





washington **river**  
**protection** solutions

**Chemical Protection  
Program Office Notebook**



**Recent History of Supplied  
Air Respiratory Use at the  
Hanford Tank Farms**

**Part 1 - Timeline**



**Key Performance Parameter #7**  
*Promote Hierarchy of Controls Beyond SCBA*

5/15/2018 1

Last week's CPPPO Notebook is titled *Recent History of Supplied Air Respiratory Use at the Hanford Tank Farms – Part 1 - Timeline*

**Tank Operations Contract**  
**Chemical Protection Program Office**  
**May 17, 2018**

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

The CPPO FY2018 Vapors Communication Survey report is ready to be published. The CPPO will be tracking implementation of the recommendations in the survey report.

The FY2018-PI MD-033, *Evaluation of Implemented and Proposed Actions in Response to the Hanford Tank Vapor Assessment Report* has been drafted and is in internal review.

### CPPO Oversight and Tracking

#### Cost and Schedule Metric

Ongoing vapor projects supporting the draft Comprehensive Vapor Action Plan (CVAP) KPPs are still moving forward as planned. FY2018 to date, \$23.3M has been spent implementing the CVAP KPPs. The delay in Vapors Monitor and Detection System (VMDS) procurements with <sup>1</sup>CEREX<sup>®</sup> has slowed the expected spending but this will substantially increase in June as the stack monitors arrive coincidentally with the IH Trailer procurement.

