



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



*Depicted are an original and a renovated 222-S Laboratory analytical facility as seen by the CPPO Team when they toured the laboratory on March 7, 2018. Commissioned in 1951, the lab on the left is easily recognizable as the analytical laboratory of origin. For more on the tour, read CPPO Activities Status. (Photo courtesy of Julien Laurenz/222-S Laboratory)*

**Tank Operations Contract**  
**Chemical Protection Program Office**  
**Weekly Report March 15, 2018**

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

In coordination with Industrial Hygiene and the Environmental, Safety, Health and Quality (ESH&Q) Chemical Protection Integration Manager, seven (7) of the nine-part presentation providing an overview of the Industrial Hygiene exposure assessment process and activities specifically related to addressing chemical vapors at the tank farms were finalized. The remaining two (2) presentations are in various stages of draft.

*The Evaluation of Implemented and Proposed Actions in Response to the Hanford Tank Vapor Assessment Report (FY2018-PI-MD-030)* is a management-directed assessment that is aimed at determining if WRPS's planned or completed actions are responsive to the recommendations identified in the *Hanford Tank Vapors Assessment Report*, (SRNL-RP-2014\_00791), or TVAR. Additionally, the assessment is aimed at determining if any of the recommendations outlined in the TVAR remain unresolved. The detailed review of the 117 corrective actions generated by the TVAR recommendations is complete, finishing the first phase of the assessment. The Phase 1 review team identified 17 corrective actions tied to the TVAR recommendations that may require additional corrective actions. The team has 8 more corrective actions to evaluate further.

The CPPO Subject Matter Experts (SME), including CTEH personnel, introduce the workforce to CPPO work scope and history, as well as avail their expertise on vapors-related issues, by way of Plan-of-the-Day meetings, the weekly CPPO/HAMTC Safety Representatives Meeting, and when invited by work groups to do so. Last week, the 222-S Laboratory hosted the CPPO SMEs. 222-S Laboratory is described by HanfordVapors.com as "the primary onsite lab for analysis of highly radioactive samples in support of Hanford projects." 222-S Industrial Hygienists, Nuclear Chemical Operators, Health Physics Technicians, Safety, and Management staff conducted the tour. They described the functions of the Sample Receipt Area, the Hot Cells, the Laboratory, and the original and contemporary analytical facilities as they escorted CPPO and CTEH staff. The tour concluded with a walkdown of the HVAC system and support trailer.



**Figure 1. 222-S HVAC System, March 2018.** (Photo courtesy of Julian Laurenz and 222-S Laboratory.)

The 222-S Lab Staff reported that they were not familiar with CPPO prior to the visit. The staff stated that they welcomed the opportunity to exchange histories and information on vapors issues.

## **CPPO Oversight and Tracking**

### **Cost and Schedule Metric**

Ongoing vapor projects supporting the draft Comprehensive Vapor Action Plan (CVAP) Key Performance Parameters (KPP) s are still moving forward as planned. FY2018 to date, \$14.7M has been spent implementing the draft CVAP KPPs. Eighty-four and eight tenths of a percent (84.8%), \$48.3M, of our revised not to exceed (NTE) value of \$56.995M has been spent. Monthly costs are expected to jump up to near \$5M per month through the spring with the VMDS, <sup>1</sup>Strobic® and IH Trailer procurement coming in. At this rate we expect the NTE to last through mid-April 2018 as shown in **Figure 2**. The cost and schedule variances are shown in **Figure 3** along with key completion milestones which are on the schedule. Figure 3 supplements the FY2018 spending data in Figure 2.

