

Exhibit 7



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OFFICE OF
CHEMICAL SAFETY AND
POLLUTION PREVENTION

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MEMORANDUM

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SUBJECT: M-1691 Herbicide, EPA Reg. No. 524-582 (Active Ingredient: Dicamba Diglycolamine Salt) and M-1768 herbicide, EPA Reg. No. 524-617 (AI: Diglycolamine Salt with VaporGrip™) – Review of EFED Actions and Recent Data Submissions Associated with Spray and Vapor Drift of the Proposed Section 3 New Uses on Dicamba-Tolerant Soybean and Cotton

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The Environmental Fate and Effects Division's March 2011 risk assessment for the proposed new use of dicamba diglycolamine (DGA) on dicamba-tolerant soybean discussed the potential for adverse effects on non-target plants due to spray drift and identified volatility (*i.e.*, vapor drift) as an uncertainty requiring additional evaluation (USEPA 2011).

In 2014, EFED issued an addendum to the 2011 risk assessment that looked more closely at the risk to terrestrial non-target organisms exposed to dicamba through spray drift and vapor drift using additional information submitted by Monsanto Company (USEPA 2014). The 2014 addendum acknowledged that volatility had been associated with dicamba historically, but did not quantitatively assess the risk for the new use on dicamba-tolerant soybeans, and

acknowledged that it was an uncertainty in the assessment. Based on the weight of evidence analysis, it was concluded that the dominant route of off-field exposure to non-target terrestrial and aquatic organisms was more likely to be a result of spray drift and runoff than the volatilized mass of dicamba from a treated field. The 2014 addendum concluded that without product- and nozzle-specific drift curves based on empirical data, the off-field distance that effects are expected for terrestrial plants remained uncertain. The addendum also noted that the uncertainties associated with estimated dicamba vapor concentrations in air and estimated deposition on plants would be greatly reduced by the submission of a terrestrial plant vapor phase toxicity study measuring both toxic response and air exposure concentrations.

In March 2016, EFED issued a second addendum to the 2011 risk assessment that incorporated new field trial data (based on applications conducted in accordance with the draft label requirements {*e.g.* nozzles, spray pressures, ground speeds} designed to reduce spray drift), data from plant damage incidents, laboratory volatility data, and terrestrial plant reproductive effects data, all in relation to spray drift and volatilization (USEPA 2016a). Also in March 2016, EFED finalized a Section 3 new use risk assessment for use of dicamba DGA on dicamba-tolerant cotton (USEPA 2016b).

The March 2016 addendum and risk assessment concluded that based on the available data, a volatilization buffer equal to the spray drift buffer, extending 110 feet (for the 0.5 lb ae/A application rate) in all directions from the treated field, was justified. Among the available data, one open literature study (Egan and Mortensen 2012) directly addressed the potential for volatilization and transport of dicamba and the potential for damage to the most sensitive tested species, soybean (non dicamba-tolerant). Based on damage assessments of non dicamba-tolerant soybean plants placed near treated fields after spray drift from a 0.5 lb/A dicamba DGA salt application had dissipated, the authors estimated the exposure at distance by correlation to known dose-damage correlations. Egan and Mortensen estimated the 95% upper bound vapor exposure would drop below the soybean no-observed-adverse-effect-concentration (NOAEC) at a distance of approximately 25 meters (82 feet). This is well within the 110-foot downwind-only spray drift buffer proposed for the 0.5 lb/A rate. Thus, the March 2016 addendum and risk assessment concluded that the 110-foot buffer distance should be adequately protective of EPA's apical endpoints of plant height and yield following potential volatilization exposure.

Two product formulations of dicamba are discussed below. M-1691, a diglycolamine (DGA) salt of dicamba, is less volatile than older dicamba formulations such as dimethylamine (DMA) salts. (Dicamba DMA salts were not considered for use on genetically engineered soybeans or cotton). M-1768, or VaporGrip™, also a DGA salt, is formulated to be even less volatile than M-1691.

Recent data submissions, including field volatility (flux) studies of both M-1691 and M-1768 in Georgia and Texas, laboratory vapor-phase toxicity studies, and laboratory vapor-phase exposure (humidome) studies, provide evidence that decrease concerns and address earlier uncertainty about off-site vapor-phase exposure. The fair weather conditions (characterized by high temperatures in the low 90⁰s F during the day and a strong diurnal cycle of heating and cooling, humidity, and mixing conditions) throughout the study periods for both TX and GA made for near-idealized conditions for volatilization occurring after applications. These data indicate that

off-site volatility exposures will be less than the terrestrial plant level of concern (LOC) for listed plants (the NOAEC) for the M-1768 formulation, and will be between the NOAEC and the lowest-observed-adverse-effect-concentration (LOAEC) for M-1691. The margin between the expected exposure for M-1691 and the LOAEC is about ten-fold.