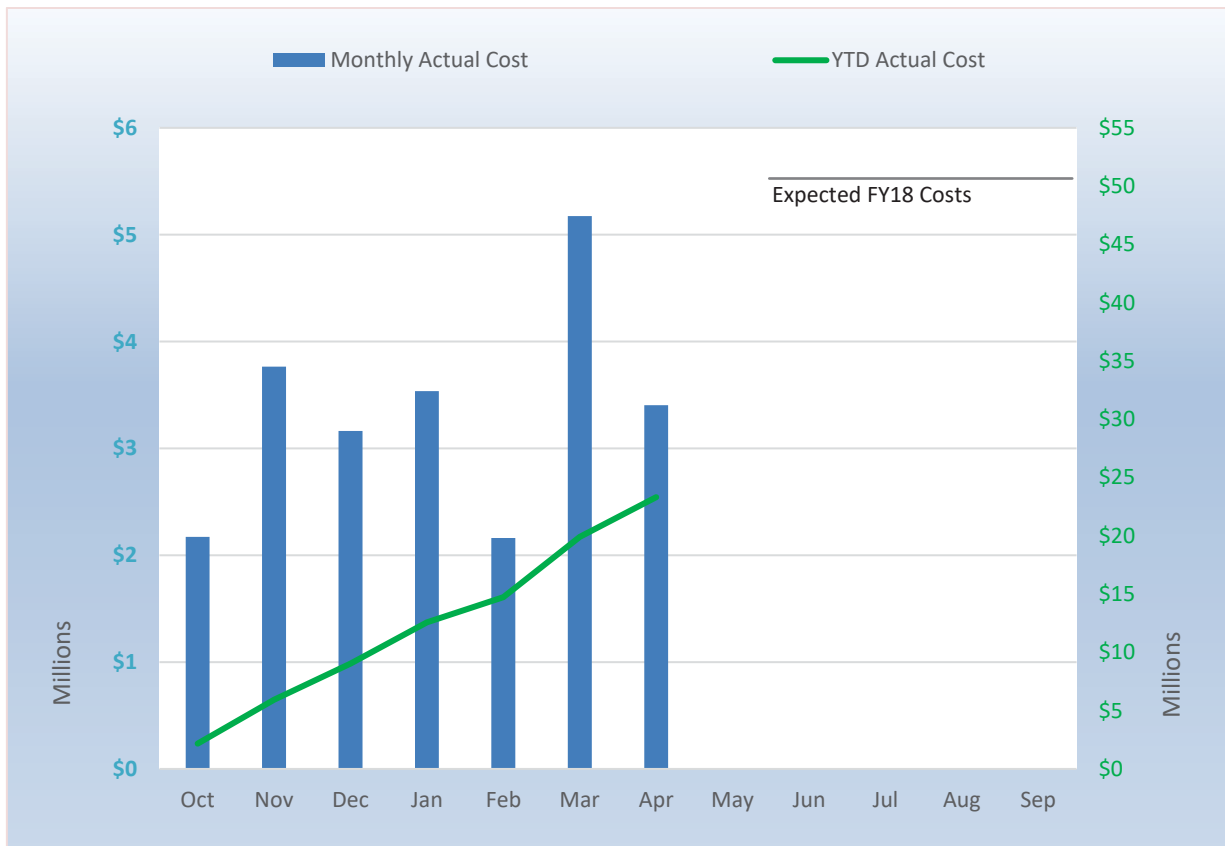


Figure 1. FY2018 Draft Comprehensive Vapors Action Plan Costs

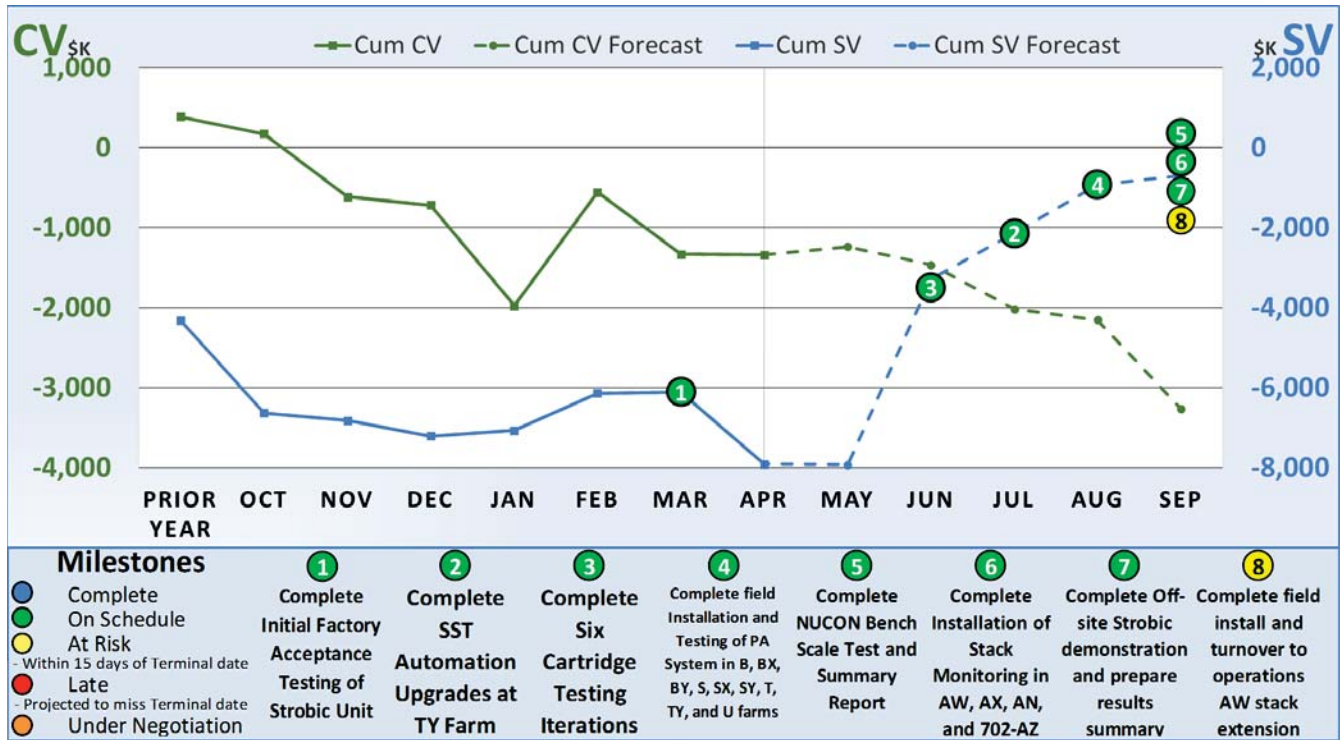


Figure 2. FY2018 Cost and Schedule Variances for the Draft CVAP

## 2. COMPREHENSIVE VAPOR ACTION PLAN Key Performance Parameters

### KPP 1. Engagement and Effective Measurement

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

**Update:**

Toxicologist Dr. Chris Kuhlman was the representative CTEH member last week. CTEH continued to support CPPO Notebook presentation materials. CTEH, part of the team from CPPO that attended last week's AZ Team Plan-of-the-day (POD) meeting, provided a briefing about the CPPO scope, what vapors information products are available, and where to find them.