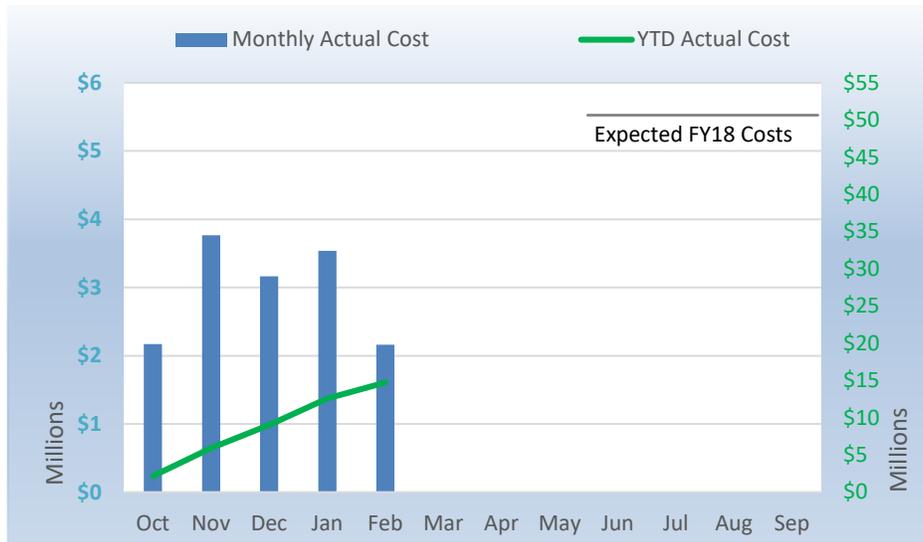


Figure 2. FY2018 Draft Comprehensive Vapor Action Plan Costs

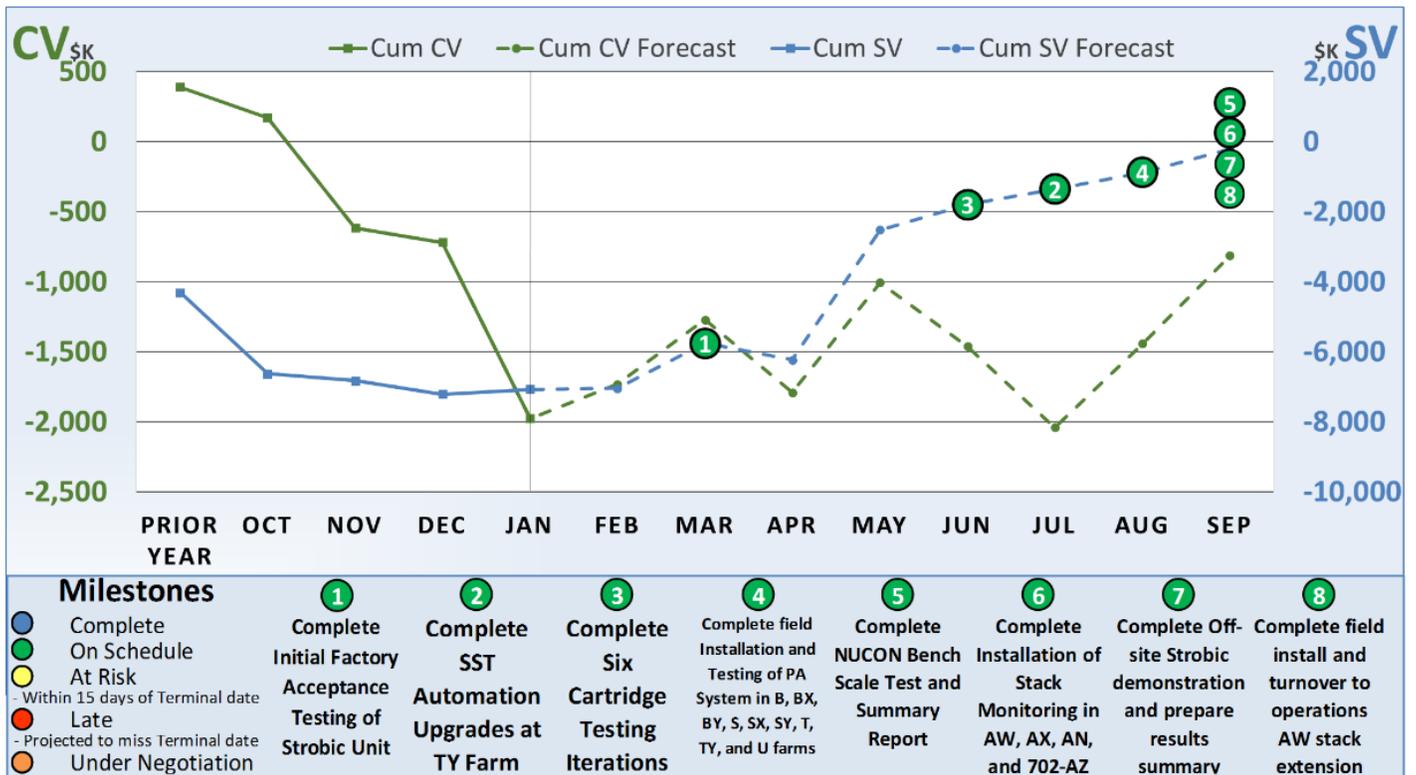


Figure 3. FY2018 Cost and Schedule Variances for the Draft CVAP

## 2. COMPREHENSIVE VAPOR ACTION PLAN Key Performance Parameters

### KPP 1. Engagement and Effective Measurement

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

In support of their ongoing assessment, the CTEH team continued to interview workers last week, focusing on the ways in which progress has been made in the vapors program.

Working closely with Industrial Hygiene, the CTEH team continued to develop the nine-part CPPO Notebook presentation series introducing the workforce to the process used by Industrial Hygiene to assess and control hazards.

The CTEH Team was represented by Dr. Lumpkin on the 222-S Laboratory tour last week. Pictured in **Figure 4** is Dr. Michael Lumpkin, Senior Toxicologist.

#### Key Performance Parameter 1

Establish a comprehensive vapor management communication plan, engagement processes, and effectiveness measurements.

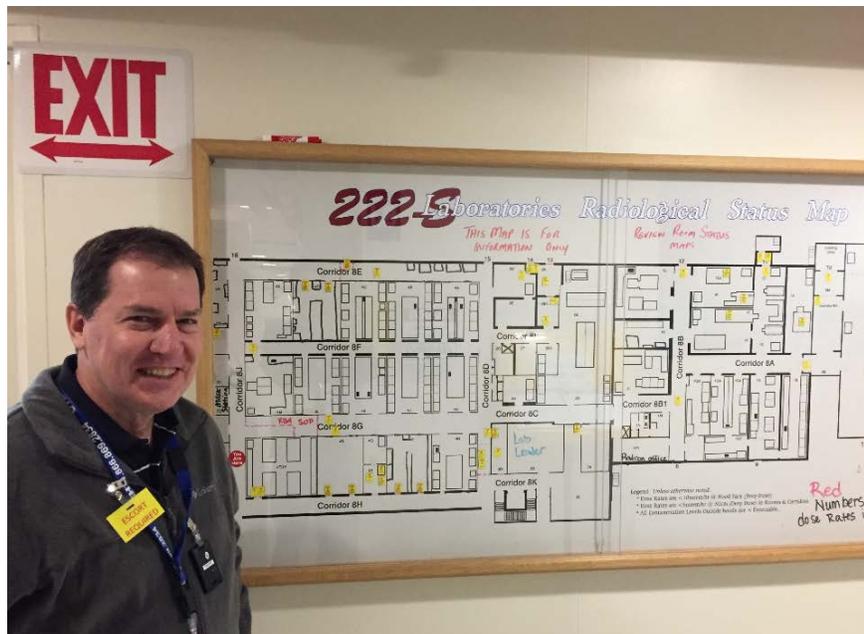


Figure 4. Dr. Michael Lumpkin, CTEH Senior Toxicologist, is pictured in front of the 222-S map.

#### ✦ Chemical Protection Engagement: Chemical Vapors Solutions Teams (CVST)

No CVST meetings were held last week.

#### ✦ Chemical Protection Engagement: Communications

Last week's CPPO Notebook is titled *Industrial hygiene exposure assessment: Risk management, part 1 Hierarchy of controls, Part 6 of 9, KPP 3*. This week's CPPO Notebook is titled *Risk management, part 2 Work boundaries, Part 7 of 9, KPP 3*.

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

There were no updates to the Hanford Vapors Website last week.

#### ✦ Chemical Protection Engagement: Effectiveness Measures

The CPPO *FY2018 Vapors Information Effectiveness Survey* results are being tabulated, reviewed, and examined, in addition to being evaluated against the 2017 survey.

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

#### ✦ IH Manual and Technical Basis

##### **Last update 3/8/2018:**

There are eight sections in the Industrial Hygiene Manual, of which Sections 1 and 4, *Introduction* and *Tank Waste Chemical Vapors*, are published on the Industrial Hygiene website. Additionally, 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-34, *Industrial Hygiene Exposure Assessment Strategy*
- TFC-PLN-174, *Industrial Hygiene Chemical Vapor Technical Basis Program Plan*

IH is continuing to develop IH Manual sections.

