Figure 1 depicts the test structure for future Autosampler testing. The modified Autosampler will have the capability of collecting real-time samples using an Ultra Violet- Differential Optical Absorption Spectrometer (UV-DOAS), near real-time samples using a Gas Chromatography-Flame Ionization Detector and the ability to collect samples for laboratory analyses. Figure 2 depicts test gas sample ports for the modified Autosampler.
Photo courtesy Ron Yonchko.
1. CHEMICAL PROTECTION PROGRAM OFFICE (CPPO) ACTIVITIES STATUS

The CPPO welcomed Kenneth Overby to the team last week. Mr. Overby is a WRPS Industrial Hygienist with many years of experience. He has worked at the Hanford Tank Farms for seven years. He is stepping into the WRPS Industrial Hygiene Subject Matter Expert position previously held by Mr. Robert Campbell.

CPPO team member, Mr. Chris Holst, presented the DAV Tool technologies to AECOM Ventures division last week. AECOM Ventures division, a computer tools opportunity group, investigated many of the Tank Farm Technologies used at the tank farms. Additionally, the group considered the ways in which computer learning can utilize data to improve the understanding of tank vapors.

In coordination with Industrial Hygiene and the Environmental, Safety, Health and Quality (ESHQ) Chemical Protection Integration Manager, the first three of the nine part presentation introducing the workforce to the new vapors-related Industrial Hygiene remedies were finalized. The remaining six presentations are in various stages of draft.

- **CPPO Oversight and Tracking**
  - **Data Access Visualization (DAV) Tool**

Sub-contracted by the CPPO, Pacific Northwest National Laboratory (PNNL) built and successfully launched the DAV Tool early in FY2018. Engaging the user by interactive access to historical and current tank vapor samples, monitoring results, and visual representations of relevant data and contextual information, the DAV Tool promotes transparency. This sophisticated tool avails the data to the user with little technical background, and allows the more technically sophisticated user to drill down to detailed content. The DAV Tool is on the HanfordVapors.com website. January 2018 DAV Tool statistics, as provided by Google Analytics, are depicted in Table 1.
2. COMPREHENSIVE VAPOR ACTION PLAN Key Performance Parameters

**KPP 1. Engagement and Effective Measurement**

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

The CTEH team continued to work on the nine part CPPO Notebook presentation series introducing the workforce to the new vapors-related Industrial Hygiene remedies. The first notebook, *Industrial hygiene assessment: Introduction, KPP 3*, was published last week. Additionally, the team assisted with tabulating the current vapors information effectiveness survey results.

**Chemical Protection Engagement: Communications**

Last week’s CPPO Notebook is titled *Industrial hygiene assessment: Introduction, KPP 3*. This week’s CPPO Notebook is titled *Industrial hygiene exposure assessment: Hazard identification, KPP 3*.

The January 29, 2018, Monday morning *IH Safety Start* presented the Stoneturn Consultant’s (STC) cartridge testing program key points as outlined by the 3rd Party reviewers in the Chemical Vapors Solution’s Team (CVST) meeting on January 17,
2018. The *IH Safety Start* presentation encouraged the audience to view the full CVST video presentation.

*Solutions*, Issue 423, published January 29, 2018, reported, “[t]he 222-S Laboratory Organic Studies group recently was reaccredited for analyzing industrial hygiene samples of organic chemicals in tank vapors by the American Industrial Hygiene Association Laboratory Accreditation Program (AIHA-LAP). This marks the 5th reaccreditation since its initial accreditation on Aug. 1, 2007. The group of 13, led by manager Dan Hansen, performs special analyses of volatile and semi-volatile organic chemicals of potential concern in tank vapors. They processed 5,065 samples last fiscal year.”

*Solutions*, Issue 423, published January 29, 2018, reported that a new chemical worker training program is in place. “Training Specialist Matt Tom assembled a team of workers, including industrial hygiene technicians, nuclear chemical operators and radiological control technicians, who met regularly for months to develop the Chemical-Worker Tier 3 training program.”

*Hanford Tank Vapors, Vapors Weekly Update*, published February 1, 2018, reported, “WRPS is preparing engineering-scale testing of ¹NUCON® technology, a novel vapor-abatement unit that pulls tank vapors into an internal combustion engine’s induction system where they are combusted and destroyed in the engine cylinders.”