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

#### Chemical Protection Engagement: Communications

**Update:**

Last week's CPPO Notebook is titled *Recent History of Supplied Air Respiratory Use at the Hanford Tank Farms – Part 1 - Timeline*.

#### Chemical Protection Engagement: Hanford Vapors Website Updates

- [CPPO Weekly Report - April 26, 2018](#)
- [CPPO Weekly Report - May 3, 2018](#)
- On the [Employee Resources](#) page, posted a link to the [Hanford Workforce Engagement Center \(HVEC\)](#) website

#### Chemical Protection Engagement: Chemical Vapors Solutions Teams

The CVST Communications Sub-committee held a meeting on May 7, 2018. Communications, IH Programs, Management, Operations, HAMTC Safety Representatives, Nuclear Chemical Operators, Radiological Control Technicians, and CPPO were in attendance, as well as a number of the Team Vapor Representatives (TVR). The meeting focused on improving TVR attendance at these meetings and the rollout of Full Face Air Purifying Respirators (FFAPR) at AP Farm. It was suggested that at least once-per-quarter, it be mandatory for the TVR to attend the Communications CVST Sub-committee meeting, with the remaining meetings being optional. Clarification of waste disturbing versus waste intruding activities was discussed at length since it is one of the criteria for determining the use of FFAPR. Questioners were satisfied with the answers given to their questions. In addition to these main topics, a request was brought up to potentially change the date of the current CVST meeting, since a couple of TVRs are not able attend Wednesday afternoons. The Chemical Protection Integration Manager said he would discuss this with the core CVST members. The Communications lead also provided updates on the Workforce Incentive Plan, litigation and settlement discussions and the evaporator campaign. The AZ Team Area Manager also reminded those in attendance to help educate workforce that are wearing FFAPR for the first time, since they are only familiar with using Self Contained Breathing Apparatus. In addition, an attendee highlighted the CPPO Weekly as a valuable resource on vapors information and recommended that this be distributed to the workforce.

A CVST New Technology Sub-committee meeting was held on May 9, 2018. Representatives from the Chief Technology Office, IH Programs, IH Field Operations, CPPO, and Nuclear Chemical Operators were in attendance. The meeting provided a comprehensive status of on-going C<sub>2</sub>Sense<sup>®</sup>, NUCON<sup>®</sup>, Fugitive Emissions, AW Farm stack extension and Vapor Monitoring and Detection System activities. The majority of questions from those in attendance focused on the C<sub>2</sub>Sense<sup>®</sup> monitoring testing, since two of the attendees are currently supporting C<sub>2</sub>Sense<sup>®</sup> field activities. Many of the questions could not be answered during the meeting, but were answered the following day when the CPPO team attended the AZ Team POD (The AZ Team is responsible for supporting C<sub>2</sub>Sense<sup>®</sup> (testing). The team leader indicated the New Technology Sub-committee could be cancelled since there are minimal new technologies under development. If the meeting is cancelled, those

who attend the New Technology Sub-Team meeting will be invited to the Fugitive Emissions Sub-Team meetings.

#### Chemical Protection Engagement: Effectiveness Measures

##### **Update:**

The CPPO *FY2018 Vapors Communication Survey* report is ready to be issued.

#### Chemical Protection Engagement: Worker Feedback

##### **Update:**

Last week's CPPO Weekly Report described the CPPO Team's meeting with Facilities Maintenance. The Facilities Maintenance Team, unfamiliar with the CPPO Notebook, recommended the CPPO Notebook be flowed down to the lower-level managers running their Plan-of-the-Day (POD) meeting in order to increase their accessibility. CPPO is currently reviewing its Notebook distribution list to effectively increase viewership.

