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Richland, WA 99352

November 9, 2010 WRPS-1003808

Mr. Jon Brock, Chair
Hanford Concerns Council
3311 W. Clearwater Avenue, Ste D200
Kennewick, WA 99336

Dear Mr. Brock,

SUBJECT: WASHINTON RIVER PROTECTION SOLUTIONS RESPONSE TO THE HANFORD CONCERNS COUNCIL INDEPENDENT REVIEW PANEL REPORT ON "CHEMICAL VAPORS INDUSTRIAL HYGIENE STRATEGY"

Reference: Letter, J. Brock, Hanford Concerns Council, to C. G. Spencer, WRPS, and T. Carpenter, Hanford Challenge, "Final Report of the Independent Review of WRPS Tank Farm Chemical Vapors Strategy," October 26, 2010

Thank you for providing the final report of the independent review of Washington River Protections Solutions LLC (WRPS) Tank Farm Chemical Vapors Strategy that WRPS and Hanford Challenge jointly requested.

I agree that this report provides a basis for strengthening and enhancing WRPS' and workers' ability to collect samples, analyze data and make informed decisions about protection from potentially harmful exposure to chemical vapors. I believe the report is helpful as we pursue our shared goal of a safe work environment in the unusually complex, challenging and potentially hazardous task of cleaning up Hanford's high level waste tanks.

I appreciate the improvement opportunities suggested by the Independent Review Panel. The recommendations are consistent with our principle of keeping chemical exposures "As Low As Reasonably Achievable" and meets our goal of continually improving worker safety at Hanford's tank farms. Over the past two years, WRPS has taken many steps to more accurately characterize tank vapors and to reduce or eliminate worker exposures to tank vapors.

WRPS is taking steps to identify funding and implement high-priority recommendations by initiating pilot projects that could lead to full implementation. There are three general areas of improvements: Hardware and Engineering Controls, Program Enhancements, and Worker Enhancements. Our response to the report is enclosed entitled "WRPS Response to Independent Review Panel Report on Chemical Vapors Industrial Hygiene Strategy."

The health and safety of our workforce is a core value and critical to the success of the Hanford cleanup mission. We appreciate the hard work of the Independent Review Panel and of the Hanford Concerns Council and appreciate working with groups like Hanford Challenge to achieve a level of protection above and beyond regulatory compliance that ensures chemical exposures are As Low As Reasonably Achievable.

You may contact me at 372-9138, or Mr. W. T. Dixon at 372-9170, with any questions regarding this matter.

Sincerely,

C. G. Spencer
President and Project Manager

WTD:MDE

Enclosure: WRPS Response to "Independent Review Panel Report on Chemical Vapors Industrial Hygiene Strategy (13 pages)

cc: Tom Carpenter, Hanford Challenge

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November 5, 2010

WRPS RESPONSE TO "INDEPENDENT REVIEW PANEL REPORT ON CHEMICAL VAPORS INDUSTRIAL HYGIENE STRATEGY" Dated September 2010

Washington River Protection Solutions (WRPS) has received and reviewed the "Independent Review Panel Report on Chemical Vapors Industrial Hygiene Strategy" dated September 2010. This report was prepared by Patrick N. Breysse, PhD, Certified Industrial Hygienist of The John Hopkins University School of Public Health and Mark R. Stenzel, Certified Industrial Hygienist of Exposure Assessment Applications, LLC. Collectively, these two experts comprised the Independent Review Panel (IRP). This report was prepared under a Memorandum of Understanding prepared by the Hanford Concerns Council (HCC). The IRP reviewed WRPS's proposed "Tank Farm Chemical Vapor Management Strategy" (referred to as "TFCVMS" or TFC-PLN-111).

