHAT) developed in 2016, and completed a training evaluation report to capture recommendations from students on improvement. Chemical Worker Tier 1 training is complete. As planned, it is now part of the Tank Operations Contractor Hanford General Education Training program, and available to take immediately. Chemical Worker Tier 2 was turned over to a subcontractor to code for computer based training. Mission Support Alliance (MSA) is planning on rolling out the new computer based training in October, 2017. Chemical Worker Tier 3 training was successfully piloted October 4, 2017. Comments from the pilot class will be incorporated into the lesson plan prior to final approval. The plan is to discontinue enhanced CHAT once the three tiers of training are in service.

## KPP 4. Engineering Controls

### ✦ Exhausters

**Update: A Farm:** The A Farm Project team met and decided upon a new location for the A-Farm Exhauster pad. This decision, following preparation and analysis of an optimization study, will permit the engineering design company (ARES) to relocate the exhauster pad. Tentatively, the design is scheduled to be completed in late 2017/early 2018. **AX Farm:** Startup activities are complete, and the AX Farm Exhauster is in full-time operation. **The Weekly Report will no longer update this activity.**

### ✦ AW Stack Extension

**Last update 10/12/2017:** Efforts to complete the AW Stack Extension design package by early 2018 are on-track. The 30% design package was completed and efforts on the 60% were initiated last week.

### ✦ Strobic Air Dilution Fan

**Update:** After Strobic completes their factory acceptance testing at their facilities, the unit will be shipped to Hanford for a field test towards the middle of 2018. A test plan will be needed to support the field test, and last week a statement-of-work (SOW) was started to procure the resources needed to prepare the test plan.

### ✦ NUCON Thermal Oxidation Vapor Abatement Unit (VAU)

**Update:** Bench-scale testing continues to be developed. The following was accomplished last week:

#### **WRPS:**

- Presented the *Propane Decision Paper* to ORP management.
- Continued preparing the technology maturation plan for the NUCON VAU.

#### **NUCON:**

- Awaits contract authorization to begin the diesel design.

#### **PNNL:**

- Secured air permit for the bench-scale test facility.
- Obtained quote for test gases needed to support bench-scale testing.
- Supported development of conceptual designs for injection and sampling system.
- Setup and readiness activities were performed on systems (e.g., GC/MS) that will be used to support testing.

#### **Key Performance Parameter 4**

Complete engineering control concept demonstrations for Strobic Air Tri-Stack® and NUCON® International, Inc. thermal combustion in support of unrestricted work boundaries

### TerraGraphics:

- Requested quotes from Mid-Columbia Engineering and American Electric for the fabrication of the Electrical Rack.

## KPP 5. Administrative Controls and Monitoring

### ✚ Permanent Installation of Vapor Monitoring and Detection System (VMDS) Equipment in A and AP Farms

**Update:** Numerous activities were performed throughout the week, including the following:

- Continued resolving comments on the Phase 2 Pilot-Scale Report.
- For the AP Farm, Ultra-Violet Fourier transform infrared spectroscopy (UV-FTIR) turnover, continued preparing 90% cabinet drawings. The team met to initiate developing maintenance procedures. The team discussed determining alarm set points.
- The infrared portion on the AP Stack resumed reporting properly following replacement of a defective probe filter on B train.
- The Ultra-Violet-Differential Optical Absorption Spectrometer (UV-DOAS) unit on the AP Stack continues to report suspect values as a result of the software library update performed last week. Troubleshooting activities are on-going.

**Key Performance Parameter 5**  
Define unrestricted work boundaries and implement monitoring on active stack ventilation and unrestricted work boundaries in the A farms to provide defense-in-depth.

### ✚ Stack and Boundary Monitors

**Update:** Stack monitor activities included:

- Initiate the design of the AX Farm stack monitors.
- Continue preparing draft SOW to obtain Cerex services for supporting stack monitoring activities.
- Submit the draft Plant Forces Work Review (PFWR) for comment. The PFWR addresses stack monitor installation.
- Review Cerex design reports for AZ Farm stack.

### ✚ Establishing Safe Unrestricted Boundaries

**Last update 10/12/2017:** Quantitative Risk Assessments (QRA) for A, AP, and AW-Farms are in review with the Office of River Protection (ORP). Six additional QRAs are planned for FY2018 beginning with 242-A Evaporator.



### Public Address System

**Update:** Fieldwork at C Farm continues to be on hold because FE&C, the subcontractor, is assigned to support leak detector replacement at AP Farm. In the meantime, efforts continued on the design packages for B, BX, BY, S, SX, SY, T, TX, TY, and U-Farms. The majority of these are at the 90% design levels.

## **KPP 6. Tank Operations Stewardship**

### Pilot SST Stewardship Program

**Update:** Remote Monitoring Equipment: A request-for-proposal was submitted for vendor review. Proposals are expected the week of 10/23. Bench-scale testing of both the level and temperature indicators were placed on-hold until the subcontractor is available. The subcontractor is currently assigned to support the leak detector replacement at AP Farm. The purpose of the bench-scale tests is to confirm the new equipment will connect to the Tank Farm Monitoring and Control System.