Chemical Protection Engagement: Hanford Vapors Website Updates
- AP Stack Weekly Report Feb. 22-March 1, 2017
- VMDS Consolidated Weekly Report May 10-17, 2017
- Event Investigation Report, EIR-2017-043
- Vapors Weekly Update – Feb. 1, 2018
- Particle Distribution Summary
- CPPO Weekly Report - Feb. 1, 2018
- Fiscal Year 2017 Mobile Laboratory Vapor Monitoring at the Hanford Site: Monitoring During Waste Disturbing Activities and Background Study
Chemical Protection Engagement: Effectiveness Measures

The survey was distributed to approximately 700 random WRPS participants. Completed surveys began returning Monday, January 22, 2018, and tabulations have begun.

Chemical Protection Engagement: Worker Feedback

*Solutions*, Issue 423, published January 29, 2018, reported that a new chemical worker training program is in place, and that ongoing worker participation and feedback impacted the final product. “Training Specialist Matt Tom assembled a team of workers, including industrial hygiene technicians, nuclear chemical operators and radiological control technicians, who met regularly for months to develop the Chemical-Worker Tier 3 training program.”

The CPPO Team has been tasked with identifying opportunities for worker feedback on CVAP product development. Discussions with CVAP subject matter experts have identified projects where this feedback is currently on-going or may potentially occur in the near future. These projects include the Autosampler, the C2Sense Monitor, and in establishing the CVST Fugitive Emissions Team.

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

IH Manual and Technical Basis Update:

Sections 1 and 4, *Introduction* and *Tank Waste Chemical Vapors*, of the IH Manual were published on the Industrial Hygiene website, and 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*

The *Industrial Hygiene Chemical Vapor Technical Basis Program Plan* "provides a method and process for reviewing, summarizing, updating, and implementing the
Hanford Tank Farm Industrial Hygiene Chemical Vapor Technical Basis ‘(TFC-PLN-174, pg. 2).

Briefings with line organization, all-hands meetings, newsletters, required reading, and other communication avenues have been utilized to communicate the changes to the exposure assessment process, vapors management strategies in the tank farms, and the changes to the IH Technical Basis. IH is continuing to develop IH Manual sections.

Health Process Plan (HPP)

Last update 1/12/2018:

The following HPP reports, all in draft and in evaluation by WRPS, have been developed: Proposed OELs 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 Limits for COPCs with Regulatory Guidelines, Proposed OELs for Chronic Exposures – Nitrile Class COPCs and 2,4-Dimethylpyridine, Recommendations for Sampling and Analysis of Hanford Waste Tank Vapors, and Hanford Tank Vapors FY 2017 Chemicals of Potential Concern update. The final study, currently in progress, is Assessing the Potential for Chronic or Acute Health Effects from Exposure to COPC Mixtures. This study will incorporate the chemical mixtures modeling, Acute Transient Exposure Concentration (TEC) Standard Operating Procedure (SOP) and Initial Screening, and potential approach to fill gaps in acute TECs and mixture effects.

Leading Indicators

Last update 1/12/2018

During the 1st Quarter, the leading indicators project team evaluated the concentration ratios between COPCs found in the data collected during the previous year’s cartridge testing. Ammonia (NH3) is currently the focus of the study due to its prevalence within the tanks. Direct read instrumentation (DRI) Ammonia readings are being compared to ammonia analytical samples to see how each sample type corresponds to concentration and duration of sampling. There were approximately 50 samples from the AP Exhauster and 5 samples from the A-103 Tank with reported concentrations for NH3 and N-Nitrosodimethylamine (NDMA). The clustering of data points from the mobile lab at the AP Exhauster show that the concentrations of both NDMA and NH3 were relatively constant over the 7-day campaign, indicating that ammonia and NDMA may be viable as leading indicators.
Maintain Industrial Hygiene Program and Institutionalize Vapor Program Requirements

Last update 2/1/2018:
Training bulletin TB-18-01, The New Chemical Worker Training Program, was issued to WRPS as required reading on January 15, 2018. The bulletin introduced Chemical Worker Tier Trainings. Determining that a “tiered approach to training is more effective because less time is spent in training that is not needed for your job requirements,” WRPS created three tiers of training and its commensurate refresher courses. Tier 1: General Chemical Awareness Training, targets all WRPS workers and is available as a standalone computer based training (CBT) for other Hanford Contractors. Tier 1, available since September 2017, covers general chemical and odor awareness. Tier 2 was published this month. It targets all WRPS workers located past the Wye Barricade, is a CBT, and Tier 1 is its prerequisite. Tier 3, which targets workers who enter the tank farms, is pending.

Central Residence for Industrial Hygiene Technicians (IHT)

Last update 2/1/2018:
Retrieval Industrial Hygiene Technicians (IHT) and their first-line supervisors will be relocated to a centralized mobile office (MO) building. The MO is slated to house approximately 100 workers. According to retrieval field support, this new space will be large enough to house all 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. The installed and occupied MO will satisfy KPP 3 for retrieval IHTs. The trailer site is at 60% completion. The trailer design is under review for approval by Washington State Labor and Industries.