In the executive summary the IRP states:

> *Managing chemical vapors at the Hanford Tank Farms is complex and requires development of strategies and procedures not typically encountered in traditional workplaces. The complexities of this situation are well appreciated by WRPS. During the process of this review, WRPS has made important improvements over previous drafts of the TFCVMS. Further, it is evident to the IRP that WRPS recognizes the unique challenges and is committed to developing comprehensive, defensible, and appropriate strategies and continued improvements. While strides have been made to improve exposure assessment strategies, this report identifies further opportunities to improve on the proposed management strategy.*
>
> *Some of the suggestions and recommendations outlined in this report are intended to ensure a robust statistical approach for evaluating exposures within the tank farms. It is important to recognize that any assessment strategy should err on the side of being protective. In some cases, the IRP is concerned that the proposed application of statistical tools designed to be used in more routine work places may lead to an underestimation of exposure. In other cases the IRP's comments focus on the need to improve risk communication and risk management procedures. If implementation of the TFCVMS ultimately incorporates these suggestions, the proposed new strategy will strengthen current practices for managing chemical vapor exposures in the tank farms, a complex and uniquely challenging environment.*

WRPS appreciates the improvement opportunities suggested by the IRP. WRPS is committed to driving continuous improvement in the management of tank farms, and specifically in protecting our workers from chemical vapors. This is consistent with the principles of "As Low As

Reasonably Achievable" exposure to hazards, and our goal to enhance the safety culture at Hanford's tank farms.

Over the past several years, the tank farm operating contractors have taken or are taking many steps to more accurately characterize tank vapors and to reduce or eliminate personal exposures to tank vapors. These actions have included:

Staffing enhancements:

- Increased substantially Industrial Hygienist (IH) and Industrial Hygienist Technician (IHT) staffing to support increased sampling and characterization of tank vapors. These personnel are now required to complete rigorous qualifications to perform these functions.

Improved information and training:

- Developed and published numerous fact sheets to educate workers on tank vapors and the potential effects of contact with tank waste.
- Required workers who need unescorted tank farm access to complete Chemical Hazard Awareness Training (CHAT).
- Required those workers to attend CHAT refresher training every two years. Over 600 personnel have been retrained in the last year.

Physical upgrades:

- Removed stack rain guards that directed vapor emissions downward toward personnel.
- Installed stack extensions on active exhausters in AN, AW and C Tank farms.
- Initiated projects to install new higher flow rate exhausters for AP, SY, AY and AZ tank farms with taller stacks.
- Installed breather filter stack extensions on nine single shell tanks with high odor potential.
- Maintained, as much as practical, continuous active ventilation on Double Shell Tanks to reduce tank vapor concentrations.
- Sealed valve pits covers to prevent emission of vapors.
- Redesigned pit drain seals to remain sealed until it is necessary to drain liquids into the tanks.
- Replaced lines on Continuous Air Monitors with sealed piping to prevent vapor emissions.
- Removed many unused instrument cabinets so that equipment inside is no longer a potential source of vapor emissions.

- Sealed valve handles on valve pits with rubber gaskets/grommets to prevent vapor emissions.

- Implemented constant flow regulation system on AN and AW farms ventilation systems to reduce headspace and emission vapor concentrations.

Additional Controls:

- Developed a complete list of Chemicals of Potential Concern (COPCs).

- Developed and implemented Occupation Exposure Limits (OELs) for COPCs that previously did not have established OELs.

- Designated areas as Vapor Control Zones (VCZs) to reduce exposures near emission sources.

- Implemented voluntary use of respirators with higher protection factors, as desired by workers.

- Added controls for waste disturbing activities to include increased IHT coverage.

- Designated Vapor Reduction Zones (VRZs) during waste disturbing activities at retrieving and receiving locations and along transfer lines.

- Implemented use of silver shield personal protective equipment to protect personnel from contact exposures with tank waste.

Instrumentation, sampling and analysis:

- Increased personnel and area sampling.

- Purchased and obtained more sophisticated organic vapor sampling and analysis equipment for prompt and accurate sample analysis, including Gas Chromatograph and Mass Spectrometer (GC/MS) and Fourier Transform Infrared Spectrophotometer (FTIR) technologies. Further development is underway to evaluate using these instruments closer to field applications and developing user proficiency.

- Expanding routine vapor surveys around emission points such as breather filters, stacks, and valve pits. Expanded surveys will ensure new equipment (e.g., radial breather filters) perform as expected. Additionally, expanded surveys will ensure previous actions to prevent vapor emissions (e.g., seal valve pits) are still effective.

- Incorporated lessons learned from additional sampling information obtained.

Worker involvement:

- Revitalized the Chemical Vapor Solutions Team (CVST), providing a forum for employee issues, questions and feedback.

- Developed Chemical "As Low As Reasonable Achievable" (ALARA) program.

