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Prototype of the Personal Ammonia Monitoring System Developed by C₂Sense

Tank Operations Contract
Chemical Protection Program Office Weekly Report
June 8, 2017

Department of Energy Contract NTE 16-TF-0089

1. CHEMICAL PROTECTION PROGRAM OFFICE (CPPO) ACTIVITIES STATUS

CPPO's internal reviews of the over 320 recommendations generated by the external assessments is ongoing. Pursuant to finalizing the external assessments recommendations table, CPPO is compiling a list of actions in response to the recommendations from the National Institute for Occupational Safety and Health (NIOSH), Tank Vapor Assessment Team (TVAT), Office of Inspector General (OIG), Office of Enterprise Assessments (EA-32), Center for Toxicology and Environmental Health (CTEH), as well as the recommendations contained in the reports generated from the TVAT FY14-15 activities.

CPPO continues to develop metrics to support a Comprehensive Vapors Action Plan (CVAP) monitoring dashboard. Multiple metrics are in various stages of development and review.

CPPO is migrating the vapors library items into IDMS to ensure they are preserved as records.

2. COMPREHENSIVE VAPOR ACTION PLAN Key Performance Parameters

KPP 1. Communications

Chemical Protection Communication

There are currently two vapors related communication plans in development. The Comprehensive Vapor Management Communication Plan is a requirement of KPP 1. The CVAP Communication Plan is a focused plan for communicating the content of the CVAP.

The outline for the Comprehensive Vapor Management Communication Plan is in development. The outline for a CVAP Communication Plan has been developed. The high level message is in development, and the details of the plan will follow.

WRPS has exceeded the commitment for 2017 for a minimum of two communication effectiveness measurements. Thus far, a focus group survey of the HanfordVapors.com website was performed; a CPPO workforce communication survey was performed; and a CPPO Communication to the Workforce LEAN event was completed. All the recommendations from these effectiveness measurements are in various stages of implementation, and will be rolled into the Comprehensive Vapor Management Communication Plan. In addition, a Safety Culture Survey will include vapors related and communications related inquiries. The survey will be used to for future planning.

The CPPO Notebook published on June 1, 2017, is titled *Human Odor Perception and Chemical Exposures, Part 1*. To date, 17 recipients of the notebook indicated their intention to present the material to their staff. This week's CPPO Notebook is the second of the promised 5 part presentation titled *Human Odor Perception and Chemical Exposures, Part 2*.

As reported via an all-employee email and the Hanford Tank Vapors Weekly Update, the Tank Farm Projects Team removed the pump from tank AW-106 last week. The team "activated primary ventilation during all the pit-intrusive activities," as well as other vapors management controls during the project.

Hanford Vapors Website Updates

Last week, several reports were updated. The non-personal data charts were updated with the most current Site Wide Industrial Hygiene Database (SWIHD) data, and were divided into pre-WRPS and WRPS collected data by separating the data as of 1 October, 2008. Updated Rounds & Routines data was compiled; it is in review for release to the website. Two A & AP Farm Vapor Monitoring and Detection System (VMDS) reports for the weeks of February 8 and February 15, 2017, were completed; they will be posted to the website soon. Additionally, a report for the AP stack covering the week of March 1, 2017, was also completed and will be uploaded to the website.

The Hanford Vapors Website posted two new items last week:

- Vapors weekly update – June 1
- VMDS Weekly Report (March 8-15, 2017)

The Hanford Vapors Website posted headspace sampling results. The sampling results from the headspace are the concentrations of chemicals in the air inside of the underground tanks. The sampling results from the source are from passive breather filters in single-shell tanks which are protected through establishment of the Vapor Control Zones. "Source-ENV" samples are taken for environmental information and give additional data for vapor hazard monitoring. The sampling results from the area are in the work zone. No samples have detected any chemicals above 10% of the Occupational Exposure Limit (OEL) in the area. The samples that reflect high Reportable Detection Limits (RDLs) have been analyzed numerous times to ensure confidence that chemicals are below the OEL."

