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HSIA Response to EPA's Questions on Standard Operating Procedures (SOPs) at Carbon Tetrachloride and Other Solvent Manufacturing Sites

Carbon Tetrachloride Docket #EPA-HQ-OPPT-2020-0592; EPA-HQ-OPPT-2016-0733
Trichloroethylene Docket #EPA-HQ-OPPT-2020-0642; EPA-HQ-OPPT-2019-0500; EPA-HQ-OPPT-2016-0737
Perchloroethylene Docket #EPA-HQ-OPPT-2019-0502; EPA-HQ-OPPT-2016-0732
Methylene Chloride Docket #EPA-HQ-OPPT-2019-0437; EPA-HQ-OPPT-2016-0742

EPA posed several questions to HSIA on August 5, 2021 via email in preparation for meeting with HSIA and the EPA Carbon Tetrachloride (CTC) risk management team. As a part of that request, EPA asked for written responses that also noted when the information or answers applies to trichloroethylene, perchloroethylene, and methylene chloride. EPA's questions are presented in italics below followed by HSIA's response.

EPA: *What administrative controls (e.g., training, signs designating process areas, etc.) are in place to ensure SOP requirements are followed?*

HSIA: Employees, both new and seasoned, at our facilities are highly trained on a regular basis to ensure SOP requirements are followed. The following outline highlights some training sessions that focus on SOPs and information included in SOPs for new operator orientation, area training for experienced operators new to a process area, and additional training for specific tasks within a process area.

Orientation Training of approximately 60 hours depending on the complexity of the unit and experience of the operator

Orientation training for new operators includes, but is not limited to:

a. An overview of safety process systems and how employees will participate, be trained and tested on the safety systems;
b. Basic PPE requirements of the facility, the type of PPE used at the facility and how the task and/or area specific PPE is identified and required;
c. Training on the Hazard Communications Program required by 29 CFR 1910.1200, including the labeling system, how to obtain hazard information and review safety data sheets, the physical and health hazards they may encounter in the workplace, measures taken to prevent exposures such as work practices; and
d. Initial training on site-wide key procedures such as line break procedures.

Process specific area training of approximately 160 hours depending on the complexity of the unit and experience of the operator.

For experienced operators new to a process area, area training includes testing their knowledge of SOPs. This specific process training and testing requires that the operator demonstrates knowledge of:

a. The process area systems and operation guidelines;
b. The hazards of the process(es), and
c. The methods used to control those hazards specific to the plant area (e.g., information included in SOPs such as engineering controls, administrative controls, personal protective equipment).

The process specific area training is module-based training, followed by testing exercises to confirm process knowledge. A documented field walk through will be given by the unit process supervisor to determine if the trainee has the required knowledge of the unit.

Specific task training of approximately 360 hours depending upon the complexity of the unit and experience of the operator.

Additional job/task specific training is generally conducted on-the-job, on shift, on a one-on-one basis and focuses on the plant procedures and practices specific to the task expected to be performed within an area. Materials covered include training and testing an operator's knowledge of SOPs. Specific task training includes:

a. Field-based training with a transition towards taking the lead on specific tasks or duties based on demonstrated competence. Until a trainee reaches full qualification, the trainer maintains full accountability and responsibility for: 1.) the operation of the unit; 2.) the trainee's understanding; and 3.) managing the trainee's learning as they progress towards qualification;
b. Testing to ensure the operator can demonstrate an understanding of the training;
c. A job performance talk-thru must be performed or explained for every task. The walk-thru must be witnessed by a unit qualified technician and a supervisor. The trainer/supervisor will use a task check off list to verify that the trainee has completed all steps of the task correctly; and
d. Testing on each of the following applicable units: 1.) troubleshooting; 2.) safety procedures; and 3.) hazard assessments.

Refresher/Requalification Training

All employees who perform work under an SOP are trained on that SOP with refresher sessions on a regular basis. Retraining includes both a process-specific training refresher course that is conducted every six to twelve months after initial qualification and requalification and every three years at a minimum.

