UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF CHEMICAL SAFETY AND POLLUTION PREVENTION

August 18, 2023 ACC p-DCB Consortium responses
September 15, 2023, EPA Review
December 8, 2023 ACC p-DCB Consortium response
January 2, 2024 EPA Review

MEMORANDUM

SUBJECT: EPA Review of ACC's p-Dichlorobenzene (CASRN 106-46-7, p-DCB) Existing Information on Occupational Inhalation Exposure Monitoring

FROM: Greg Macek, Chemical Engineer
Risk Assessment Branch 4 (RAB4)
Existing Chemicals Risk Assessment Division (ECRAD)
Office of Pollution Prevention and Toxics (OPPT)

Keith Jacobs, PhD, Lead Biologist
Risk Assessment Branch 5 (RAB5)
Existing Chemicals Risk Assessment Division (ECRAD)
Office of Pollution Prevention and Toxics (OPPT)

THROUGH: Seema Schappelle, PhD, Branch Chief
Risk Assessment Branch 4 (RAB4)
Existing Chemicals Risk Assessment Division (ECRAD)
Office of Pollution Prevention and Toxics (OPPT)

TO: David Turk, Branch Chief
Data Collection Branch (DCB)
Data Gathering and Analysis Division (DGAD)
Office of Pollution Prevention and Toxics (OPPT)

BACKGROUND

In April 2021, the Environmental Protection Agency (EPA) received an existing data submission of an Occupational Inhalation Exposure Study on p-Dichlorobenzene from the American Chemistry Council p-Dichlorobenzene TSCA Risk Evaluation Consortium. This existing study was provided in response to a January 19, 2021 TSCA Section 4 Test Order issued by EPA for p-Dichlorobenzene to offer as an alternative to *de novo* testing to meet the need for facility-specific occupational inhalation exposure data on p-dichlorobenzene. The submission by the Consortium also included a spreadsheet with the results of the monitoring.

The Consortium members consist of Solvay, Celanese and LANXESS. LANXESS is an importer and they do not directly handle p-DCB so they did not submit monitoring data. The Condition of Use (COU) that was the subject of the monitoring is the use of p-DCB to make polyphenylene sulfide (PPS).

Monitoring was done at one Celanese facility and one Solvay facility in 2020. The concentration of p-DCB at the facilities ranges from 100% in the p-DCB storage tank to <100 ppm in the final solid polymer. Celanese also did some monitoring at their compounding facility where PPS polymer (<100 ppm p-DCB) is blended with other additives and extruded into pellets.

A total of 105 data points were collected. Both workers and Occupational Non-Users (ONUs) were monitored and samples consisted of both Full shift (12-hours) sampling and task based (15 min to 60 min) samples. The Study indicated that Assay Technology 525 Trace Air Organic Vapor Monitoring Badges were used that meet NIOSH 1003 accuracy and precision criteria for sampling and analytical methods.

The purpose of this memo is to identify any additional information needed in the Study Report to enable EPA to use this monitoring data in a TSCA Risk Evaluation for p-Dichlorobenzene.

On August 18, 2023, ACC provided responses to each of the EPA recommendations in the below sections. The purpose of this updated memo is to provide EPA's review of the ACC responses.

RECOMMENDATION FOLLOWING TECHNICAL REVIEW

ECRAD recommends the following information be added to the Monitoring Study Summary report:

1. Rationale for the selection of the sites that were monitored.
   This has been added to the Study Report Summary.

   EPA Review: Acceptable. The Monitoring Study Summary Report includes the rationale that the Celanese and Solvay sites that were monitored represent all of the consortium's U.S. polymer manufacturing uses of p-DCB.

2. A discussion of how monitoring for non-routine activities such as maintenance was considered.
   This monitoring data represents the regular operations of these sites. Non-routine activities such as maintenance were not considered for various reasons. The primary logic is that maintenance activities take place under controlled conditions using specific SOPs which includes properly clearing the lines of chemical prior to beginning work. As such, maintenance activity does not represent exposure during normal operating conditions or a worst-case scenario. This sampling was conducted prior to the issuance of the January 2021 Test Order and the data was submitted as existing information. The Test Order does not reference non-routine activities such as maintenance.
   The PDC Consortium recommends EPA accept this sampling dataset without maintenance information to satisfy the TSCA Section 4(a) Test Order.