- Implemented an employee awards program for CVST and Chemical ALARA for sound recommendations and effective program implementation.
- Upgraded CHAT training and CHAT refresher based on worker input.
- Expanded the areas of VCZs to enhance chemical ALARA-based on worker input.
- Identified priorities for further sealing vapor sources based on worker input.

The IRP developed 12 specific recommendations related to TFCVMS. Each recommendation (in *italics*) with WRPS's response is discussed separately below. In some responses, specific related tasks are listed. Although some of these tasks are related to more than one recommendation, for brevity they are listed only once.

While many actions have been implemented, more are being planned or going through various stages of development. Some of the actions are technically challenging and will require highly competent resources over a lengthy period of time (months to years). Therefore, the implementation schedule will be determined based on available funding and technical resources, along with competing safety and health priorities. WRPS will brief Hanford Challenge on the status by the end of February 2011, assuming the impacts of the FY 2011 budget are known.

> ***RECOMMENDATION 1: Adopt Similar Exposure Groups (SEGs):*** *Currently, the first portion of the proposed WRPS exposure assessment process is based in the development of tank farm source homogeneous exposure groups (HEGs). While this is a useful step in identifying SEGs, this grouping of equipment should be incorporated into the SEG process defined in the American Industrial Hygiene Association (AIHA) Exposure Assessment (EA) Model. The screening level (SL) and administrative control level (ACL) assignment decisions are a component of the formation of SEGs and the SEG exposure assessment strategy.*

RESPONSE:

WRPS will adopt Similar Exposure Groups (SEGs).

WRPS agrees that SEGs are a better tool to more accurately characterize personal exposures. The AIHA Exposure Assessment Model will be implemented using SEGs. The current planned revision for TFC-PLN-34 "Exposure Assessment Strategy" will include this facet, which will be implemented for tank vapors through the TFCVMS. WRPS will take steps to initiate such SEGs for a select group of tanks, and when successful, expand use to other tank groupings. This model should be fully implemented within two years.

HEGs relate solely to the hazard (source) to ensure that the source is appropriately characterized. The evaluation of sources that may statistically exceed the SL or ACL will be used appropriately in the development and continuing evaluation of SEGs.

Specific tasks:

- Implement use of AIHA Exposure Assessment Modeling with use of Similar Exposure Groupings to augment Homogeneous Exposure Groupings.

- Develop and implement use of a critical review of exposure assessment data to determine what changes should be made in sampling and analysis plans. Additionally, these reviews may lead to changes in implemented engineered controls.

- Develop and implement a periodic assessment of tank contents, tank vapors, area sample results, emission point sample results, and personnel sampling results for safer, more protective, and more efficient sampling and operation.

- Define and enhance an iterative process that supports continuing evaluation of sampling strategies and methodologies with sound professional judgment.

RECOMMENDATION 2: Revise sampling strategies at vent sources to consider additional factors. *The sampling strategy based on collecting vent source samples using the approach as presented in NIOSH publication number 77-173 is not appropriate for the tank farm source characterization. Again, the sampling strategy should be moved to the AIHA EA formation of SEGs where all the components of an exposure assessment (workplace, workforce and work practice) are considered rather than just a portion of the workplace data. Additionally, waste disturbing and passive tank operations should not be grouped. And, WRPS should collect more source measurements to better identify the true variability in the source data under a wide range of conditions including environmental conditions (such as the weather). The collection of vent flow measurements should be added to the data measured when vent source sampling occurs.*

RESPONSE:

WRPS will revise sampling strategies at vent sources to consider additional factors.

WRPS agrees that the AIHA Exposure Assessment model is more appropriate for Tank Farm implementation than the approach in NIOSH 77-173. SEGs will be developed such that respective exposure data maintains statistical validity. Waste disturbing and passive tank operations will not be grouped. Additional sampling data will be obtained during waste disturbing, maintenance and operations activities under varying environmental conditions to maintain an evolving hazard evaluation process with increased understanding of the effects of environmental conditions and work activities on hazard and exposure variability. The use and value of vent flow measurements will be evaluated.

Specific tasks:

- Develop and validate sampling and exposure models for hard-to-detect chemicals to ensure they are not contributing significantly to personnel exposures.

