



washington **river**
protection solutions



Stoneturn Consultants addressed the well-attended Chemical Vapors Solutions Team meeting on January 17, 2018.

**Tank Operations Contract
Chemical Protection Program Office Weekly Report
January 25, 2018**

1. CHEMICAL PROTECTION PROGRAM OFFICE (CPPO) ACTIVITIES STATUS

In coordination with Industrial Hygiene and the Environmental, Safety, Health and Quality (ESHQ) Chemical Protection Integration Manager, the approach to introducing to the workforce the new vapors-related Industrial Hygiene remedies was drafted.

CPPO Oversight and Tracking

The draft Comprehensive Vapors Action Plan (CVAP), developed by WRPS and the Department of Energy (DOE) Office of River Protection (ORP), includes actions that address the recommendations made by the Tank Vapors Action Team (TVAT) and the other external assessments (Office of Inspector General (OIG), National Institute of Occupational Safety and Health (NIOSH), DOE-Office Environment, Safety, and Health Assessments (EA-32), Center for Toxicology and Environmental Health (CTEH), Vapor Management Expert Panel (VMEP)) performed through FY2017. Significant progress has been made to address these recommendations. As shown in **Table 1** below, the current estimate is that **48 %** of the deliverables addressing the recommendations have either been Completed or Field Work Completed. In order to validate the status, the CPPO has undertaken an exercise to review the status of each recommendation. The recommendations status columns in **Table 1** below are defined as follows:

- **Completed** - The scope and deliverable(s) (i.e. final report or documentation) addressing the recommendation is complete and closed. CPPO has validated deliverable(s) complete.
- **Field Work Complete** - The scope addressing the recommendation is complete, but the final deliverable(s) is not complete (i.e. final report or documentation).
- **In Progress** - The scope addressing the recommendation is in progress.
- **Pending Validation** - Status of the scope addressing the recommendation and associated deliverable(s) is awaiting initial CPPO review.

The data in **Table 1** shows that of the 363 total recommendations, **48% of the** recommendations have been addressed. **Thirty-four percent** have been verified Completed and are considered closed; **15 %** have the Field Work Completed and are awaiting final deliverables (i.e. documentation) to close. CPPO has validated that **41%** have ongoing actions; they are In Progress. **Ten** percent of the recommendations have yet to be reviewed and statused by the CPPO. Twenty-four additional recommendations were added this month from the VMEP II Report. The recommendations that are Pending Validation are primarily FY2018 scope. *The CVAP Action Status Report – Summary* and the *CVAP Action Status Report – Detailed* are available to the workforce on the Intranet. Updated monthly, the reports are housed on the Vapors Protection Tab.

Table 1. External Assessments Recommendations Status

Report	As of January 23, 2018				
	Total	Validated Complete	Field Work Complete	In Progress	Pending*
TVAT	117	77	8	27	5
OIG	3	3	0	0	0
NIOSH	54	6	14	28	6
EA-32	28	7	5	14	2
CTEH	23	3	3	15	2
VMEP I, II	67	9	12	41	5
Other	71	18	11	25	17
Total	363	123	53	150	37

External Assessments Recommendations 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)

The CTEH team continued to work on the Industrial Hygiene Risk Assessment notebook presentations, of which there are nine.

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

The CVST hosted Stoneturn Consultants (STC) at last week's meeting. Held on January 17, 2018, the special meeting occurred at 2268E/Lunchroom/200E at 1:30 p.m. A little over a hundred people attended, and Tank Vapor Representatives were over 20 in number.

✦ Chemical Protection Engagement: Communications

Last week's CPPO Notebook is titled *Department of Energy Office of Enterprise Assessments (EA-32), Follow-up visit summary*. This week's CPPO Notebook is titled *242-A Evaporator Campaign-06, Industrial hygiene sampling and monitoring results*.

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

Solutions, Issue 421, published on January 15, 2018, reported, “Use of an air-line breathing system inside the tank farms can be a beneficial, but limited, alternative to self-contained breathing apparatus (SCBA) in specific work activities, based on the results of recently completed worker evaluations (RPP-RPT-60438, *Airline Equipment Evaluation*).”

Hanford Tank Vapors, published on Hanfordvapors.com and distributed in an all-employee email on January 17, 2018, discussed air-line respirators as well.

Chemical Protection Engagement: Worker Feedback

The Data Access Visualization (DAV) Tool team randomly selected 12 workers to participate in an ease-of-use session. Worker feedback persuaded the DAV Team to set information links to the images of machines and processes that are unfamiliar to most people such as the Ultra-Violet-Differential Optical Absorption Spectrometer (UV-DOAS).

Worker feedback and questions were sought during the January 8, 2018, CVST Communications Sub-committee meeting. Workers questioned why STC has recommended that additional cartridge testing be performed. Although the questions were not answered by STC at last week’s CVST meeting, they will be answered at the next.

Chemical Protection Engagement: Hanford Vapors Website Updates

- Vapors weekly update Jan. 17, 2018
- CPPO Weekly Report - Jan. 18, 2018

Chemical Protection Engagement: Effectiveness Measures

The survey has been distributed to 700 random WRPS participants, and is available by request. Completed surveys were returned Monday, January 22, 2018, and tabulations have begun.