Key Performance Parameter 1

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

The Hanford Vapors Website updates are as follows:

Non-personal Headspace Sampling Data Pre-2008

A Farm headspace
AN Farm headspace
AP Farm headspace
AW Farm headspace
AX Farm headspace
AY Farm headspace
B Farm headspace
BX Farm source
C Farm headspace
S Farm headspace
SX Farm headspace
SY Farm headspace
T Farm headspace
TX Farm headspace
TY Farm headspace
U Farm headspace

A Farm source
AN Farm source
AP Farm source
AW Farm source
AX Farm source
AZ Farm headspace
BX Farm headspace
BY Farm headspace
C Farm source
S Farm source
SX Farm source
SY Farm source
T Farm source
TX Farm source
TY Farm source
U Farm source



RJ Lee Group Mobile Lab Briefing to Distinguished Guests - 2016



AP Stack Emission – Winter 2017

Non-personal Headspace Sampling Data 2008 - 2017

A Farm headspace
AN Farm source
AW Farm source
AX Farm source
AZ Farm source
BX Farm headspace
BY Farm source
C Farm source
SX Farm headspace
SY Farm headspace
T Farm headspace
TX Farm headspace
TY Farm source

A Farm source
AP Farm source
AX Farm headspace
AY Farm source
B Farm source
BY Farm headspace
C Farm headspace
S Farm source
SX Farm source
SY Farm source
T Farm source
TX Farm source
U Farm source

Percent of OEL Pre - 2008

- | | |
|---------------------|---------------------|
| A Farm percent OEL | AN Farm percent OEL |
| AP Farm percent OEL | AW Farm percent OEL |
| AX Farm percent OEL | AY Farm percent OEL |
| AZ Farm percent OEL | B Farm percent OEL |
| BX Farm percent OEL | BY Farm percent OEL |
| C Farm percent OEL | S Farm percent OEL |
| SX Farm percent OEL | SY Farm percent OEL |
| T Farm percent OEL | TX Farm percent OEL |
| TY Farm percent OEL | U Farm percent OEL |



Headspace Sampling -- 2017



The MultiRAE PRO

Percent of OEL 2008 - 2017

- | | | |
|---------------------|---------------------|---------------------|
| A Farm percent OEL | AN Farm percent OEL | AP Farm percent OEL |
| AW Farm percent OEL | AX Farm percent OEL | AY Farm percent OEL |
| AZ Farm percent OEL | 702-AZ percent OEL | B Farm percent OEL |
| BX Farm percent OEL | BY Farm percent OEL | C Farm percent OEL |
| S Farm percent OEL | SX Farm percent OEL | SY Farm percent OEL |
| T Farm percent OEL | TX Farm percent OEL | TY Farm percent OEL |
| U Farm percent OEL | | |

✚ Data Analysis and Visualization Tool (PHOENIX)

Update: Last week, the Data Analysis Visualization (DAV) team met with the project steering committee to show the system’s progress to date. The system has been rolled out to the production environment, and full-scale final testing begins this week. Most of the system’s features were active. Full scale testing will begin next week. The system is on schedule to go live at the end of September.

✚ CPPO Oversight and Tracking

Cost and Schedule Metric

Several projects supporting the Comprehensive Vapor Action Plan (CVAP) KPPs are currently underway. Delayed procurements are now in place and vendors are ramping up to support a tight schedule. Year-to-date, \$18.8M (75%) of our revised not to exceed (NTE) value of \$25M has been spent. Monthly costs are expected to rise and stabilize at \$3.5M per month for the remainder of the year. At this rate, we will hit the NTE value by July 2017.