Additional Administrative Controls

Personnel entering certain process areas must sign in and out of the area. All personnel entering a process area must go through site orientation training that includes annual hazard communication/PPE training, which informs the employees about the hazards they work with in the facility, including all chemicals. The personnel must wear the minimum PPE required for entering the process area.

Signs are used within the plant to list the PPE required to enter a process area. In areas where additional PPE is routinely required, PPE requirements are posted in that area.

Finally, all SOPs must be readily available in hardcopy or electronically to employees that work in the unit.

EPA: *The SOP states that googles and work gloves are required anytime valves are operated and Figure 2 mentions nitrile gloves, which is consistent with some of the information provided during the risk evaluation process. Some work gloves do not offer chemical protection or offer limited protection. Are nitrile gloves the only gloves used? Is there a specific standard (e.g. ASTM) that is used or the manufacturer uses to determine the type of gloves?*

HSIA: Nitrile gloves are the primary gloves approved and listed in the PPE Hazard Assessments for tasks with potential exposure/contact with CTC. Nitrile gloves are also used for Perc and butyl gloves are used for TCE. In some cases, a specific PVC glove many be approved for tasks based on the hazard assessment. Other work gloves, such as cotton or leather, are not approved for any task where contact with CTC, Perc, Methylene Chloride or TCE is expected to occur (e.g., opening valves, etc.)

Glove permeation testing is typically performed by the glove manufacturers to make a preliminary decision of appropriateness of the glove materials for protection against chemical exposure. Chemical permeation testing is performed according to the American Society of Testing and Materials (ASTM) F739 total immersion and ASTA F1383 intermittent contact methods.

The ASTM F1383 is an intermittent test with one minute of immersion followed by nine minutes of no immersion, and then repeated up to a maximum of four hours or 240 minutes. The test was designed for showing reasonable use of gloves with highly volatile chemicals where limited contact was involved and not total immersion.

Other glove selection factors are considered such as length of task, type of task performed, and expected exposure. Many of the glove recommendations made are for tasks where incidental contact, i.e., no contact (or at worst very little contact), with a chemical is anticipated. The gloves specified are intended to prevent chemical contact with the skin during an unanticipated event – such as a spill or splash to the hand. Based upon the controls and standard operating practices in place, chemical contact is rarely seen with the glove, and these practices have been successful in

making actual hand contact with the chemical during the task practically unseen as a risk to hands protected by gloves. If there is a rare situation that creates contact with the glove or with gloved hand, the gloves are removed and the hands are washed.

EPA: *How are the PPE selections modified when the chemical hazard involves a mixture of chemicals compared to a single individual chlorinated solvent hazard?*

HSIA: The PPE is selected that best provides protection against the chemical of highest concern or the chemical that presents the most likelihood/potential for exposure to the worker in the mixture. The chemical hazard determination for each chemical in the mixture is made using the permeation data for that chemical published by the manufacturer (ATSM F739). This is the standard for liquids and gases. The Hazard Assessment provides the glove selection information to employees or those personal purchasing gloves.

EPA: *The document states that gloves are donned before sampling and loading/unloading activities. In addition, we understand tasks take 5-30 minutes. How many times are gloves reused and how is the number of reuses calculated based on breakthrough time and other workplace factors? How are the employees trained to recognize that a glove can no longer be used?*

HSIA: Employees are trained on how to inspect PPE used as part of unit orientation/SOP training as outlined in the PPE self-inspection guideline. If the gloves used for sampling/loading/unloading or line opening do not pass inspection (e.g., by showing any sign of discoloration or deformity) or have otherwise been in contact with a chemical, the gloves are disposed of per PPE policy.

Use or reuse of gloves vary based upon the task but are typically disposed of quickly. Cost is not considered in glove reuse. If the gloves do not pass inspection, they are disposed and replaced. In some cases, gloves are disposed of after a task or at the end of a shift. While there is training that requires when gloves should be disposed of, there are no restrictions on obtaining a new set of gloves after a single use or as needed or identified by the operator.