#### **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 2/15/2018:**

The HPP process has transitioned into the TFC-Charter-71 process implementation. The process evaluates the studies conducted in the HPP process.

The TFC-Charter 71 process conducts both technical and economic feasibility evaluation for the studies with the *Proposed TFOELs for Chronic Exposures – COPCs with Regulatory Guidelines* (PNNL-26777) and *Proposed Acute Exposure Concentration Limits for COPCs with Regulatory Guidelines* (PNNL-26850) studies scheduled for review this year.

### Leading Indicators

#### **Last update 2/15/2018:**

The Leading Indicators study now focuses its evaluation on three primary leading indicator compounds. These are ammonia, mercury, and nitrous oxide. The study has developed evaluation methods that compare paired data, data in which two or more samples were taken simultaneously, to various concentrations. Specifically, the project is using the reference concentrations of ½ of the occupational exposure limit (OEL), the OEL, and the excursion limit (3 times the OEL).

### Maintain Industrial Hygiene Program and Institutionalize Vapor Program Requirements

#### **Last update 3/8/2018:**

Tiers 1, 2, and 3 of WRPS's three tiers of vapors training, are launched. Training bulletin TB-18-01, *The New Chemical Worker Training Program*, was issued to WRPS as required reading on January 15, 2018.

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

#### **Last update 3/8/2018:**

The project to complete the centralized mobile office (MO) building for IHTs continues. The MO is slated to house approximately 100 workers. Plans are to install the MO in 200 East area on 4th Street near 218A across from PUREX. Once installed and occupied, the MO will satisfy KPP 3 goals. The trailer site design is at 90% completion and is in review. The trailer design was approved by Washington State Labor and Industries.

#### **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.

## Air Dispersion Modeling

### **Last update 3/8/2018:**

The Dispersion Modeling project team has revised the Air Pollutant Graphical Environmental Monitoring System (APGEMS). The new modeling system is called APGEMS-TF. APGEMS-TF is an atmospheric dispersion model that has been optimized for modeling chemical vapor source emissions from the Hanford Tank Farms. The user interface has been simplified by making known source emission rates from known Tank Farm sources available from a simple pick list. APGEMS-TF produces atmospheric simulations utilizing actual meteorological data from the Hanford Met Stations. Simulations can be run using historical or current meteorological conditions. Post modification regression tests and test cases are complete and the model is being made available to a limited distribution for acceptance testing. The draft report summarizing the model, capabilities, limitations, and quick user's guide has been delivered and is in review.

## **KPP 4. Engineering Controls**

### A Farm Exhausters

#### **Update:**

Development of the A Farm Exhausters continued. The verification activities for five of the six A Farm tank seal loops were completed. The engineering change notices allowing construction to begin on the A/AX Farm access road were completed too. The following A Farm Exhauster pad construction activities occurred over the last two weeks:

- The excavation of the exhauster slab retaining wall footings for both the south and north walls was completed.
- The subcontract to construct the exhauster slab was awarded to American Electric Inc.
- For the A Farm concrete pad, the vendor began providing submittals and initiated mobilization activities. Walk downs continued in an effort to confirm the ducting isolation activities.

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

Complete engineering control concept demonstrations for <sup>1</sup>Strobic Air Tri-Stack<sup>®</sup> and <sup>2</sup>NUCON<sup>®</sup> International, Inc. thermal combustion in support of unrestricted work boundaries

### AW Stack Extension

#### **Update:**

Fabrication of the AW Farm stack extension is underway. The following was accomplished over the last two weeks:

- Bids for installation of the AW Stack extension were received and are being evaluated for award.
- The non-radiological permit application continues being prepared.

### AN Stack Extension

#### **Last update 3/1/2018:**

Engineering evaluations, determining the maximum height the existing superstructure can support, and whether there would be a beneficial impact to the work area based on the extension, are in progress.

### Strobic® Air Dilution Fan

#### **Update:**

Fabrication of the Strobic Air Dilution Fan continued. The following was accomplished over the last two weeks:

- WRPS personnel visited Strobic®'s facility to status the progress of the factory acceptance test activities. The plenum and fan tests were completed. Although the variable frequency drive was installed, it has not been tested. WRPS personnel also supported Strobic® in developing their submittals.
- The test plan contract for Richland off-site testing was awarded to Hi-Line. Efforts continue to award the off-site testing contract.