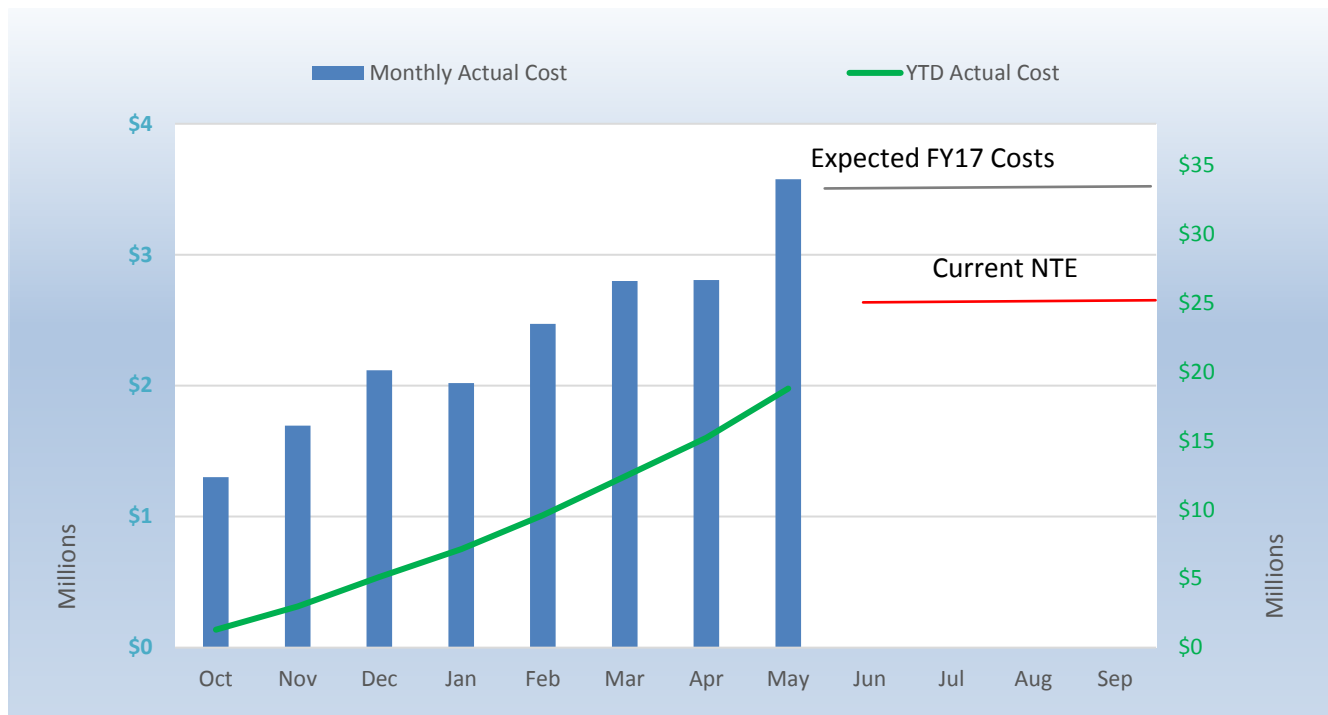


Figure 1. FY17 Projected CVAP Costs

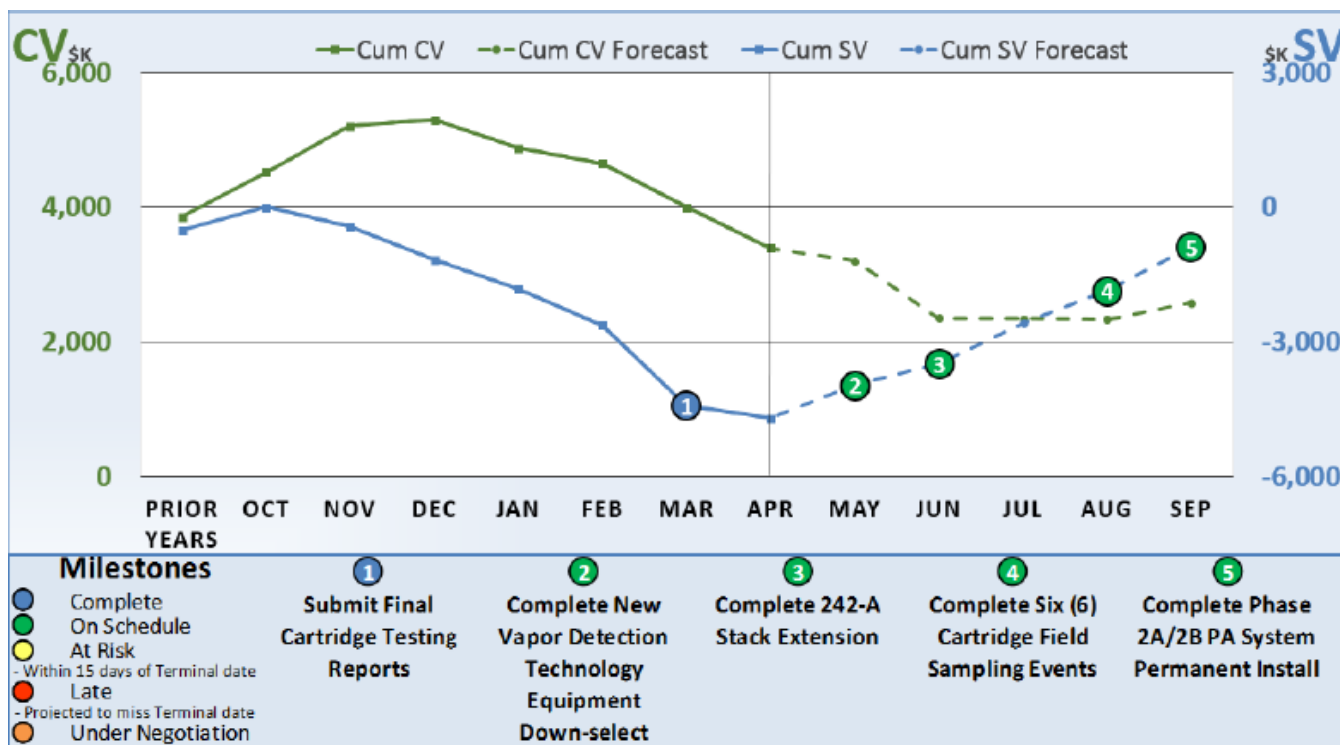


Figure 2. FY17 Cost and Schedule Variances for CVAP

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

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

Update: Updates to RPP-22491, *Industrial Hygiene Chemical Vapor Technical Basis*, are underway. An outline of the revisions has been developed, and a list of the changes was submitted for IH management review, including a revised COPC listing based on recommendation from the PNNL Report. The template for RPP-22491 revisions has been created and is under review. The GAP analysis for RPP-22491 is ongoing.

Institutionalizing the Vapors Program with the IH Program Requirements

Update: The IH Manual draft is taking shape; its structure and drafts contents have been compiled into an Excel spreadsheet, which is now in review/revision with IH Management. The spreadsheet maps out the requirement matrix, and is a primary tool in the GAP analysis. The focus of the IH Program Manual is on Chemical Vapor Program aspects, and it revises existing standards and procedures. The IH management is reviewing the spreadsheet for completeness and accuracy.

Key Performance Parameter 2

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

Health Process Plan

Update: PNNL Health Study Roadmap: A schedule for FY17 has been developed for the Health Process Project. Accomplishments:

- Task 1: Schedule
- Task 2: Establish Tank Operations Assessment Team.
 - An interim Tank Operations Assessment Committee has been identified. A charter for the Assessment Committee is developed and in review.
- Task 3: Establish an External Peer Review Health Panel.
 - Submitted the Draft External Review Recommendations. A meeting with Sr. management to finalize the membership in the Assessment Committee was held on March 14th. WRPS reviewed PNNL's assessment team recommendations, and drafted a charter for membership and function. PNNL is in the process of reviewing and providing additional comments.
- Task 4: Implement Routine Analysis and Screening Process for Updating COPCs.
 - A draft of the sampling and analytical recommendation report is in internal review.
 - The COPC report update is underway.
- Task 5: Establish Acute/Transient and Chronic Exposure Action Levels.

- Draft reports for Chronic Occupational Exposure Limits and nitrosamines have been formatted and will be submitted to WRPS for their review.
- PNNL continued to evaluate chemical mixture methodology test cases, and a concept paper for evaluation of mixture interactions has been developed and is under internal review.
- Task 6: Evaluate Computational Approaches for Predicting Exposure and Delivered Dose.
- Task 7: Database Implementation and Management.
 - Worked on adding more functionality to the citation management capability.

