

SECOND VAPOR MANAGEMENT EXPERT PANEL (VMEP) 17-TRS-00015 REPORT SUMMARY

The Vapor Management Expert Panel (VMEP) was chartered by the Department of Energy Office of River Protection (DOE-ORP) in February of 2015 to “provide assurance to ORP that actions committed to following the Tank Vapor Assessment Team’s (TVAT) report (SRNL-RP-2014-00791) and actions resulting from any new, emergent issues are being carried out and effective in protecting workers from potential vapor exposures.”

The VMEP provided a second periodic report to DOE-ORP spanning the team’s activities from October 2016 through June 2017. In the report, the VMEP members evaluated multiple topics and provided observations on each. The topics covered were:

- Strategy and Core Principle Development
- Overall Program/Project Management Execution
- Engineered Controls
- Defense-In-Depth and Quantitative Risk Analysis
- Industrial Hygiene Program Enhancements
- Medical Monitoring and Surveillance, and
- Communication, Engagement, and Partnering Efforts.

STRATEGY AND CORE PRINCIPLE DEVELOPMENT

VMEP members noted that progress is now being made based on an inspiring vision for what the tank farms should look like and will be managed like in the future as reflected in the form of a draft Comprehensive Vapors Action Plan (CVAP). This comprehensive strategy is broadening the vapors management efforts to the 20 square miles of the east/west plateau of the Hanford Site.

The team also suggested vapor management initiatives should go beyond the tank farms, considering that in some cases, problematic vapors appear to be coming into the tank farms from other sources on the plateau such as servicing of sanitary facilities (e.g., "Porta-Potties") and startup of diesel engines. They further observed that application of the core principles of worker involvement, effective communication, and the use of risk based decision making continue to need more attention. VMEP members recommend even more progress in engaging, and ultimately partnering with, more of the workforce in a manner encouraging trust and increasing participation by the full workforce in understanding the issues, airing concerns, and offering solutions as needed.

OVERALL PROGRAM/PROJECT MANAGEMENT EXECUTION

The VMEP members recognized that WRPS has made, and continues to make, progress in executing the projects and activities described in the draft CVAP. Some members expressed that the WRPS organizational interfaces are not well understood or controlled.

While the draft CVAP is broken down into the eight Key Performance Parameters (KPPs), it is difficult to follow who owns each KPP and how they will be used to achieve the expected outcome of "being safe and feeling safe." The related processes and procedures must be institutionalized in the industrial hygiene (IH) manual using a detailed and disciplined approach as necessary to protect workers from the chemical and radiological risks to which they may be exposed.

ENGINEERED CONTROLS

The VMEP members noted that new technologies are being developed and explored, from vapor destruction technologies to personal protective equipment (PPE) improvements. They also suggested some hazard reduction or control options may be cost-effective and timely in some places, but may not be justified in others.

The fiscal year 2016 Vapor Abatement Workshop resulted in recommendations to further evaluate Strobic Air®'s high velocity fans and NUCON International, Inc.'s thermal oxidizer. VMEP members believe it would serve the vapor strategy well to continue increasing attention on the installation and use of engineered control systems as major components of the strategy for transitioning from reactive to proactive controls of tank vapors.

Several VMEP members believe that clearly defined goals should be set and requirement specifications well developed using a more disciplined approach and/or better documentation of the rationale.

DEFENSE-IN-DEPTH AND QUANTITATIVE RISK ANALYSIS

VMEP members support the focus of the comprehensive vapor management strategy on three proposed areas as including:

- Limiting access to nine single-shell tank farms with maintained respiratory protection controls
- Implementing an odor management strategy outside the fence lines, and
- Operating with a conservative risk-based decision process with centralized command and control.

In the report, it was noted that Kenexis Consulting Corporation, was hired to develop the *Design Practice and Philosophy for Chemical Vapor Detection and Alarming* report, and they applied this approach to the three quantitative risk assessments conducted. VMEP acknowledged that the analytical approach appears sound, but recommend it should be peer reviewed.

The VMEP team recognized that the term 'risk' can have different meanings for individuals and recommended the use of terms related to risks, risk mitigation, and the various forms of applying mitigation to risk, should be clarified by WRPS.

INDUSTRIAL HYGIENE PROGRAM ENHANCEMENTS

VMEP members noted the level of effort to continue to address vapor issues associated with work in the tank farm is very significant. Because much has been done, reflection on what has been learned to inform the basis for worker health experiences is warranted.

