



# Department of Pesticide Regulation



Brian R. Leahy  
Director

## MEMORANDUM

Edmund G. Brown Jr.  
Governor

TO: George Farnsworth  
Assistant Director  
Pesticide Programs Division

FROM: David Duncan *Original signed by*  
Environmental Program Manager II  
916-445-3870

DATE: December 29, 2015

SUBJECT: DETERMINATION OF CRITERIA FOR DPR'S LIST OF TARPAULINS THAT QUALIFY FOR A 60 PERCENT BUFFER ZONE REDUCTION CREDIT FOR CHLOROPICRIN

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This memorandum requests your approval to establish the Department of Pesticide Regulation's (DPR) California-specific list for tarps that qualify for U.S. Environmental Protection Agency (U.S. EPA) 60 percent buffer zone reduction credit. It also identifies the criteria for adding candidate tarps to the list.

Chloropicrin soil fumigant product labels include buffer zones for human health protection based on field flux studies. By using one of the U.S. EPA-listed tarps, labels allow buffer zone distances to be reduced by as much as 60 percent when using chloropicrin field fumigation products <<http://www.epa.gov/soil-fumigants/tarps>>. U.S. EPA maintains and publishes a list of tarps approved for credits that reduce buffer zone distances by 20, 40 or 60 percent. These credits are based on modeling data. DPR found there were insufficient data to determine if flux differed significantly between untarped applications and applications using the tarps on the 20 and 40 percent buffer zone reduction credit list. Therefore, applications using these tarps do not receive buffer zone reduction credit in California.

However, DPR has evaluated flux data for high barrier tarps, also known as Totally Impermeable Film (TIF), that appear to be effective in significantly reducing emissions; therefore, DPR recognizes that TIF tarps should qualify for a 60 percent buffer zone reduction credit. A key laboratory test that determines whether a tarp is approved for credit by the U.S. EPA is the measurement of the mass transfer coefficient (MTC) under ambient humidity levels. MTC values measure permeability of the tarp when challenged by individual fumigants.

Best management practices and labels require fields to be fumigated at soil moisture content high enough to control the movement of the fumigants out of the soil, which creates high humidity under the tarps. DPR and others have concerns about the performance of some tarps under high relative humidity (RH) conditions (Qian, et al. 2011). Based on these concerns, DPR determined that data were needed to confirm whether U.S. EPA's list of tarps designated to receive 60 percent buffer zone reduction credits provide similar protection during high RH conditions. Therefore, DPR requested tarp manufacturers to submit a tarp sample to measure permeability



at high RH conditions (DPR, 2015). These results will be used to develop DPR's tarp list for 60 percent buffer zone reduction credit for chloropicrin. DPR has received and reviewed the laboratory results requested.

### **Laboratory Quality Control**

Results from the high RH permeability tests were submitted to DPR and reviewed for quality, completeness and clarity. A review of the laboratory reports indicated a need to set parameters on acceptable measures of quality control. Three of 13 laboratory reports were not considered for the statistical analysis due to indication of leakage during the testing period. The ASTM method E2945 – 14 Standard Test Method for Film Permeability Determination Using Static Permeability Cells (ASTM, 2014), the standard for laboratories, states: "In general, when the percent recovery remains above 60% for all sample times and all replicates, the concentration measurements can be considered acceptable." The laboratory results for 10 tarps with acceptable data were generally greater than 70 percent and less than 130 percent at all sampling intervals (Spurlock, 2015). It is recommended that all tarps test results meet these quality control criteria to be considered for DPR's list of acceptable tarps (see criteria below).

### **Determination of MTC threshold**

An analysis of the high RH MTCs of the 10 tarps submitted for testing by manufacturers was conducted to determine the MTC criterion for placing a tarp on a California-specific list (Spurlock, 2015). The analysis was conducted to identify a range of high RH MTCs to group the tarps. The analysis results for the 10 tarps submitted indicated a statistical grouping of nine tarps with one tarp as an outlier. Analysis of the high RH MTC results of the nine tarps indicated that any tarp with an MTC of  $\leq 0.026$  cm/hr would be considered to be similar (based on the 95<sup>th</sup> percentile of the replicate MTC measurements).

This determination is supported by flux estimates from field studies of tarped applications used by DPR to develop chloropicrin buffer zones. Most of the flux studies for the TIF tarpaulins were conducted using a specific type of TIF tarpaulin. One of the studies determined that the MTC of that specific tarp was around 0.02 cm/hr (Gao, et al. 2013). Studies currently underway indicate that tarps within the same high RH MTC measurement range have similar flux profiles to the specific tarp used to determine chloropicrin buffer zones, i.e., 0.02 cm/hr (H. Ajwa, personal communication). Therefore, DPR has determined that tarps with similar MTC measurements would fall at or below a MTC threshold of 0.026 cm/hr.

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**Criteria for DPR's list of tarps that qualify for a 60 percent buffer zone reduction credit for chloropicrin:**

DPR will only add tarps already listed by U.S. EPA. The tarp list will be maintained on the DPR website.

Laboratories testing soil fumigant tarp for permeability must adhere to the following data quality criteria:

- The ASTM E2945 – 14 Standard Test Method for Film Permeability Determination Using Static Permeability Cells method must be adhered to and any deviations must be noted.
- Raw unadjusted concentration data at each sampling interval must be submitted to DPR.
- Any adjustment of data must be documented with an acceptable justification.
- Total recovery of the fumigant must be within the range of 70% to 130% for all sampling times.

**Mass Transfer Coefficient (MTC) threshold:**

The tarp must have a mean MTC of 0.026 cm/hr or less.

If you have any questions or need further assistance, please feel free to contact Ms. Pamela Wofford, Environmental Program Manager I, at 916-324-4297 or <Pam.Wofford@cdpr.ca.gov>.

Approved by:

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## References

ASTM. 2014. Method E2945-14: Standard Test Method for Film Permeability Determination Using Static Permeability Cell. DOI:10.1520/E2945-14.

DPR. 2015. Letter to Agricultural Film Manufacturers dated April 8, 2015.

Spurlock, F. 2015. Analysis of High Barrier Tarpaulin Chloropicrin Mass Transfer Data Measured Under High Relative Humidity Conditions. Memorandum to Pamela Wofford dated December 21, 2015.

Gao, S., Ajwa, H., Qin, R., Stanghellini, M. and D. Sullivan. 2013. Emission and transport of 1,3-dichloropropene and chloropicrin in a large field tarped with VaporSafe™ TIF. Environ. Sci. Technol. 47: 405–411.