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

IH Manual and Technical Basis

Update:

TFC-PLN-174, *Chemical Vapors Technical Basis Plan*, TFC-ESHQ-S_IH-C-67, *IH Chemical Vapor Technical Basis Maintenance*, TFC-ESHQ-S_IH-C-66, *COPC to COC Evaluation Process*, and other implementing documents are nearing completion. Briefing material is being developed to help facilitate the communication of the

changes affecting the exposure assessment process and the management of chemical vapors in the tank farms.

Health Process Plan

Last update 1/12/2018:

The following HPP reports 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. After the IRP's review, the studies will be reviewed by an external expert panel (EEP), finalized, and submittal to WRPS.

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.

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.

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.

✦ Maintain Industrial Hygiene Program and Institutionalize Vapor Program Requirements

Last update 1/12/2018:

WRPS made strides in the 1st Quarter of FY2018 in improving parity with other well established programs such as the radiological controls program. *Tier 1* training is complete and has been implemented as *Tank Operations Contractor Hanford General Education Training (TOC HGET)*. It will be included as part of WRPS's all employee annual training. The class provides very basic information on chemicals and chemical odors. *Tier 2* training is designed for workers that may work in the 200 East and West areas, but do not perform work within the tank farm's fence. It is complete. *Tier 3* training is designed for workers that will actually enter the tank farms. The class is an access-controlled entry systems (ACES) requirement for tank farm entry. This class was successfully piloted on October 4, 2017. The attendees offered many insightful recommendations regarding content and worker perspective. These comments have been incorporated. Once *Tier 3* training is implemented, it will be taught in the class room, and will eventually take the place of the *Chemical Hazards Awareness Training*. The *IH Fundamentals Training*, still in development, targets industrial hygiene technicians.

✦ Central Residence for Industrial Hygiene Technicians (IHT)

Last update 1/12/2018:

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. KPP 3 advocates a central location for IHTs that is commensurate with other technician level employees.

✦ Air Dispersion Modeling

Update: 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:

American Electric successfully conducted the “proof-of-concept” for verifying isolation of the A Farm ventilation ducting. In addition to the ducting activities, the engineering design media was prepared for relocating the exhausters, which allowed a request-for-proposal to be submitted for construction of the exhauster slab and exhauster installation. Also, the statement of work was prepared for equipment removal in support of ventilation installation.

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

AW Stack Extension

Last update 1/18/2018:

The final (100%) design package is currently being reviewed. The *Plant Forces Work Review* was also 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.

¹Strobic® Air Dilution Fan

Last update 1/18/2018:

WRPS continues to review submittals provided by Strobic. In parallel with submittal reviews, equipment was procured.

²NUCON® Thermal Oxidation Vapor Abatement Unit (VAU)

Last update 1/18/2018:

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

- Terragraphics
 - Performed preliminary inspection of electrical rack to review supplier requested changes.
 - Received a draft copy of NUCON®’s suggested modifications to the VAU skid.
 - Continued developing the site alternatives for the technical demonstration.
 - Continued working on the Functions and Requirements document revision.

- **NUCON®**
 - Continued working on the design and fabrication of the diesel conversion kit. Accomplishments included the following:
 - ✓ *Completed the Process and Instrumentation Diagram (P&ID), skid structural, and piping arrangement drawings.*
 - ✓ *Received the diesel oxidation catalyst and diesel particulate filter.*
 - ✓ *Procured the pipe and fittings.*
 - ✓ *Painted the diesel generator skid.*
- **PNNL**
 - The team focused on determining the analytical requirements for the engineering-scale test, including the following:
 - ✓ *Worker feedback with 222-S allowed WRPS to determine an appropriate path forward for canister sample and sorbent tube sample requirements. 222-S confirmed that nitrous oxide, 1,3-butadiene, benzene, acetaldehyde, furan, acetonitrile, propanenitrile, and 2,4-dimethylpyridine analysis can be performed from canister samples.*
 - ✓ *Canisters will be a combination of ³Restek® and ⁴Entech® cans (30 existing and 35 new purchased) with silconert/silicosteel coating for inertness. Moisture control plans are already established by 222-S and sampling can proceed as planned.*
 - ✓ *PNNL P&ID and equipment design will integrate sorbent tube sampling with canister sampling for 222-S analysis. In addition, only a single sorbent tube sample will be required for each vapor abatement unit, which will simplify the PNNL P&ID and equipment requirements.*
- **WRPS**
 - Instead of using the ⁵CEREX® ultra-violet Fourier transform infrared spectroscopy (UV-FTIR) currently located at tank farms to support testing, WRPS authorized PNNL to lease an Fourier transform infrared spectroscopy (FTIR) from another company. Authorization was based on a favorable cost and risk comparison, and initiated by worker feedback from PNNL.
 - Efforts continued to identify and procure a photoionization detector for volatile organic carbon analysis on high temperature diesel exhaust.
 - Received worker feedback from WRPS Operations on the recently released NUCON® engineering-scale testing presentation. The feedback was in regards to how similar technologies may have been previously reviewed in support of SST retrieval activities. A meeting will be held in the near future between CPPO, CTO, and Operations to discuss these technologies.