Database Implementation and Management

Update: In FY 2016, PNNL developed a database to review and update the COPC list and associated OELs. See Task 7, Health Process Plan, for the latest update.

Leading Indicators

Last update 5/25/2017: For the next few months, the Leading Indicators team will be focused on supporting the integrated vapors data collection data quality objective (DQO) process. This DQO will drive data collection that will be used as the basis to validate and update the Leading Indicator Process. Accomplishments for the week ending 5/21 are shown below:

- Continued review of analysis code, ideas for any potential revision needs
- Continued investigation of the effect of series or parallel sampling in available data
- Continued investigation of existing data sources (content, format, etc.) and how to best incorporate into analysis

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 FY 2018.

Parity Implementation with Established Programs

Last update 6/1/2017: The successes in implementing parity with established programs are as follows:

- Enhanced CHAT continues to be well received. As of 5/18/2017, 8 CHAT Initial and 12 CHAT refresher classes have been held.
- Training has hired an additional two subcontractors to help complete required training documentation for the Industrial Hygiene Technician (IHT) Training Program.
- IHT Continuing Training has held 4 sessions (2 each week) with great response to the hands on training for Physiological Monitoring Instruments and Theory on Photoionization Detector (PID) operation. Training continues until June 7th. Make-up sessions may be offered.

- Chemical Worker Tier One is in the Design Phase; comments are being incorporated from key stakeholders and a draft storyline is being prepared. Draft slides were released for review on 5/23; the comment period is scheduled to end by 6/7/2017. The slides will incorporate the comments received from the key stakeholders.
- Chemical Worker Tier Two and Three are being developed. However, the focus is on completing and implementing Chemical Worker Tier One.

On May 18, 2017, WRPS, CHPRC, HAMMER, and Labor held an IHT Training Program kickoff meeting, the goal of which is to “[d]esign, develop and implement an IHT fundamentals and continuing training program that will educate and develop independently competent and highly effective IHTs who are trusted and respected by the workforce.” Expected to be launched in September 2017, the Industrial Hygiene Fundamentals course curriculum may include:

- Laws and Standards
- Math unit conversions and statistics
- Chemistry
- Physiology, anatomy, and toxicology
- Respiratory protection and PPE
- Industrial hygiene documentation
- Personal and area monitoring
- Using an industrial hygiene database

KPP 4. Engineering Controls

✚ 242-A Evaporator Stack Extension

Update: The new vessel vent exhaust stack was delivered to the construction site. Installation activities continued last week. Extension activities are on-track to be complete by mid-June.

✚ Exhausters

Update: The design for the SY-Farm exhauster, which is scheduled to be completed by the end of FY17, is on-going and approximately 80% complete. In parallel with the design effort, a Request-for-Proposal has been released to procure construction support and is currently scheduled to be awarded in July.

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

Strobic Air Dilution Fan

Update: Strobic is currently working on the preliminary AW-Farm fan design and estimate which is expected to be completed by mid-to-late June.

NUCON Thermal Oxidation Vapor Abatement Unit (VAU)

Last update 6/1/2017: The draft Functions and Requirements (F&Rs) document for the NUCON vapor abatement unit (VAU) was submitted to WRPS for review. Along with the F&R document, three draft statements of work (SOW) needed to support VAU prototype testing were prepared and routed for internal review. The three SOWs included:

- Solicitation for NUCON to ship the prototype VAU to the Hanford Site.
- Revision to TerraGraphics SOW for site selection, F&Rs, test apparatus design, and engineering support.
- Solicitation to national laboratories for test documentation, analytical support and data analysis.

KPP 5. Administrative Controls and Monitoring

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

Update: Last week, two of the four pilot-scale spectrographic units remained off-line as a result of an outage needed to support equipment modifications. Efforts are also on-going to review the viability of VMDS equipment and determine their path forward.