The issues of workers experiencing exposures to vapors in the tank farms and reporting responses is not new, but as information is gained an increased understanding of the underlying basis for worker experiences can be used to update understanding of the basic hypothesis. According to a VMEP member who were also on the TVAT, the overarching concept for TVAT recommendations was that ***transient short-term exposures to tank farm vapors of various concentrations coupled with variability in worker response can explain the pattern of reported odor and health experiences.*** The most common occurrence from transient exposures at the tank farms would be significant odors or reversible symptoms, and methods to address such concerns need to continue to be refined. The committee suggested that the term "bolus" needs to be clarified, observing the term was intended to communicate the idea of transient peak exposures from various sources.

Analysis of health studies and trending reports further suggests significant health effects, beyond reversible symptoms, are not occurring at a high incidence. Verifying this finding to ensure key effects are not being missed has been suggested by the VMEP. While the various actions WRPS is taking continue to develop, emphasis is needed to continue to have an approach for effective engagement and communication in what we do and do not know about health experience of the workforce. Increasing the presence of IH professionals in the field is a theme appearing to still need attention.

The VMEP observed, a risk-informed control approach is making progress, but needs further development, such as, a rigorous analysis of data trends in injuries related to SCBA use versus health effects and symptoms from vapor related incidents without SCBA.

MEDICAL MONITORING AND SURVEILLANCE

The VMEP members found that Hanford tank farm workers are closely monitored in medical surveillance programs and have been for many years. Generally, annual reports show no difference in health indicators between tank farm workers and other Hanford workers such as administrative staff.

The committee recognized a new initiative begun by WRPS in 2017 to evaluate the detection of leading indicator gases (ammonia, volatile organic compounds, and nitrous oxide) as potential surrogates for the complex mixture of chemicals of potential concern (COPCs) comprising tank vapors. In addition, they noted that as of 2017, aggregate health data specifically related to tank farm workers and associated with self-reported odors and symptoms does not suggest pervasive or systematic chronic health effects associated with exposure to tank farm vapors. A summary of available data is presented in Appendix C of the report. The VMEP commented, with no evidence of pervasive chronic health effects associated with vapors, it is very difficult to narrowly direct reading instrument COPC measurements to any particular chemicals on the basis of those most likely to cause health effects. VMEP members with expertise in this area are not recommending highly sensitive direct-reading instruments for all the COPCs, but do recommend recognition that the leading indicator gas measurements are not expected to prove or disprove an association of tank vapor exposure with chronic health effects.

Even though, as NIOSH stated in their 2016 report, "the procedures and protocols for responding to health and odor events are technically appropriate and comprehensive," VMEP observed WRPS, ORP, DOE Richland Operations Office, and HPM Corporation (HPMC) Occupational Medical Services (OMS) have worked together in the last year to make enhancements to the program. The VMEP also commented, education of the workforce to correctly identify the types of odors at the tank farms has the potential to reduce the number of abnormal operating procedure (AOP- 15) events, and consequently increase the specificity of the laboratory tests at HPMC OMS, as being associated with tank waste sources.

COMMUNICATION, ENGAGEMENT, AND PARTNERING EFFORTS

VMEP members commended the progress made since the 2016 VMEP report on efforts to inform workers and interested parties about the facts and challenges related to vapors and the strategies and activities related to worker safety.

VMEP members applauded the establishment of the Chemical Protection Program Office and noted its strategic direction is commendable and will improve the communication flow and worker understanding of the progress being made to address the vapors issues.

Key to the continued program progress, the committee declared workers must be actively and substantively engaged in all stages of an effort or project, including discussions regarding risk concerns

related to decision-making or informed decisions, such that they can better understand and support or accept leadership's decisions. To feel safe, they must be partnered with management in the development of the work product and (personally or collectively through their surrogates) support or accept the residual risk.

OVERALL RESULTS

VMEP members generally agree that considerable progress has been made on vapor issues on many fronts to make sure workers are safe and feel safe since the TVAT report (SRNL-RP-2014-0079 1) and VMEP's first periodic report submitted in 2016.

VMEP members also observe that these better understandings and improved relationships, although slowly, are appropriately influencing decisions and the decision-making process.

Most notable to VMEP members since the 2016 report is that the site is moving from a reactive posture to a posture of adopting proactive control strategies in many areas. Improved monitoring and detection equipment continue to be tested and deployed.

A copy of the full *17-TRS-00015 Second Vapor Management Expert Panel Periodic Report and Recommendations* assessment can be found [here](#).