It was suggested by a CVST Communications Sub-committee meeting attendee that at least once-per-quarter, TVRs be required to attend the Communications CVST Sub-Team meeting, with the remaining meetings remaining optional. In addition, an attendee highlighted the *CPPO Weekly* as a valuable resource on vapors information and recommended that this be distributed to the workforce.

#### Chemical Protection Engagement: Workforce Engagement

##### **Update:**

The CPPO attended the AZ Team POD meeting and provided a briefing (where approximately 35-40 members were in attendance) about the CPPO group and what vapors information products are available and where to find them. The briefing was followed by a Q&A session, during which the workforce had a series of questions on the <sup>1</sup>C<sub>2</sub>Sense<sup>®</sup> activities currently being performed at A Farm, a farm the AZ Team supports. Although highly encouraged by management, no additional questions or feedback were provided to the CPPO Team. It should be noted that the AZ Team is very familiar with CPPO activities as management routinely reviews CPPO materials with the group and has TVRs relay information from the CVST meetings.

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

### IH Manual and Technical Basis

#### **Last update 5/10/2018:**

Industrial Hygiene continues to add to a growing body of IH Technical Basis and IH program updates. TOC-IH-58435, *Industrial Hygiene Manual*, saw updates to Sections 1, 2, 3, and 4, which are complete and have been published to the IH Intranet. Section 5, *Reporting Occupational Exposure and Medical Monitoring*, and Section 6, *Emergency Response*, are on the IH SharePoint for review. The following procedures have been issued:

- TFC-ESHQ-S\_IH-C-66, *Identifying Chemicals of Concern in Hanford Tank Farms*
- TFC-ESHQ-S\_IH-C-67, *Maintenance of the Industrial Hygiene Chemical Vapor Technical Basis*
- TFC-ESHQ-S\_IH-C-48, *Managing Tank Chemical Vapors*
- TFC-PLN-174, *Industrial Hygiene Chemical Vapor Technical Basis Program Plan*
- TFC-ESHQ-S\_IH-C-63, *Modeling/Mapping Procedure*
- TFC-PLN-34, *Industrial Hygiene Exposure Assessment Strategy*

IH staff have been routinely updated on the many changes by way of newsletters, management briefings, and all hands meetings. Furthermore, *IH Administrative Procedures and IH Manual* is required reading and was issued February 3, 2018. Required Reading and IH communication for Section 3 of the IH Manual was sent to all IH staff on April 23, 2018. *Risk Communication Techniques* and *Crucial Conversations*, two IH professional development courses, are well underway with approximately 8% of the workforce trained in *Risk Communication Techniques* and 27% trained in *Crucial Conversations*.

Bi-weekly meetings focused on developing exposure assessments are on-going. The meeting is attended by representatives from all line organizations, work control, and work planning. In addition to developing exposure assessment procedures, the group integrates exposure assessment outcomes with work control. The *AP Farm Exposure Assessment* is in IH SharePoint in review.

#### **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 (HPP)

#### **Last update 5/10/2018:**

Six of the HPP studies that have transitioned in the TFC-Charter 71 process have been slated to be issued outright as version Rev 0. This decision was made because the exposure limit values presented in the reports are based on established exposure limits provided by the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV) guidance. These reports include the following: *Proposed HTFOELs for Chronic Exposures – COPCs with Regulatory Guidelines; Proposed Acute Exposure Concentration Limits for COPCs with Regulatory Guidelines; Proposed HTFOELs for Chronic Exposures - Nitrile Class COPCs and 2,4-Dimethylpyridine; Recommendations for Sampling and Analysis of Hanford Waste Tank Vapors; Hanford Tank Vapors FY 2017 Chemicals of Potential Concern Update; and Hanford Tank Farm Occupational Exposure and Risk Assessment Plan: Health Process Project.* Two additional HPP studies are currently under review by IH to assess the technical and economic impacts of implementing the study recommendations. These studies are *Proposed Risk-Based Approach for Nitrosamine Chemical of Potential Concern* and *Proposed Occupational Exposure Limits for Furans*.