### <sup>2</sup>NUCON® Thermal Oxidation Vapor Abatement Unit (VAU)

#### **Update:**

The engineering-scale test continues to be developed, and the following was accomplished since the last update:

#### Terragraphics

- Test and Design Engineers provided support for VAU startup and training activities.
- Work continued on the *Technical Demonstration Conceptual Design* for BY-108.
- Work continued on finalizing the *Site Selection Report*.

#### NUCON®

- A NUCON® technical representative was on-site to assist with VAU startup and training activities.

#### WRPS

- Two AreaRAE Photo Ionization Detector instruments were transferred to PNNL in order to measure volatile organic carbon during the engineering-scale test.

## PNNL

- Continued developing the analytical equipment to support the engineering-scale test. Additionally, PNNL:
  - Sampled the calibration gas; sent it to 222-S for analysis.
  - Demonstrated the effectiveness of chromatography in the Lab with the calibration gases, and then moved chromatograph to the test trailer.
  - Received, unloaded, and completed testing of the Fourier transform infrared (spectrometry), and then moved equipment to the test trailer.
  - Rented a replacement quadrupole mass spectrometer for the Proton Transfer Reaction-Mass Spectrometry.
  - Received blended tracer gas (3% methane in nitrogen) to support exhaust flow measurements.
  - Continued preparing procedures for FTIR and PTR-MS.
- Continued preparing equipment and systems needed to support testing activities, including the following:
  - Completed electrical retrofit for skid load and control.
  - Successfully started VAU diesel engine.
  - Continued construction of the sampling and injection system assembly.
  - Completed plumbing injection lines into the trailer.
  - Confirmed VAU flowmeter was operational and received calibration certificate.
  - Shipped two <sup>3</sup>DryCal® primary flow meters to Mesa Labs for calibration.

## KPP 5. Administrative Controls and Monitoring

### Permanent Installation of VMDS Equipment in A and AP Farms

#### **Last update 3/8/2018:**

Numerous activities were on-going last week including:

- Continuing efforts to obtain approvals on the *Phase 2 Pilot-Scale Report*. The report is currently with WRPS for general counsel review.
- Continuing work on the A Farm coverage maps.
- Preparing the *AX Farm Basis of Design* and *AN Farm Basis of Design*.
- Continuing work on the AP Farm UV-FTIR turnover to Operations including:
  - Development of the *Functions & Requirements* document, with comments incorporated on the draft document.
  - Continued engineering review to specify test gases and starting procurement activities.

#### **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.

- Continued preparation of the ammonia set point calculation. The 90% draft is complete and is undergoing review.
- Calculations used to support AP Farm turnover were completed. These calculations included the heat trace verification, sample pump flow verification and heating/cooling verification.
- Efforts to complete Operational Readiness Checklist items continued.
- Continuing work on the Autosampler modifications, including:
  - Preparing the report summarizing the development and selection of the test gases.
  - Continuing the purchase of the gas standards, heated tube set and gas generator.
  - Preparing the draft test procedure to support integrated testing activities.
  - Preparing design drawings for the test bed manifold and Hanford E-Skid, as well as completing the draft E-Skid testing procedures.
  - Developing the functional requirements for the Autosampler implementation strategy.

#### Stack and Boundary Monitors

##### **Last update 3/8/2018:**

The <sup>4</sup>CEREX® Stack Monitor Procurement contract proposal was submitted and a technical review is being prepared. The AN Farm design package remains in review. The 60% design installation package for the AX Farm continues to be prepared.

#### Establishing Safe Unrestricted Boundaries

##### **Last update 2/15/2018**

Coordinated with ORP, a draft paper, tentatively titled *Comprehensive Vapor Action Plan KPP 5 - Defining the Unrestricted Work Boundary*, was developed clarifying how WRPS will define work boundaries in and around the tank farms. This document provides a regulatory basis for the implementation of the tank farm boundaries moving forward for the IH Program. It is in final review by ORP and WRPS IH program staff. During FY2017, WRPS's subcontractor Kenexis Consulting Corporation completed three quantitative risk assessments (QRA) designed to assess the probability and likely consequences of an episodic, acute exposure. To support these planned QRAs, all comments have been received for the AN-Tank Farm Basis of Design (BOD), and the BOD for the AY/AZ-Tank Farms has been initiated. All laser scans needed to support the AN and AY/AZ QRAs have been completed, and laser scan data analysis has been initiated.