EPA: *If concentrations and amounts of accidental contact are minimal, how does the facility determine if the gloves should be replaced? Is it simply based on employee inspection or evidence? Have you considered using charcoal patch testing?*

HSIA: The PPE disposal decision is based on the employee's inspection or implemented policies, such as a single use for specific tasks. If the gloves used for sampling/loading/unloading or line opening do not pass inspection (e.g., by showing any sign of discoloration or deformity) or have otherwise been in contact with a chemical, the gloves are disposed of per PPE policy. There are no incident trends that indicate the current methods of protection, inspection and glove replacement are not protective. Charcoal patch testing is not an industry standard.

In addition to the engineering controls and PPE use that prevents exposure, any minimal accidental exposure is also mitigated by the highly evaporative nature of the solvents. As mentioned above, although glove inspection and disposal in certain cases is mandatory, there are no restrictions on obtaining a new set of gloves after a single use.

EPA: *Can you clarify what is entailed in the step "extra PPE can be removed if conditions permit".*

HSIA: PPE can be removed if conditions permit although it is not typical to remove or downgrade PPE. For respiratory protection to be removed, it must be validated that exposures are below applicable exposure limits and/or within the protection factor of the respiratory protection type being downgraded to. Direct read instrumentation is often used to establish baseline concentrations during the performance of a task and/or to clean an area after a task has been performed. There must be sufficient evidence to suggest that exposures do not exceed exposure limits and PPE (including respiratory protection) is no longer needed. If there is any potential for the employee to come into contact with any liquid, splash, overspray, etc., then PPE would not be removed.

One example of when PPE requirements can be modified for a specific task, if conditions permit, would be a line opening task that requires full body PPE and a respirator for a "first break", when the individual begins to loosen bolts on a flange to break the line apart. Prior to this, the line has been cleared for maintenance. Once it has been verified using direct read instrumentation that the equipment is clear of all liquids, then the PPE requirements may be modified.

Other examples would be when a worker leaves the area where the potential exposure exists, a line opening task is completed and the equipment is closed up and returned to normal operations; or if the real time air monitoring with a direct reading instrument for specific chemicals shows that the level is below the exposure limit, then the PPE may be modified for that specific task. Permission from the environmental health and safety department, the operations permit writer or a supervisor may be required to make this decision. The full PPE must be put back on before the worker reenters the work area, for example, where the risk of solvent exposure exists until the specific task if completed and the risk of exposure no longer exists.

EPA: *Do you use any tools in addition to gloves, such as glove bags, tongs, funnels, SafeTainers®, etc. for any of the tasks that may lead to contact with CTC or other solvents? If not, have you considered these tools? If these tools are mot helpful or feasible, could you explain why not?*

HSIA: The tools listed in the question are not applicable to the CTC, TCE, Perc or Methylene Chloride manufacturing or feedstock processes. Closed loop sampling systems are used to collect process samples. Emission control devices are used to collect and dispose of vapors for rail car loading and unloading. If additional tools are used (wrenches, etc.), then they would need to be

evaluated for use on a task-by-task basis and decontaminated after the task is completed prior to reuse or be disposed of.

There are no incident trends that would lead us to research alternatives or additional methods of protection such as those listed. Our typical activities don't currently necessitate use of the tools listed in the question above.

EPA: *What circumstances trigger the need for the lower and the higher range of PPE when documentation suggests a range?*

HSIA: The potential for exposure to a chemical while performing a task determines the level of PPE required. This is based on the engineering controls in place for the task/process, the industrial hygiene data, and an assessment of the task to determine what the exposure level and frequency of exposure might be. In some cases, PPE may not be needed based on the exposure assessment, yet it is required by the hazard assessment to be worn as an additional backup layer to protect the worker.