- Develop and implement a predictive program that determines the impact of environmental conditions and waste-disturbing activities on vapors. Such a program

should be able to predict impacts due to a lower barometric pressure and/or a low (stable) stability class and the effect on increasing vapors in work spaces.

RECOMMENDATION 3: Identify a process for determining when to apply headspace or source concentrations in an exposure assessment model. *The contribution of various determinants of exposure should be quantified for use in an exposure assessment model. The relationship between source concentration data and the headspace concentration data varies by orders of magnitude. WRPS should better identify and analyze the source of variation between vent source data and tank headspace data and identify those situations where the headspace concentration data should be used versus the vent source concentration data. For example, when a tank is actively ventilated, the concentration coming out of the stack is probably better represented by the headspace concentrations.*

RESPONSE:

WRPS will identify a process for determining when to apply headspace or source concentrations in an exposure assessment model.

The contribution of various determinants of exposure will be quantified for use in the exposure assessment model. This includes identifying those situations where the headspace concentration data should be used versus the vent source concentration data.

WRPS believes that a continuous review of sample data is necessary to determine the best way to protect personnel. Data should be continuously evaluated and new sampling strategically completed due to the potential for changing tank conditions over time. Recent data and observed trends will continue to be valued over dated data. Each tank will be viewed independently based on known sampling history and trending. Predictive methods will be used prudently based on confidence in the data available.

Source data will be evaluated relative to emission points. The role of headspace data will be evaluated for each emission point as part of the hazard assessment. Variability in environmental data and hazards over time, changes in operations and control measure status (e.g. active versus passive ventilation), and chemical changes with evaporation of tank liquid will be accounted for in the exposure assessment model.

RECOMMENDATION 4: Evaluate control strategies that capture or contain vapors. *Because of the uncertainties inherent in the tank farms, WRPS should evaluate containing or capturing vapors emitted from an active vent. For example, the vent could be scrubbed. If scrubbing of the vent vapors is not practical, WRPS should model the dispersion patterns using worst case environmental conditions and assuming that the vapors coming out the vent approximate the headspace concentration. This information can then be used to determine the required height of the stack.*

The current stack heights of approximately 25 feet may not be adequate at least under some conditions. Doing the kind of analysis suggested above can help determine whether

the existing stack heights achieve an appropriate level of dilution. The IRP recognizes that WRPS plans to extend the stack height to 40 feet in one farm for which the next retrieval is planned. This is a positive step which can add an additional layer of protection under most circumstances.

One other very important consideration regarding active vent stacks is the elimination of rain caps. Rain caps drive the ventilated air downward which greatly reduces vapor dispersion. If air is blowing out of the vent, rain cannot enter and if the vent is not always on, rain caps are available that do not impede the air upward movement.

RESPONSE:

WRPS will re-evaluate control strategies that capture or contain vapors if increased stack heights do not provide sufficient mitigation.

WRPS believes that passive engineered controls, such as stacks, are generally more effective and reliable than active engineered controls, such as scrubbers. This is supported by an alternatives analysis, *Evaluation of Engineering Alternatives to Address Tank Vapor Issues*, RPP-19512, which was performed in 2004. The analysis evaluated seven options and combinations for reducing potential worker exposure and minimizing operational upsets due to the presence of vapors. The major conclusion was that the relative feasibility of taller exhaust stacks was greater than the feasibility of all other options, including in-line scrubbers. The evaluation also showed that taller stacks would result in higher vapor concentration dilution in the workplace along with lower costs (capital, operating and maintenance) and shorter schedules compared to scrubbers.

Further evaluation of scrubbers and four other control technologies was also done in *Feasibility Study for Control of Vapors from Waste Storage Tanks in the 241-C, 241-AW, and 241-AN Tank Farms,* RPP-RPT-23101 dated November 2004. It concluded that while feasible, these technologies had uncertain performance with significant capital and operating costs, and regulatory hurdles.

Therefore, WRPS and the predecessor contractor have focused on the proven passive technology of using stacks to remove vapors from the workspace and providing increased dilution by stack height.