#### **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.

### Leading Indicators

#### **Last update 5/10/2018:**

Pacific Northwest National Laboratory supported WRPS in improving its chemical vapors hazard management program with research, analysis, development, testing, and technical support focused on better identification and understanding of the vapor hazards. PNNL-27449, *FY18 Leading Indicator Phase 2 Report*, published last month, describes one part of an overall vapors program managed by WRPS, specifically addressing the identification of chemical vapor leading indicators (LIs). The report is part of the toolbox and technical basis used by the WRPS Industrial Hygiene group to devise processes and procedures used to limit worker exposure.

### Air Dispersion Modeling

#### **Last update 5/10/2018:**

Industrial Hygiene submitted its final technical review of *Air Dispersion Modeling, Revision A*; comments are being dispositioned and publication is pending. The Air Pollutant Graphical Environmental Monitoring System (APGEMS) modeling software (version 1.0) and accompanying draft report were completed and delivered to WRPS by the Dispersion Modeling Project Team in March. The report describes the APGEMS software and discusses the technical limitations of the

current version. Since then, the APGEMS software has been refined, resulting in version 1.1. Test cases are now being run by PNNL using the improved version of the software.

### Central Residence for Industrial Hygiene Technicians (IHT)

**Last update 4/12/2018:**

A centralized mobile office (MO) building is slated to house approximately 100 Industrial Hygiene Technicians (IHTs). This new space is designed to be large enough to house the retrieval IHTs and their first-line supervisors. Plans are to install the MO in 200 East area on 4th Street near 218A across from PUREX. KPP 3 advocates a central location for IHTs that is commensurate with other technician level employees. The trailer design has been approved by Washington State Labor and Industries.

## **KPP 4. Engineering Controls**

### A Farm Exhausters

**Last update 5/10/2018:**

Over the last two weeks, crews continued construction of the exhauster retaining walls which support the exhauster slab. They completed the installation of the rebar and concrete forms for the walls, adjusted rebar clearances, began assembling piping, and worked on determining appropriate concrete mix to enable pumping the concrete 300-feet (**Figure 2**).

In order to isolate the ventilation ducting seal-loop, the crew successfully filled the A-101 20-inch seal-loop with grout. They mobilized to A-102 for isolation of that seal-loop. These efforts will help maintain tank vacuum and improve visibility during retrieval operations.

To facilitate the expansion of the road between A and AX Farms, a concrete slab was demolished and loaded-out. The slab footprint and areas where bollards were removed were backfilled and compacted. The Vent Pit lid was loaded on an ERDF trailer for disposal and additional backfill/compaction efforts continued.





*Figure 2. Pictured is an A Farm Exhauster Retaining Wall. The rebar and forms have been installed and are awaiting the concrete. For more, see KPP 4, Engineering Controls. (Photo courtesy of M. Allen.)*

### AW Stack Extension

#### **Last update 5/10/2018:**

The fabrication of the AW Farm stack extension continued. In the last two weeks, the following was accomplished:

- Efforts continued on preparing the non-radiological and radiological permit application.
- Planning for the foundation and stack installation activities continued. The work package for foundation activities has been approved and will be undergoing an un-reviewed safety question (USQ) review while the work package for installation activities is still developing. In addition, the vendor delivered submittals for fabrication of the stack extension, which are currently being reviewed by WRPS.

#### **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.

### AN Stack Extension

#### **Update:**

Engineering evaluations are being performed to determine the optimum height required for the stack and whether the existing superstructure can support that stack height increase. Modeling was approved last week.

### <sup>2</sup>Strobic® Air Dilution Fan

#### **Last update 5/10/2018:**

Efforts focused on the Strobic® Air Dilution Fan off-site testing. The following was accomplished over the last two weeks:

- The *Non-Conformance Report*, created in response to noted shipping damage on the Strobic unit, was resolved and repairs are on-going.
- The test plan, design, and equipment list needed to support off-site testing were completed and efforts are on-going to prepare the test pad.