Air Dispersion Modeling

Last update 1/25/2018: The Dispersion Modeling project team is currently working on Air Pollutant Graphical Environmental Monitoring System (APGEMS) regression tests and test cases; the model updates are complete, but modifications continue as they perform tests and identify fixes or opportunities for improvements, mostly in the software and graphic user interface (GUI). They are also drafting a report to summarize the model, capabilities, limitations, and to provide a quick users guide.
KPP 4. Engineering Controls

A Farm Exhausters

Last update 1/18/2018:
The design team began modifying the vendor contract, further refining the concrete installation work scope. In order to confirm the scope of ducting isolation activities, the team began walkdowns.

AW Stack Extension

Last update 2/1/2018:
The final (100%) design package continues its review. The Plant Forces Work Review was completed and is currently under review.

AN Stack Extension

Last update 1/18/2018:
Engineering evaluations to determine the optimum height required for the stack and whether the existing superstructure can support that stack height increase are planned.

Strobic® Air Dilution Fan

Last update 2/1/2018:
For factory acceptance testing, the following was accomplished during the reporting period:

- WRPS continued to review submittals provided by Strobic, focusing on the schedule, welding, nondestructive examination procedures, and drawings submittals.
- Equipment procurement and receipt is on-going.
- In parallel with these activities, unit fabrication was started.

For the second phase of off-site testing, efforts to award the test plan contract continued. Four proposals were received and all were deemed technically viable. The next phase will be to award the contract.
NUCON® Thermal Oxidation Vapor Abatement Unit (VAU)

Last update 2/1/2018:

The engineering-scale testing continues to be developed, with the following accomplished during the reporting period:

- Terragraphics
  - Performed final inspection of the electrical rack and the rack was shipped to the test site on 1/18/18.
  - Continued developing the site alternatives for the technical demonstration. During the week of 1/15, performed an initial screening of the site alternatives, with the following four tanks selected for further evaluation: BY-108, TY-103, SX-104, and A-106. During the week of 1/22, performed field walkdowns of the four sites to determine the site layout of each tank.
  - Continued work on Functions and Requirements document revision.

- NUCON®
  - Continued working on the design and fabrication of the diesel conversion kit. All drawings were completed and submitted for the kit, and the generator was shipped.

- PNNL
  - Continued development of the analytical equipment as testing of the pre-concentrator was started along with approval to lease the FTIR unit.
  - Received electrical rack and started set-up activities.

- WRPS
  - Continued its efforts to identify and procure a photoionization detector (PID) for volatile organic carbon analysis on high temperature diesel exhaust. A market review was completed, which recommended using available AreaRAEs along with preconditioning the exhaust to cool, dilute, and remove condensable material prior to running through the PID.
  - Received feedback from the workers in Operations on the recently released NUCON engineering-scale testing CPPO Notebook. A meeting was held between CPPO, the Chief Technology Office (CTO), and Operations to discuss the technologies in the context of the worker’s many years of experience in the tank farms. Historical lessons learned were examined and NUCON’s depth of knowledge about the tank farms was increased.
KPP 5. Administrative Controls and Monitoring

Permanent Installation of VMDS Equipment in A and AP Farms

Update:
Numerous activities were on-going last week including:

- Efforts to obtain approvals on the Phase 2 Pilot-Scale Report continue. The report is currently with WRPS for general counsel review.
- Efforts are on-going to determine scope and schedule for reporting data that is being used to support VMDS technology development.
- Work continued on the AP Farm UV-FTIR turnover including:
  - Development of the Functions & Requirements document, which was delayed after resources were reassigned.
  - Preparation of the ammonia set point calculation and identification of the test gases that will be used to support turnover continued.
  - Calculations used to support AP-Farm turnover were started. These calculations included the heat trace verification, sample pump flow verification and heating/cooling verification.
  - Efforts to complete Operational Readiness Checklist items continued.
- Work continued on Autosampler modifications, including:
  - Preparing report summarizing development and selection of test gases.
  - Initiating procurement of test gases.
  - Completion of test plan that will be used to support integrated testing activities.
  - Procurement of items needed to support assembly of the Autosampler.
  - Preparing design drawings for the test bed manifold and Hanford E-Skid.

Stack and Boundary Monitors

Update:
The majority of the AN Farm and AZ Farm design documents started formal reviews. The 3CEREX® stack monitor proposal was delayed after questions were submitted by the vendor. As a result of the delayed contract, the procurement of the 13 UV-DOAS units are still on-hold. Additionally, the construction statement-of-work was routed for approvals.