Previous calculations for typical meteorological conditions at Hanford showed that increasing the stack height from about 13 feet to 40 feet in AP farm is expected to reduce the concentration of vapors in the workspace from a dilution factor of about 1000 to a dilution factor of about 3000. Recent, more sophisticated modeling shows that even under worse case environmental conditions, increasing the stack height from 17 feet to 40 feet in C farm is expected to reduce vapor concentrations by a factor of about five. Such stack extensions should keep vapor concentrations in the workplace well below Occupational Exposure Limits, even assuming worst case environmental conditions and headspace concentrations in the stack, consistent with ALARA principles. However, detection of odors or minor symptoms to sensitive individuals is still possible under unusual environmental conditions.

In the past few years, stacks have been extended at tank farms as follows:

- AN: 15.5 feet to 28 feet
- AW: 15.5 feet to 28 feet
- 9 SSTs (highest odor tanks): 5 feet to 15 feet

Based on recent analyses of existing field conditions, two stack extensions were designed and installed at C farm to support waste retrievals. This increased stack heights from 17 to 40 feet above ground. The added stack height provides better upward dispersion of the exhausted gases resulting in much lower concentrations of chemical vapors and odors at ground level. Engineering analysis has shown that further stack extensions would result in little additional benefit.

Observations to date during C-111 retrieval show there were no significant vapor concentrations in the workspace, odor complaints, or other reported symptoms. However, the effectiveness of stack extensions must be demonstrated during more aggressive waste disturbing operations. Additional sampling will be performed near these modified stacks during upcoming waste-disturbing operations under varying ambient conditions to quantitatively determine the effectiveness of the design.

As an enhancement for exhauster designs currently in progress for the remaining DST stacks (AP, SY, AY and AZ), new stack heights will be specified at a minimum of 40 feet to ensure improved dispersion. The current project schedules for these new exhausters (contingent upon funding) are:

- SY: start construction by October 2011, start operations by October 2012
- AP: start construction by April 2012, start operations by April 2013
- AY/AZ: start construction by December 2012, start operations by December 2013

Recently a Toxics Best Available Control Technology (TBACT) Analysis (RPP-ENV-46679 Rev. 1) was submitted to the Washington State Department of Ecology (Ecology) for the emissions from the new SY, AP, and AY/AZ exhausters. The removal technologies evaluated included scrubbers. Due to the high costs of removing tank vapors with these technologies, Ecology agreed that from an environmental standpoint, no additional control technologies would be required.

WRPS will continue to evaluate the effectiveness of the stack height extensions and determine whether additional measures need to be taken. WRPS will re-evaluate stack heightening effectiveness of the stack extensions in C farm after usage through the next year over various meteorological conditions.

If stack height extensions are not providing sufficient mitigation, WRPS will re-evaluate scrubbers, and other containment and capture technologies.

In addition, the feasibility of real-time monitoring is being investigated. Real-time monitoring options, if successful, could provide a more complete record of how chemical compound concentrations vary with changing field conditions.

In the past, exhausters had rain caps that impeded airflow. These caps have since been removed. Future stack designs will not include rain caps that impede air flow.

> ***RECOMMENDATION 5: Develop and refine the exposure assessment process (qualitative, semi-quantitative and quantitative process) needed to support the decision making process associated with implementing the AIHA EA Model.*** *WRPS should develop a sampling strategy that considers a range of environmental conditions and vent flow rates as discussed above. Additionally, the date and information collected to support the model should be documented in a format that is easily accessible over time. Then, WRPS should consider more frequent analysis of these data to ensure that models are accurately predicting actual events.*

RESPONSE:

WRPS will develop and refine the exposure assessment process (qualitative, semi-quantitative and quantitative) needed to support the decision making process associated with implementing the AIHA EA Model.

TFC-PLN-34 "Exposure Assessment Strategy" will be updated to implement the AIHA exposure assessment model. WRPS will include periodic sampling protocols to support continuous improvement of both hazard and exposure data evaluation within the TFCVMS. This evaluation will include improved evaluation of control measure status and environmental conditions. The strategy will include a periodic review on accumulated data.