   EPA Review: The existing data that was submitted did not include maintenance activities and was collected prior to the issuance of the test order. The ACC response provided a qualitative

assessment of potential inhalation exposure for maintenance activities. This included a logic for why maintenance activities were not monitored due to the SOPs being followed which require properly clearing the lines of chemical prior to beginning of the work. EPA's view is that there are uncertainties associated with the qualitative assessment that can be addressed with monitoring. EPA recommends that additional monitoring be conducted for workers involved in maintenance activities.

EPA requests additional information on how often line breaking is done and also the method for clearing the lines and why the procedures used eliminate the possibility of exposure.

ACC p-DCB Consortium December 8, 2023: The p-DCB Consortium has provided an Overview of Maintenance Workers at p-DCB Sites (Overview) for the two polymer manufacturing activities sites in the United States. The Overview contains a summary of the-tasks associated with maintenance workers, if the tasks are planned or unplanned, the estimated frequency on an annual basis, and the duration of the task (Table 1). Given the lack of potential exposure, a Tier 1, or screening level assessment, is appropriate for maintenance workers at p-DCB Consortium sites and sampling data is not required. The Overview describes the process for line and vessel breaks, clearing procedures and includes Standard Operating Procedures (SOPs) relevant to maintenance activities and tasks.

EPA Review January 2, 2024: Acceptable. EPA has reviewed the data provided in the Overview of Maintenance Workers on the estimated annual frequency of various maintenance activities as being 2x/year or less frequent. EPA concurs that a screening level assessment can be utilized for estimating exposure for maintenance workers. EPA will use conservative exposure assessment approaches while incorporating the information provided by industry on the frequency and duration of exposure and SOPs for these maintenance activities.

3. The worker activities are described in general terms. The summary report needs more detail pertaining to p-DCB for each exposure group.
   This has been added to the Study Report Summary.
   Please be reminded that in October 2022, the p-DCB Consortium submitted the ACC p-DCB Consortium Handling and Worker Protection Overview for our condition of use and presented this information to EPA on October 19, 2022. Those documents contain detailed information for each exposure group including standard operating procedures as attachments.

   EPA Review: Acceptable. EPA confirms that this additional detail has been added to the Study Report Summary and notes that this document along with the above-mentioned document will be good sources of information for the Risk Evaluation.

4. A discussion of the number of samples for the material handlers. This group had the highest exposures but the fewest samples.
   This has been added to the Study Report Summary.

   EPA Review: Acceptable. Additional detail has been added to the Study Report Summary to further clarify the number of full-shift and short-term samples that were taken for the material handlers.

5. Clearly state that the monitoring results have been combined for the two facilities that were

monitored for the p-DCB reactant use.
This has been added to the Study Report Summary.

EPA Review: Acceptable. EPA confirms that this detail has been added to the Study Report Summary.

6. A discussion of the air concentration (TWA) detection limit for the monitoring method along with a comparison to the EPA OEL of 13 ppb (0.08 mg/m^3). The detection limits appear to be different for each measurement.
This has been added to the Study Report Summary.

EPA Review: Acceptable. The Study Report Summary included additional clarifying detail on the detection limits of the monitoring with comparison to the EPA provisional OEL of 0.08 mg/m3.

7. Present task-based monitoring results in the Spreadsheet Table 1 for the lab technicians and material handlers separately and include sample duration information.
Please be advised that a typo was made in the Summary table and has been updated.
The listing of lab technicians and material handlers in the task based monitoring results was a typo. The analysis was done on the task based samples for Material Handlers and Process Field Operators. Sample duration information for these two groups are similar and can be found in Table 2 of Summary of p-DCB IH data. Would EPA please confirm that this typo update is acceptable? If additional statistics need to be calculated, the p-DCB Consortium will need to involve a 3rd party contractor.

EPA Review: Acceptable. The Study Report Summary clarifies that the task-based sampling is for material handlers and process field operators. EPA has the discrete data points from Table 2 of the Summary p-DCB IH data. Calculation of additional statistics isn't necessary.

8. IH results summary tables need to be included in the main report instead of in a separate spreadsheet.
This has been added to the Study Report Summary.