### <sup>3</sup>NUCON® Thermal Oxidation Vapor Abatement Unit (VAU)

#### **Last update 5/10/2018:**

Activities supporting the engineering-scale testing continued. The following was accomplished over the last two weeks:

#### **TerraGraphics:**

- Test and Design engineers provided support for VAU startup and training activities. This included confirming power requirements and working to repair leaks in the Diesel Particulate Filter.
- Work continued on the *Technical Demonstration Conceptual Design* for BY-108, including resolving comments from the 60% conceptual design package, and in parallel, work continues on the 90% conceptual design package.

#### **NUCON®:**

NUCON® provided technical support for VAU startup and training activities.

#### **PNNL:**

Continued developing the analytical equipment needed to support the engineering-scale test (Figure 3). Efforts focused on the following:

- Completing the *Data Management Plan*
- Completing initial calibration of proton transfer reaction-mass spectrometer (PTR-MS)
- Connecting the calibration gasses to the in-trailer instrumentation
- Replacing the Mass Spectrometer on the GC/MS
- Turning over the trailer from crafts to the testing team

PNNL provided technical support for the VAU startup and training activities, including the following:

- Issuing and submitting the *NUCON® Test Plan: Standard Operating Procedure and Worker Safety and Health Exposure Assessment Report*
- Continuing support for the WRPS QA surveillance
- Completing internal sample loop leak test
- Completing heat tracing and installation of the sampling system

PNNL also continued preparing equipment and systems needed to support testing activities, including the following:

- Completing the VAU exhaust leak rate testing
- Completing the installation of the sampling tubes routed to the VAU
- Completing performance testing of the main mass flow controller
- Completing shakedown testing the week of April 30
- Starting VAU testing the week of April 30 (**Figure 4**)

**WRPS:**

WRPS performed a QA pre-test surveillance on VAU and PNNL documentation.



**Figure 3. NUCON® Instrumentation Trailer**



Figure 4. NUCON® Vapor Abatement Unit and Instrumentation Trailer

## KPP 5. Administrative Controls and Monitoring

### ✚ Permanent Installation of VMDS Equipment in AP Farm

#### Update:

As the second week of May closed, VMDS activities had included the following:

- Efforts to obtain approvals on the *Phase 2 Pilot-Scale Report* draft, a report summarizing the results of the FY2017 pilot-scale activities continue.
- The UV-FTIR installed at AP Farm is in the process of being turned over to Operations. The on-going activities supporting the turnover include the following:
  - Completing the final review of the functions-and-requirements (F&R) document, RPP-RPT-60580. DOE provided

#### 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.

administrative comments anticipated to be resolved quickly, allowing for approval of the document.

- Continuing to prepare the test plan for startup activities. The draft plan has been completed and review by the Joint Test Working Group is next.
- Incorporating comments on uncertainty calculation (RPP-RPT-60669) and preparing to submit for final approval.
- The calibration gas calculation (RPP-CALC-62150) is undergoing final review and approval.
- The statement of work to procure calibration support for the UV-FTIR was approved and is with procurement for processing.
- Releasing four Material Requisitions for procurement of the test gases.
- Continuing efforts to complete Operational Readiness Checklist items.

#### Stack and Boundary Monitors

##### **Update:**

Activities in progress at the end of the second week in May include:

- Performing fabrication and factory acceptance testing of the Ultra Violet Differential Optic Absorption Spectrometry (UV-DOAS) units.
- Submitting the draft AW and AX Farm stack monitor design packages for review.
- Continuing to prepare the AX Farm stack monitor design package for review.

#### Establishing Safe Unrestricted Boundaries

##### **Last update 5/10/2018:**

The *Industrial Hygiene Basis for defining the Unrestricted Work Boundary*, clarifying how WRPS will define work boundaries in and around the Tank Farms, was published on March 28, 2018. This document provides a regulatory basis for the implementation of the Tank Farm boundaries moving forward for the IH Program and provides defense in depth. The walk-downs in support of the AP, AN, A, and AW Tank Farms coverage maps have been completed, and the draft coverage maps are in development for the AP and AW Tank Farms.