> ***RECOMMENDATION 6: Complement the use of the ppbRAE direct reading instrument and related sampling methodologies to identify points of emissions and short term exposures associated with scheduled events or upsets.*** *WRPS uses the ppbRAE direct reading instrument extensively to identify points of emissions and short term exposures associated with either scheduled events or upsets. This instrument uses a photo ionization detector and is not specific. Although the ppbRAE is a very useful instrument, because of its limitations it should be complemented with other analytical tools and procedures. It is likely that in many cases the ppbRAE is only responding to ammonia concentration. WRPS has a project team working on these issues and this effort should have a high priority. Several IH Techs reported that they use the instruments readings to determine if exposures are acceptable. There are likely cases where the negative response of the instrument only means that the agent of concern is not detectable rather than that exposures are acceptable. WRPS has an effort under way to enhance its analytical capabilities with other instrumentation and sampling methodologies.*

RESPONSE:

WRPS will complement the use of the ppbRAE direct reading instrument and related sampling methodologies to identify points of emissions and short-term exposures associated with scheduled events or upsets.

WRPS has continued to improve our capacity to screen samples for a broader range of specific chemicals of potential concern, including a recent demonstration of improved GC/MS capabilities, a review of a Fourier Transform Infrared Spectrophotometer, and current on-site testing of a Proton Transfer Reaction/Mass Spectrophotometer for improved detection of volatile organic compounds. WRPS will continue to review available instrumentation, including handheld devices, to assure it can appropriately detect the known hazards at the activity locations using the latest and best technology.

Specific tasks:

- Expand the use of more sophisticated instruments such as the GC/MS and FTIR for prompt accurate sampling and analysis.
- Develop a method to evaluate actual versus predicted exposures and adjust modeling appropriately to result in an increased predictability of vapor exposures.
- Seek additional sampling locations and methods for obtaining sampling data such as samples of system interiors during operations and determining the feasibility of collecting condensable atmospheric samples.
- Evaluate knowledge of IHTs to ensure that they understand the limitations of monitoring equipment.

RECOMMENDATION 7: Strengthen sampling strategies to rely on a specific rationale through an iterative process that supports development of professional judgment. *The IRP does not believe that the periodic sampling strategy is as robust as it should be considering the dynamic nature of the work in the tank farms. There are many issues that impact the development of a sampling strategy. The rationale for sampling should be clearly developed and documented. That is, how does WRPS know that the sampling strategy is adequate to address all the needs of an exposure assessment and have the IHs been adequately trained in how analyze and interpret the data when collected? Note that this strategy must also be able to support the evaluation and calibration of professional judgments and modeling activities including determining the exposure contribution associated with various determinants of exposure.*

RESPONSE:

WRPS will strengthen sampling strategies to rely on a specific rationale through an iterative process that supports development of professional judgment.

The rationale for any periodic sampling strategy will address the broader scope conditions and issues to adequately support the AIHA exposure assessment model. The use and evaluation of data will be included within our strategies. TFC-PLN-34 will establish a process for the use of professional judgment. The determination of periodic sampling will be reviewed and documented in TFCVMS within the context of implementation of SEGs to assure appropriate ongoing sampling is conducted to validate and support the continuing SEG evaluation. The

ongoing professional development plan for IHs will include education on exposure determination and the implementation of professional judgment in the process.

RECOMMENDATION 8: Ensure a representative sample of workers within an SEG wear monitoring devices. *The IRP is concerned that, although on a given day many individuals may be working in a SEG, only one individual is monitored and the IH Techs suggested that many times they carry the monitor. Is the IH Tech's exposure representative and is one measurement sufficient to characterize exposure in the SEG? At least a preliminary analysis of the monitoring data should be conducted on a very regular basis, such as at least weekly, using techniques such as Bayesian Statistics. The statistical package used by WRPS contains this capability. A comprehensive analysis of the data should be completed such as semiannually or annually. This will likely be a major effort and appropriate resources should be allocated.*

RESPONSE:

WRPS will ensure a representative sample of workers within an SEG wear monitoring devices.

The highest at-risk workers will be monitored from each applicable work group. Any positive data obtained will be evaluated as applicable to each worker within the designated area or performing the designated function.

When SEGs are developed, monitoring will be defined, implemented, and evaluated based on results applicable to that SEG. SEG appropriate data, in accordance with the AIHA exposure assessment model, will be collected and evaluated across multiple iterations of activities within that SEG over time. Evaluation of that data would occur periodically as it is difficult to predict the actual level of activity within a specific SEG. Data evaluation will also look for trends and to predict potential adverse situations.