Based on the data described in the Appendix below, including the registrants' field studies and volatilization modeling, the 110-foot omnidirectional buffer for volatilization is no longer warranted for the M-1768 formulation, because the expected exposure at field's edge is less than the NOAEC. A buffer for the M-1691 formulation is also not warranted, taking the uncertainty of exposure and toxicity estimates into account, because the exposure is ten-fold less than the lowest effect level (LOAEC) at the edge of the field.

However, EFED finds that the in-field spray drift buffer of 110 feet downwind (0.5 lb/A rate) or 220 feet (1.0 lb/A) at the time of application must be maintained, because spray drift remains the main concern for potential off-site exposure.

As with all risk assessments, conclusions are made within the bounds of the stated uncertainties. In this case, these principally include whether the submitted field volatility studies adequately encompass the extremes of conditions that cause volatilization, and the statistical uncertainty in the calculation of the level of concern, which is based on the no-effect level for the most sensitive tested plant, soybean. It is possible that volatilization could be greater under conditions outside the scope of the submitted studies. Within these uncertainties, we conclude that no volatilization buffers are needed.

Results of the Georgia and Texas field volatility studies indicate that exposures from the M-1691 formulation are between the NOAEC and LOAEC for the most sensitive plant, while those from the M-1768 formulation are below the NOAEC. Thus, the M-1768 formulation is less likely to cause off-field effects from volatilization.

In August 2016, EPA's Office of Enforcement and Compliance Assurance issued a Compliance Advisory entitled "High number of complaints related to alleged misuse of dicamba raises concerns" (USEPA, 2016c). This document noted that 117 plant damage incidents affecting 42,000 acres have been reported to the Missouri Department of Agriculture (MDA) in the summer of 2016 due to alleged illegal "over-the-top" (post-emergent) use of currently registered dicamba products on dicamba-resistant cotton and soybeans and noted that similar reports have been received by Alabama, Arkansas, Illinois, Kentucky, Minnesota, Mississippi, North Carolina, Tennessee and Texas. These alleged applications would have been inconsistent with the label approved at that time because the over-the-top use had not yet been registered by EPA. Since the over-the-top use has not yet been approved, the labels on these products would not have had the restrictions on the current draft label (*e.g.*, specifying extremely-coarse or ultra-coarse nozzles, spray pressures, equipment speeds and the use of a 110 foot in-field buffer) designed to reduce spray drift. It is not clear at this time what caused these incidents. It is also not clear how the reported damage relates to the apical endpoints (plant height and weight) that are the basis of EPA's risk assessment. As more information becomes available on these and any other incidents, EPA will evaluate the incidents.

If registration of M-1691 and/or M-1768 is granted, EFED recommends analysis of any post-registration incident reports associated with their usage to confirm the findings in this analysis concerning the volatilization route of exposure. Comprehensive post-registration documentation of any incidents should include: wind and other weather conditions surrounding the associated application, whether label language designed to reduce spray drift was followed, and the distance between the application and the location with plant damage.

EFED's March 2016 addendum discussed previous incidents (2012-2015) that had been associated with dicamba use on dicamba-tolerant crops and noted that the Missouri Department of Agriculture had concluded that one incident was a result of volatilization of dicamba, rather than spray drift. EFED also noted in the March 2016 addendum that the incident observations were qualitative measures of visual injury (*e.g.* leaf spotting or curling), rather than quantitative estimates of damage (*i.e.* directly relating to EPA's apical endpoints of plant height, biomass and survival). Submission of field data that quantitatively link visual estimates of plant damage from dicamba to EPA's apical endpoints would be helpful for understanding the nature of the reported incidents and better incorporating any such data into future risk characterization of dicamba's potential effects due to potential volatilization.

Appendix. EFED Summary Conclusions on Vapor-Phase Toxicity of Dicamba and M-1691 and M-1768 Field Volatility (Flux) Studies and Deposition Analysis