### Public Address System

#### **Last update 3/8/2018:**

Prior to turning the east area A, AX, AY, and AZ Farms over to operations, the last speaker, AX-001, required troubleshooting. The troubleshooting work is complete, allowing the turnover to resume. For the west area PA systems, work continued on preparing excavation permits and crossing lists for the S, B, T, and U Farms.

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

### Pilot SST Stewardship Program

#### **Last update 3/8/2018:**

In the last month, it was determined that the TX Farm and TY Farm designs, along with the *SST Stewardship Execution Strategy Document* (FY2015 LEAN Report) would be complete in FY2018, while the TY Farm installation activities would be deferred until FY2019. Since the last CPPO update:

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

Efforts continued on the draft *TY Farm Temperature and Surface Level Design* packages. In addition to design activities, all the equipment needed to support temperature and surface level installation was received.

#### **FY LEAN 2015 Report:**

Review of the second draft of the *SST Stewardship Execution Strategy Document* has been completed and comment incorporation was started.

#### **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

#### **Last update 3/1/2018:**

Headspace sampling at BY Farm was completed the weekend of February 9, 2018. Cartridge testing at BY Farm is also complete. Sampling at BY-108 and BY-110 completed PAPR and APR testing the weekend of February 24, 2018. Mobilization began at AP Stack.



**Figure 5. Headspace sampling at BY Farm, February 2018**

## Mobile Laboratory

### **Last update 2/15/2018**

Since the last update, the following was accomplished:

- A contract to R.J. Lee was issued for supporting the FY2018 Spring Background Study using the mobile laboratories. After the contract was awarded, a kickoff meeting was held with R.J. Lee to discuss details of the study.
- A meeting was held with R.J. Lee to provide feedback on their procedures from a quality assurance perspective. Edits are being made to the procedures.
- A meeting was held with the workforce as part of the weekly HAMTC/CPPO meeting. The NUCON Project Manager provided details of the FY2018 Spring Background Study. The group discussed locations where monitoring would occur. Feedback was provided by the workforce on alternate locations, which the Project Manager agreed to take into consideration.

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

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

## <sup>5</sup>C<sub>2</sub>Sense® Personal Vapor Monitor

### **Update:**

During the reporting period, the following was accomplished:

- C<sub>2</sub>Sense® shipped ammonia sensor chips for supporting upcoming field trials.
- A material requisition was prepared to procure alternative ammonia detectors for the field trials.
- The ammonia sensors and associated parts for the C<sub>2</sub>Sense® field trial were provided to the workforce, who will fabricate the mounting plates that will be used to secure the ammonia sensors.
- Procedures and work packages needed to support the C<sub>2</sub>Sense® field trial continue being prepared. The procedures are being prepared with support of the WRPS Industrial Hygiene group.

## KPP 8. Medical Support

The scope of KPP-8 is to support RL medical program enhancements in conjunction with other Hanford Site organizations. In the last month, the following events occurred:

- The Office of the Ombudsman visit was cancelled. No new visit has been confirmed.

The HAMTC President did not agree with the committee's recommendation to replace the Access Control Entry System (ACES) exclusion note in TFC-BSM-HR\_EM-C-10, *Reasonable Accommodations* procedure with, "employees with minimal or no symptoms and a normal exam may be returned to work with or without restrictions while lab test results are pending." Discussions continue with HAMTC.

- HPMC confirmed that they are currently working on the epidemiology study comparing Tank Farm Vapor Exposures and Non-Exposed Group of Hanford Workers.

### 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>Strobic Air is a registered trademark of MPC Inc., Wilmington, Delaware.

<sup>2</sup>NUCON is a registered trademark of Nucon International, Inc., Columbus, Ohio.

<sup>3</sup>DryCal is a registered trademark by Mesa Labs, Butler, New Jersey.

<sup>4</sup>CEREX trademark by TECAN SP, INC. Baldwin Park, California.

<sup>5</sup>C<sub>2</sub>Sense is a registered trademark by C<sub>2</sub>Sense, Inc., Cambridge, Massachusetts.