Specific task:

- Assure that representative workers from appropriate work groups are sampled and monitored to accurately characterize the group's exposures. This will include designating who will carry the personal sampling equipment in lieu of using volunteers.

RECOMMENDATION 9: Foster the development of sound professional judgment and communicate with workers about how it is applied. *WRPS agrees with the use of professional development, and the use of data analysis (modeling), while stakeholders (including representatives of employees) have discouraged the use of any modeling and instead encouraged reliance on ongoing sampling data. This belief that quantitative measurements should be used exclusively is a misconception and unfortunately is biased toward the failure to identify exposures that are potentially significant. A robust, scientifically-sound exposure assessment process incorporates quantitative measurements, professional judgment and modeling, used in concert to accurately and efficiently characterize exposure.*

Considering that the site has hundreds of chemicals used under many different conditions, it is neither practical nor possible to assess each exposure situation with quantitative measurements. In addition, many exposures must be characterized prior to the start of work. For example, the selection of personal protective equipment, appropriate engineered controls or the appropriate hazard communication must be completed prior to the start of work and therefore cannot be based on quantitative measurements. WRPS has agreed that the use of professional judgment should be expanded both in definition and in practice and better explained to workers over time.

RESPONSE:

WRPS will foster the development of sound professional judgment and communicate with workers about how it is applied.

WRPS agrees that a robust, scientifically-sound exposure assessment process incorporates quantitative measurements, professional judgment and modeling, used in concert to accurately and efficiently characterize exposure.

Historical quantitative data applicable to a SEG, trended over time and limited to an appropriately recent window, is an appropriate quantitative method of anticipating an exposure for an upcoming SEG activity. Modeling, used appropriately, is an effective predictive and comparative tool. Together quantitative data and modeling serve to inform sound professional industrial hygiene judgment during the evaluation of a planned work activity within that SEG. Professional judgment is needed to use any obtained data wisely so that it can be appropriately applied to the situation of interest.

Specific task:

- Improve communication with workers via CVST and other methods of changes and progress implementing changes, including effective use of modeling and professional judgment.

RECOMMENDATION 10: Use SEG data to support medical monitoring. *WRPS should develop the capability to collect the time individuals spend working in the various SEGs in order to support medical surveillance, illness investigations, and health surveillance of groups of workers. This information should be made available to the medical provider along with the basic characterization and exposure assessment data associated with working in the SEG.*

RESPONSE:

WRPS will use SEG data to support medical monitoring.

For reported illnesses and abnormal events, potentially affected groups will be identified and data provided for the group. WRPS will review its data collection and reporting system to identify methods of reporting results and periodic evaluations to the SEG members collectively. WRPS endeavors to monitor the individuals from applicable work groups with the highest exposure potential. Such sampling data would then bound the other potentially affected workers. Appropriate sample data from SEGs will be communicated to AMH to support medical surveillances, illness investigations, and health surveillances of groups of workers.

> ***RECOMMENDATION 11: Expand awareness of potential symptoms of exposure.*** *Potential symptoms of overexposure should be expanded beyond the perception of odor to include other symptoms such as watering of the eyes, tingling of the skin, tightness of breathing, etc.*

RESPONSE:

WRPS will expand awareness of potential symptoms of tank vapor exposure.

The communication system will be re-evaluated to identify additional or improved methods of providing information on the range of potential symptoms of vapor exposures, beyond just the perception of odor. This will include review and revision of abnormal operating procedures, as necessary. This information will be included in the Chemical Hazard Awareness Training and refreshers provided to the workforce (such as weekly tailgate meetings).

> ***RECOMMENDATION 12: Clarify hierarchy of controls.*** *WRPS should delineate in its proposed strategy that engineering controls should consider containment, capture and dilution and that preference should be given to containment and capture if beneficial and effective, or in the absence of evidence, as a precautionary measure.*

RESPONSE:

WRPS will clarify the hierarchy of controls within the strategy.

WRPS recognizes the value of containment/capture strategies. As data is gathered and analyzed, if stack extensions are not providing sufficient mitigation further evaluation will be done to determine the feasibility of beneficial containment/capture options that could be implemented in the future to mitigate the chemical vapor releases.

The vapor management strategy will be revised to address engineered controls, based on whether they have been proven effective, beneficial and reliable, with preference for passive controls over active controls.