KPP 5. Administrative Controls and Monitoring

Permanent Installation of VMDS Equipment in A and AP Farms

Update: In FY2017, WRPS identified viable VMDS components for use in the tank farms. The turnover of AP Farm UV-FTIR to Operations has been initiated. Activities last week include the following:

- Efforts are on-going to determine the format for reporting data that is being used to support VMDS technology development.
- Work continued on the modification of the Autosampler. Activities included:
 - Analyzing sample through the GC-FID. The results of these analyses will help finalize the test gas standards.
 - Briefing WRPS IH personnel on the Autosampler activities, with their feedback being used to support acceptance testing and test planning.
 - Procurement of items needed to support development of the gas standards and Autosampler. In parallel with these activities, design drawings for the test bed manifold and Hanford E-Skid are being prepared.
- For the AP-Farm UV-FTIR turnover, numerous activities were on-going during the reporting period, including the following:
 - Development of the Functions & Requirements document.
 - Preparation of the ammonia set point calculation. Efforts are underway to determine if additional chemicals should be included as part of this calculation.
 - Identification of the test gases that will be used to support the turnover.
 - Approval of the Operational Readiness Checklist for action, with efforts currently on-going to compile evidence needed to declare readiness.

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:

A path forward has been determined to resolve the WRPS Quality Assurance (QA) issue with Cerex. The plan is for members of the WRPS QA and Engineering departments to visit Cerex and witness both fabrication and factory acceptance testing of their equipment. With a resolution now in-place, the request-for-proposal is currently being prepared for procurement of the UV-DOAS units.

Establishing Safe Unrestricted Boundaries

Update:

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 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 electrical installation at both C Farm and AP Farm were completed. The design reviews for all West area farms have been completed and are going through final approvals. All ground scanning activities were completed for both the West area farm and B Farm complex, and work was started on the crossing lists and excavation permits. During turn-over testing of the PA system, an issue surfaced around the potential for batteries dying out and not re-charging in the cabinets. The solution is to install solenoids in the reader boards for battery drain protection. This warranted work, to which the vender has agreed, requires the construction contractor's resources in support of the repairs.

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. Procurement of equipment needed to support temperature and surface level installation activities were also started. Contracts were also awarded to MSA in support of network development and installation activities.

FY LEAN 2015 Report:

A draft of the *SST Stewardship Execution Strategy Document* was submitted for internal review. Since this is a first-of-its-kind document, the purpose of the preliminary review was to solicit feedback and confirm that WRPS was satisfied with the direction of this document. The review was completed and comments are currently being incorporated.

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 1/12/2018:

The 1st Quarter of FY2018 has seen the fruition of the hard work and effort that went into the air purifying respirator cartridge (APR) testing program by WRPS, PNNL, and STC. STC is the independent 3rd party selected by HAMTC to oversee the cartridge test process and FFAPR implementation. WRPS, HAMTC and STC have agreed FFAPRs, equipped with ⁴Scott 7422-SD1[®] or 7422-SC1[®] cartridges, are appropriate for use in SY Farm for similar exposure groups 1 (SEG1) and similar exposure groups 2 (SEG2) (non-waste disturbing) work activities. WRPS and HAMTC also agreed that although FFAPRs are effective against tank vapors, the rollout of FFAPRS must be done on a farm by farm basis. A properly completed industrial hygiene hazard assessment, specific to each farm, must support the transition from SCBA to FFAPR. The IH assessment for SY Farm was approved, and the rollout of FFAPRs there began December 12, 2017. The hazard assessment for AP Farm is being created. Once it is approved, FFAPR rollout will continue at AP Farm for SEG2 work activities. FFAPR use at AP for SEG1 activities was rolled out in FY2017. Separate IH assessments are concurrently being developed for AY/AZ, AW, AN, and AX Farms.

Key Performance Parameter 7

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

Mobile Laboratory

Last update 1/18/2018:

The contract for RJ Lee Mobile Laboratory has been extended through June 30, 2018, to allow for mobile lab operations in FY2018.

Personal Vapor Monitor

Last update 1/18/2018:

A contract was issued for ⁶C₂Sense[®] to provide support for the upcoming field test in the tank farms. An Integrated Project Team was established for the field trial and a kick-off meeting is currently planned.

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.

¹Strobic Air is a registered trademark of MPC Inc., Wilmington, Delaware.

²NUCON is a registered trademark of Nucon International, Inc., Columbus, Ohio.

³Restek is a registered trademark by Restek Corporation in Bellefonte, Pennsylvania.

⁴ENTECH is a registered trademark by ENTECH INC. in Lebanon.

⁵CEREX trademark by TECAN SP, INC. Baldwin Park, California.

⁶C2Sense is a registered trademark by C2Sense, Inc., Cambridge, Massachusetts.