Establishing Safe Unrestricted Boundaries

Last update 1/25/2018:
Coordinated by 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 basis for the implementation of the tank farm boundaries moving forward for the IH Program.

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. The QRAs are being evaluated by WRPS and ORP. The subcontractor used a computational fluid dynamics air model; they modeled three tank farm emission sources, including a passively ventilated farm, an actively ventilated farm, and an actively ventilated farm in which one of the five tanks experiences buoyant displacement gas release events (BDGRE). The three QRAs are *A Farm Passive Breather Filters*, *AP Farm Exhauster*, and *AW Farm Exhauster* (including a BDGRE event).

**Public Address System**

**Update:**
The final step in turning over the A Farm Complex PA system to operations is to finish the repair work on the reader boards. The vendor replaced the solenoids on all sixteen reader boards and performed final testing; two were still identified as not functioning correctly and troubleshooting efforts are underway. Efforts continued on preparing excavation permits and crossing lists for the west area PA systems.

**KPP 6. Tank Operations Stewardship**

**Pilot SST Stewardship Program**

**Update:**

**SST Remote Monitoring Equipment:**
Efforts continued on the TY-Farm temperature and surface level design packages. Vendor feedback was provided by the design subcontractor who suggested a method for optimizing TY Farm equipment to support other SST farms. Although this will impact the scope of on-going design calculations and drawings, this optimization will result in a better end product. In addition to design activities, procurement of equipment needed to support temperature and surface level installation continued. *The Plant Forces Work Review*, which determines who performs installation activities, was submitted for review.

**FY LEAN 2015 Report:**
Comments are being incorporated to the *SST Stewardship Execution Strategy Document*. 
KPP 7. Hierarchy of Controls

Cartridge Testing and SCBA Alternatives
Last update 2/1/2018:
The rollout of full-face air purifying respirators (FFAPR) using 4Scott 7422-SD1® or 7422-SC1® cartridges has been ongoing at SY Farm since December 12, 2017. The industrial hygiene assessments for AY/AZ, AW, AN, and AX Farms are complete and await only approval from Stoneturn Consultants (STC). STC gave a presentation on the results and recommendations for the cartridge testing process to WRPS workers on January 17, 2018. STC was very complementary of WRPS’s industrial hygiene program. STC also held a question and answer forum after their presentation. Headspace sampling began in BY Farm in late January 2018. Once the headsight sampling event is complete, cartridge testing will be conducted at BY Farm too. This round of testing will include power air purifying respirators cartridges.

Mobile Laboratory
Last update 2/1/2018:
During the reporting period, a draft Statement of Work to continue the background study was written by WRPS and offered to R.J. Lee.

C2Sense® Personal Vapor Monitor
Last update 2/1/2018:
An Integrated Project Team kick-off meeting was held on January 18, 2018, with weekly follow-on meetings planned to status C2Sense® activities for the upcoming field test in the tank farms. During the week of January 20, C2Sense® developed their schedule for supporting testing and presented it at the status meeting.

KPP 8. Medical Support

Expanding WRPS Employee Awareness of the Medical and Company Return to Work Processes: A meeting was held with HAMTC and building trades representatives, during which it was agreed to eliminate the ACE’s exclusion note in TFC-BSM-HR_EM-C-10, Reasonable Accommodations procedure and replace it with, “[e]mployees with minimal or no symptoms and a normal exam may be returned to work with or without restrictions while lab test results are pending.” The HAMTC Safety Lead agreed to take this to the HAMTC.
President for his concurrence. Once an agreement is reached, a communication plan will be developed and delivered to the workforce.

Expanding Hanford Worker’s Awareness of Existence and Role of the Washington State Labor & Industries (L&I) Office of the Ombudsman for Injured Workers of Self-Insured Businesses: The Office of the Ombudsman is confirmed to be on-site February 26-28, 2018, to meet and talk with Hanford workers regarding any concerns or questions they might have. Meetings will be scheduled on-site and in town to expand the workers’ awareness of the existence and the role of the Ombudsman office. This will be the second series of meetings offered to the Hanford workers. The communication and schedule will be coming from DOE/RL in the next few days so that each contractor can communicate it to their workforce.

1NUCON is a registered trademark of Nucon International, Inc., Columbus, Ohio.
2Strobic Air is a registered trademark of MPC Inc., Wilmington, Delaware.
3CEREX trademark by TECAN SP, INC. Baldwin Park, California.
4Scott is a registered trademark by 3M in Maplewood, Minnesota.
5C2Sense is a registered trademark by C2Sense, Inc., Cambridge, Massachusetts.