EPA Review: Acceptable. EPA confirms that the monitoring results summary tables have been added to the Study Report Summary.

EVALUATION OF ACC'S INHALATION EXPOSURE MONITORING STUDY

The remainder of this memo includes a summary of ECRAD's evaluation of individual aspects of the monitoring study.

I. Inhalation Sampling Strategy

- Selection of Facilities Monitored

INHALATION EXPOSURE MONITORING STUDY: Monitoring was done at one Celanese site and one Solvay site for the COU of p-DCB as a reactant to make polyphenylene sulfide

(PPS). Celanese also did some monitoring at their compounding facility where PPS polymer (<100 ppm p-DCB) is blended with other additives and extruded into pellets.

ECRAD Review: The rationale for the selection of these sites for monitoring needs to be included in the summary report.

- Selection of Exposure Groups for Monitoring

INHALATION EXPOSURE MONITORING STUDY: The exposure groups monitored and their associated activities are presented in the below table.

Exposure Group	Activities
Material Handlers	Unload p-DCB into site storage tanks
Process Field Operators	Tasks such as collecting samples and responding to leaks
Laboratory technicians	Sample analysis
ONUs	Office and warehouse workers
Compounders	Operators of compounding machines

ECRAD Review: The summary report needs discussion of how monitoring for non-routine activities such as maintenance was considered. Also, the activities are described in general terms. The summary report needs to provide more detail pertaining to p-DCB for each exposure group.

- Sampling Method

INHALATION EXPOSURE MONITORING STUDY: Sampling was conducted using Assay Technology 525 Trace Air® Organic Vapor Monitor Badges that meet NIOSH 1003 accuracy and precision criteria for sampling and analytical methods.

ECRAD Review: ECRAD has no comments.

- Number of Samples

INHALATION EXPOSURE MONITORING STUDY: A summary of the number of samples collected in the monitoring is presented in the table below.

Exposure Group	Type of Sample	Number of Full-Shift Samples Taken
Material Handlers	Full-Shift	5
Process Field Operators	Full-Shift	26
Lab Technicians	Full-Shift	9

Exposure Group	Type of Sample	Number of Full-Shift Samples Taken
ONUs	Full-Shift	27
Compounding	Full-shift	7
Lab Technicians, Material Handlers	Task-Based	31
	Total	105

ECRAD Review: An observation of this data and the sampling results is that the exposure group with the highest exposures had the fewest number of samples. Was there any consideration given to increasing the number of samples for the material handlers? Also, it appears that these are the combined results at the two facilities. These considerations should be clearly discussed in the results and the summary report.

- Detection Limit

INHALATION EXPOSURE MONITORING STUDY: The summary report did not include a discussion of the detection limit for the monitoring method.

ECRAD Review: ECRAD recommends that this discussion be included in the summary report along with a comparison to the EPA provisional OEL of 13 ppb (0.08 mg/m^3), equivalent to the draft EPA IRIS Reference Concentration (RfC) for p-DCB (EPA, 2006) based on histopathology in the olfactory epithelium of rats.

- Reporting of Monitoring Results

INHALATION EXPOSURE MONITORING STUDY: The Consortium provided a spreadsheet with two individual sheets. One sheet provided the summary statistics of the monitoring by exposure group for both full-shift and task-based sampling. The second sheet contained details on each sample that was collected.

ECRAD Review: ECRAD requires that the monitoring results that are presented in the Spreadsheet Table 1 for the task-based sampling present the results of lab technicians and material handlers separately and include sample duration information. Also, ECRAD requires that the IH results summary tables be included in the main report instead of in a separate spreadsheet.

REFERENCES

ACC. 2020 (November). American Chemistry Council – p-Dichlorobenzene TSCA Risk Evaluation Consortium. Study Title: p-Dichlorobenzene (p-DCB) Occupational Inhalation Exposure Study Conducted During Polyphenylene Sulfide Manufacture and Compounding.

ACC. 2021 (April). American Chemistry Council – p-Dichlorobenzene TSCA Risk Evaluation Consortium. Summary of p-DCB IH

EPA, 2006 (May). Environmental Protection Agency. Toxicological Review of Dichlorobenzenes; In Support of Summary Information on the Integration Risk Information System (IRIS). Final Revised Draft. EPA/635/R-03/015.