Stack and Boundary Monitors

Last update 5/1/2017: The design contract is being developed to install the AW/AX Stack monitors. The boundary monitors will become focal in FY18 after the individual stack monitoring activities are complete.

Establishing Safe Unrestricted Boundaries

Update: A teleconference was held with PNNL, WRPS, and Kenexis staff to discuss using the model applications. WRPS solicited the meteorological data needed to support APGEMS. The team began assembling the data to support the APGEMS software quality assurance plan.

Public Address System

Update: Installation of Public Address systems continues. Among the accomplishments last week are:

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.

- The AW-Farm work package needed to support upcoming activities is in review and nearly finalized.
- Excavation permits for both AW and AN-Farm work have been approved.
- A design contract supporting the remaining FY18 activities was awarded.

KPP 6. Tank Operations Stewardship

✚ Pilot SST Stewardship Program

Update: Funding authorization still pending for TY Farm activities.

KPP 7. Hierarchy of Controls

✚ Cartridge Testing and SCBA Alternatives

Update: To date, cartridge testing has been conducted at eight different, specifically selected Double-Shell and Single-Shell Tank locations. Eight of the tests were conducted under static conditions and one test was conducted during waste disturbing activities. A new cartridge test apparatus (jig) has been built and is ready for use. The new jig is capable of testing cartridges from other manufacturers and also powered air-purifying respirator (PAPR) cartridges. The next wave of testing scheduled this month will begin in SX Farm followed by testing during Tank AW-102 air-lift circulator (ALC) operation.

✚ Mobile Laboratory

Update: Maintenance and calibration checks were performed in the Mobile Laboratory to prepare for upcoming sampling events. Also, during the week, a flow controller was found to be out of tolerance and was reconciled per approved procedures. Finally, additional non-Hanford background measurements were collected throughout the Tri-Cities area.

✚ Personal Vapor Monitor

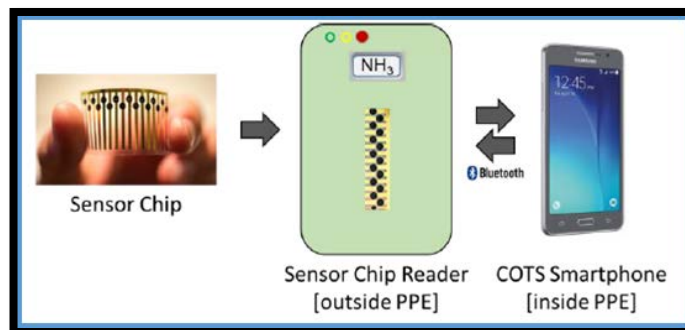
Update: C₂Sense, Inc. continues developing a personal ammonia sensor. Last week, the circuit boards for the device were assembled. See the personal device on the cover of this CPPO Weekly Report.

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.

Key Performance Parameter 7

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



KPP 8. Medical Support

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

Key Performance Parameter 8

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

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

Update: The subset of the Vapors Mitigation Risk Register this week is shown in **Table 1**.

Table 1. Vapors Mitigation Risk Register

CVAP ID Number	Current Status	Handling Actions	Current Risk Level
004 Integration with other key projects more complex than expected.	242-A Stack Extension experiencing delays due to construction issues, possible threat to EC-6 startup.	<ol style="list-style-type: none"> 1. Identify key program interfaces early. 2. Engage with program/project managers early. 	Medium
009 Resources not available when required.	Cartridge testing experienced lack of resources over the weekend causing a delay in test schedule and resulting in a back to back weekend overtime call to make up for the missed test.	<ol style="list-style-type: none"> 1. Identify key resources up front and secure availability. 	Medium
032 Litigation requires legal scrutiny of communications with workforce.	The ongoing vapors litigation and negotiations constrain the expedited release and communication of planned vapors program activities. Currently the risk is realized and ongoing.	<ol style="list-style-type: none"> 1. Continue to prepare communication documents and releases in anticipation of legal release. 2. Coordinate and communicate with WRPS legal team early and often. 3. Communicate all allowable data and information to the workforce in lieu of vapors program plans. 	High