EPA: *The waste packaging SOP has a step for cleaning. "If the exterior of the drum is contaminated, clean the exterior of the drum." Could you clarify how the drum is cleaned and what PPE is used during this step?*

HSIA: The drum is cleaned using a solvent chosen for the type of contamination. For CTC wastes, it would likely be perchloroethylene. In that instance, the required PPE would be full body protection and a full-face respirator with supplied air. For Perc wastes, it's most likely that perc is used to clean the drum. For methylene chloride wastes, it's most likely that methylene chloride is used to clean the drum, and for TCE wastes, it must likely that TCE is used.

EPA: *We understand that the NESHAPs require management practices consisting of quarterly inspection for leaks. Are there any additional inspections, for example, due to process changes or equipment updates, and if so, how often do they occur?*

HSIA: In addition to the quarterly inspections referenced above, HSIA's CTC, perc, TCE and methylene chloride manufacturing, processing and feedstock facilities implement the following multi-layered inspection program, management of change (MOC) procedures and pre-start up safety reviews (PSSR) requirements.

Operator Rounds
Operator audible, visual and olfactory (AVO) rounds occur at least twice each shift. During this time, operators are walking through the process area looking for leaks, drips and odors while they are taking readings from field instruments.

Mechanical Integrity Inspections
EPA's RMP (40 CFR 68.73) and OSHA's PSM (29 CFR 1910.119(j)

a. These regulations impose performance-based mechanical integrity programs that apply to the manufacturing and processing equipment. In certain cases, these standards allow/require site-specific inspection practices, maintenance and replacement based upon process knowledge and experience.

b. Industry standards for mechanical integrity incorporate Generally Accepted Good Engineering Practices (RSAGAGEP) for the process safety/mechanical integrity program (including design, fabrication, installation, inspection, testing and repair.

c. Performance-based standards and site-specific implementation for testing, inspection and repair begins with API industry standards. For example, (i.) API 653 for Tanks; (ii) API 570 and 574 for Pipes; and (iii) API 510 and API RP 572 for pressure vessels.

Management of Change (MOC)
(40 CFR 68.75) and (29 CFR 1910.119(1))

d. The MOC process reviews any changes proposed for existing processes prior to the implementation to minimize the occurrence of unplanned events. The MOC provides a mechanism for documenting changes and tracking all follow-up activities resulting from changes.

e. Supplemental training is implemented based upon each site's MOC program and training is presented when needed and upon the MOCs in place.

Pre-Startup Safety Review (PSSR)
(40 CFR 68.77) and (29 CFR 1910.119(i)

PSSR reviews the installation of new processes (new facilities), significant modification to processes, or a change to process safety information. This review is to ensure that all process safety system(s) affected by the change have been reviewed to verify that they are in place and adequate prior to the introduction of chemicals or energy to the process.

Reportable Quantity

The mechanical integrity inspections, quarterly inspections and AVO rounds described above are actions taken to both prevent and detect any releases early. The reportable quantity levels (per the Clean Water Act Section 311, CERCLA and DOT) represent additional regulatory programs in place to detect and end any potential release.

Reportable quantities for the substances discussed in this response are listed below.

	CWA Section 311 40 CFR § 117.3	CERCLA 40 CFR § 302.4	DOT 40 CFR § 172.101 Table 1 to Appendix A
Carbon Tetrachloride 56-23-5	Not listed	10 lbs	10 lbs
Perchloroethylene 127-18-4	Not listed	100 lbs	100 lbs
Methylene Chloride 75-09-2	Not listed	1,000 lbs	1,000 lbs
Trichloroethylene 79-02-6	100 lbs	100 lbs	100 lbs

EPA: *Upon entering the production area or designed process area, at what point do respirator use requirements take effect?*

HSIA: The production areas for CTC, TCE, Perc and Methylene Chloride are all located outside and the equipment is a closed process system. Respirators are not required to be worn in the process area under normal operating conditions but are required per the task.

This is supported by the industrial hygiene data collected for employees working in the process area. Full shift and task-based samples are evaluated against the applicable occupational exposure limits. When precautionary protection is required for certain tasks, that requires respiratory protection. If another employee is going to enter the area where an SOP task is being conducted, they too would have to don the appropriate PPE for that SOP.