#### Public Address (PA) System

##### **Update:**

Activities thus far in May include the following:

- Continuing activities to support turnover of the second set of PA systems (AW, AN, AP and C Farms). Efforts are focused on closing out and approving turnover documentation.

- Continuing efforts for the next set of PA systems (B, S, T, and U Farms). Fieldwork at S, SX, and SY Farms was initiated and completed (excavation, trenching, wiring, and conduit installs) with the exception of standing up the poles and performing final electrical tie-ins. Additionally, the excavation permits for T, TX, and TY Farms is nearing completion. The excavation permit to support U Farm activities is being prepared.

## KPP 6. Tank Operations Stewardship

### Pilot SST Stewardship Program

#### **Update:**

Activities completed by the second week of May include the following:

#### **SST Remote Monitoring Equipment:**

The TY Farm temperature and surface level design verification report has been completed. The final phase of the TY Farm design is completing MSA network development and installation activities. Efforts continued on the draft TX Farm design; initiated the electrical and mechanical design packages.

#### **FY2015 LEAN Report:**

The *SST Stewardship Execution Strategy Document* has been entered into SmartPlant for final reviews and approvals; most approvals have been obtained.

#### **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

**No Update**

### Mobile Laboratory

#### **Last update 5/10/2018:**

RJ Lee Mobile Laboratory team members are performing maintenance tasks on the mobile laboratory. The lab was not funded to support the EC-08 Evaporator Campaign, but will be supporting the C<sub>2</sub>Sense<sup>®</sup> data collection from the AP Stack.

### Personal Vapor Monitor

**Last update 5/10/2018:** Since the last update two weeks ago, the <sup>4</sup>C<sub>2</sub>Sense<sup>®</sup> field demonstrations were initiated. C<sub>2</sub>Sense<sup>®</sup> data from four detectors and two ground truth instruments were collected from A-103 and A-105 passive breather filters (PBFs). Instrument readings at the PBFs (air drawn from under the PBFs) showed ammonia concentrations as high as 93 ppm, but concentrations at the C<sub>2</sub>Sense<sup>®</sup> and ground truth ammonia detectors are lower than desired (≤2 ppm). The detectors

were re-located as close as possible to the PBF, but this did not significantly increase the ammonia concentrations ( $\leq 3$  ppm). The detectors were removed from the field and reconfigured to increase the ammonia concentration being measured.

The new configuration, developed with input from the workforce, which uses a pump to pull high ammonia concentration air from the PBF and deliver it to an ice chest with detectors enclosed, was constructed and tested in the lab (**Figures 5-7**). The <sup>5</sup>ToxiRAE Pro and <sup>6</sup>Ventis™ Pro V ammonia badges were received for supporting upcoming field trials, while the <sup>7</sup>ChromAir® are still on order.



**Figure 5. C<sub>2</sub>Sense® System Installed at A-103 Passive Breather Filter (Photo courtesy of E. Morrey.)**



**Figure 6. (Left) Sample Pump Tubing Running to A-103 HEPA Filter. (Photo courtesy of E. Morrey.)**



**Figure 7. (Right) Four C2Sensors with Sample Pump and Ice Packs to Maintain Temperature. (Photo courtesy of E. Morrey.)**



## 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.

<sup>1</sup>CEREX® Stack Monitor CEREX trademark by TECAN SP, INC. Baldwin Park, California.

<sup>2</sup>Strobic Air is a registered trademark of MPC Inc., Wilmington, Delaware.

<sup>3</sup>NUCON is a registered trademark of Nucon International, Inc., Columbus, Ohio.

<sup>4</sup>C<sub>2</sub>Sense is a registered trademark by C2Sense, Inc., Cambridge, Massachusetts.

<sup>5</sup>RAE Systems by Honeywell, San Jose, California.

<sup>6</sup>Ventis™ Pro5 Multi-Gas Monitor is a registered trademark by Industrial Scientific in Pittsburgh, Pennsylvania.

<sup>7</sup>ChromAir is registered to Morphix Technologies, Virginia Beach, Virginia.