**Update:** FY LEAN 2015: Report/Work Location Evaluations: The engineering services contract was awarded to ARES and a kick-off meeting was held. Scoping activities were also initiated during the week.

#### **Key Performance Parameter 6**

Institutionalize a tank operations stewardship program that minimizes required tank farm personnel entries; and establishes parameters for locating ancillary personnel and offices.

## **KPP 7. Hierarchy of Controls**

### Cartridge Testing and SCBA Alternatives

**Update:** Prior to June 30, 2017 cartridge testing was conducted at the AP Stack, A-101, 702-AZ, AN Exhauster, AW Stack, BY-108, AX-101, SX-101 and SX-104 tank farm locations. PNNL reports are complete for all of the above except for SX Farm. Copies of the completed reports are available [HERE](#). In August, cartridge testing was performed at the AX Stack. The PNNL reports for the SX Farm and the AX Stack are currently being written. More information on these cartridge tests will be made available as the reports go final. PNNL has developed a summary report rolling up the information contained in the cartridge testing reports issued to date. This summary report is currently being reviewed by WRPS management. The final summary report is expected soon. Cartridge testing for FY-2017 was halted at the end of August. Cartridge testing for FY2018 is slated to begin in January/February of 2018.

#### **Key Performance Parameter 7**

Provide options to promote the hierarchy of controls for chemical vapor respiratory protection beyond current use self-contained breathing apparatus.

To date, the third party (STC) review has indicated that full face air purifying respirators (FFAPR) equipped with the Scott 7422-SC or the Scott 7422-SD1 cartridge provides adequate protection for SEG 1 work activities at the following locations:

- AP Farm
- SY-102
- A-101
- 702-AZ
- AN Farm
- AW Farm

WRPS hopes to rollout the use of FFAPRs at these locations by the end of December 2017.

#### Mobile Laboratory

**Last update 10/19/2017:** Last week, efforts focused on issuing a new contract for RJ Lee to support FY2018 activities.

#### Personal Vapor Monitor

**Last update 10/19/2017: Figure 2** depicts the first ammonia sensor prototype delivered by C<sub>2</sub>Sense. The white item is the sensor chip holder and associated electronics. The black item is an external battery. The sensor chip is the brown card inserted into the holder. **As a first prototype**, a number of improvements to the system will be made before the system goes into production. Primarily, these improvements will include:

- Reduction in size (the goal is about 25% of the current size)
- Incorporation of the battery inside the unit
- Incorporation of a local display showing the current ammonia concentration measurement

The system has a local alarm that can be set to inform the wearer when the ammonia concentration is above the alarm threshold and provides continuous ammonia concentrations for each tank farm worker to the central shift office. Initial testing shows the device will detect ammonia at about 250 ppb (0.25 ppm). Five prototypes will be delivered to WRPS by the end of November. Field trials of the new sensor will begin in FY2018. These tests will be conducted in two phases, beginning with static tests at fixed locations where higher ammonia concentrations are expected (e.g. inside vapor control zones, around passive breather filters, etc.). The second phase of the test will put the sensor on five IHTs during normal daily operations. If all works as planned,

production devices will be available in FY2019. In addition, the CVST Vapor Technology Sub-team will be doing a survey of commercially available ammonia sensors. If sensors with similar capabilities are identified by the CVST Sub-team, these sensors may also be included in the FY2018 field trial, as appropriate.



Figure 2. First Ammonia Sensor Prototype by C<sub>2</sub>Sense

### KPP 8. Medical Support

The scope of KPP-8 is to support RL medical program enhancements in conjunction with other Hanford Site organizations.

#### Key Performance Parameter 8

Support medical program enhancements in conjunction with responsible Hanford Site organizations and establish update to WRPS process/procedures.

#### 4. Vapors Mitigation Program Plan - Top Risks -CPPO Weekly Update

This is the last Weekly Report that features the Vapors Mitigation Risk Register on a regular basis.

**Last update 10/12/2017:** The subset of the Vapors Mitigation Risk Register this week is shown in **Table 4**.

**Table 4.** Vapors Mitigation Risk Register

CVAP ID Number	Current Status	Handling Actions	Current Risk Level
022 Procurements Less Than Adequate	Procurement coordination needs to improve between WRPS, Dr. Dai, and MCE. Cerex UV-DOAS design components.	Identify and track project designated high priority procurements for equipment and services.	Medium
009 Resources not available when required.	Lack of design and engineering resources are causing delays in VMDS System Integration, 242-A Stack Extension.	<ol style="list-style-type: none"> <li>1. Identify key technical resources up front and secure availability.</li> <li>2. Utilize resource loaded schedule where appropriate.</li> <li>3. Coordinate work planning to streamline resource utilization.</li> </ol>	Medium
004 Integration with other key projects more complex than expected.	Integration of field work for VMDS implementation and associated execution concerns for SY, A-Farm, and AW stack upgrades. Installation and turnover of PA system to tank farm operations. Incorporate MCE schedule.	<ol style="list-style-type: none"> <li>1. Identify key program interfaces early. (Ongoing)</li> <li>2. Engage with program/project managers early. (Ongoing)</li> <li>3. Maintain weekly communication and IPT meetings.</li> <li>4. Incorporate instrumentation (stack monitor) installation into future design of equipment.</li> </ol>	Medium