Dicamba Vapor Phase (Humidome) Study Conclusions

A dicamba vapor toxicity response laboratory study was conducted and submitted by Monsanto Company to EPA in 2016 (Gavlick, 2016; MRID 49925703, supplemental suitable for quantitative use). The goal of this dose-response study was to identify a no-effect dicamba air exposure concentration for non-dicamba-tolerant soybean plants. Analytical and biological results were obtained. The analytical results explain that, percent acid equivalency dicamba applied being equal, the DGA form of applied dicamba is less volatile than the other dicamba formulations (*i.e.*, dicamba DMA and dicamba acid) as indicated by the amount of dicamba extracted from the polyurethane foam filter compared to the other formulations. The biological results indicate that soybean height (the only apical endpoint measured) is not significantly reduced compared to control plants following 24 hours of exposure (at 85°F for 16 hours and 70°F for 8 hours with 40% relative humidity) to vapor-phase dicamba at concentrations less than or equal to 0.0177 $\mu\text{g}/\text{m}^3$; however, 24 hour exposure (at 85°F for 16 hours and 70°F for 8 hours with 40% relative humidity) to concentrations of vapor-phase dicamba greater than or equal to 0.539 $\mu\text{g}/\text{m}^3$ significantly reduced soybean height compared to control plants (~32% reduction at the LOAEC of 0.539 $\mu\text{g}/\text{m}^3$). It is notable that the dose spacing in this study results in an approximately 30x difference between the NOAEC and LOAEC, creating uncertainty as to where effects to plants from vapor-phase exposure to dicamba may occur. Generally, definitive toxicity studies are conducted with lower dose-spacing (*e.g.* 1.5-3x geometric spacing between doses). Additional data examining a range of doses between the NOAEC and LOAEC from this study would reduce the uncertainty.

A separate humidome study was conducted by Monsanto Company to compare the volatility differences among dicamba DMA, dicamba DGA, and dicamba DGA plus VaporGrip™ (MRID 49770303). Nominally, 14.48 mg of dicamba acid was applied to 200 in² of bare soil in replicate humidomes (three humidomes for dicamba DGA, four humidomes for dicamba DGA plus VaporGrip™) which approximates the maximum single application rate of 1 pound dicamba a.e. per acre. For dicamba DGA applied alone, the study showed 0.0008% of the amount of dicamba applied volatilized off the soil, based on filter recoveries. The vapor-phase concentrations were determined to be 0.0407 $\mu\text{g}/\text{m}^3$, in line with upper bound concentration predicted by PERFUM from the flux data described in the field volatility study summaries (see next section titled: *Field Volatility (Flux) Studies and Deposition Estimates*), above the vapor-phase NOAEC, but below the vapor-phase LOAEC as determined in MRID 49925703. For dicamba DGA plus VaporGrip™, the study showed 0.00006% of the amount of dicamba applied volatilized off the soil, based on filter recoveries. The vapor-phase concentration was determined to be 0.00298 $\mu\text{g}/\text{m}^3$, which is below the vapor-phase NOAEC determined in MRID 49925703.

Field Volatility (Flux) Studies and Deposition Estimates

Field volatility research on the dicamba DGA salt formulation (M-1691) and dicamba DGA plus VaporGrip™ additive (M-1768) was conducted by Monsanto Company on treated fields in Georgia and Texas in 2015/2016 and submitted to EPA (Jacobson 2016a-d, respectively MRIDs 49888401, 49888403, 49888501 & 49888503). The fair weather conditions (characterized by high temperatures in the low 90⁰s F during the day and a strong diurnal cycle of heating and cooling, humidity, and mixing conditions) throughout the study periods for both TX and GA made for near-idealized conditions for volatilization occurring after applications. The flux data were incorporated into the EPA recommended AERMOD dispersion model¹ to estimate dicamba acid-equivalent (a.e.) deposition downwind from the treated field. Furthermore, the PERFUM model,² which is a post-processor for EPA recommended dispersion models, was used to provide estimated peak air concentrations for dicamba. Findings and deficiencies noted during review of these two studies and submitted deposition modeling by the registrant are discussed in greater detail below.

Upper-bound deposition and peak air concentrations predicted by AERMOD and PERFUM, respectively, from the flux data in these studies resulted with the M-1691 formulation. As a conservative estimate of vapor drift, the combined 90th upper-bound percentile predicted deposition (*i.e.* upper-bound predicted dry plus upper-bound predicted wet deposition) at 5-meters from the edge of field would be 3.12×10^{-5} lb a.e./A for the M-1691 formulation in Georgia, and the predicted peak air concentration is 6.03×10^{-2} $\mu\text{g}/\text{m}^3$. Deposition estimates are generally an order of magnitude lower than the most sensitive vegetative vigor NOAEC, 2.61×10^{-4} lb a.e./A for soybean height from the available vegetative vigor data for terrestrial plants. The peak air concentration estimates, however, are above the NOAEC from the vapor-phase study discussed above ($0.0177 \mu\text{g}/\text{m}^3$), but well below the LOAEC of $0.539 \mu\text{g}/\text{m}^3$ for soybean height. The upper-bound predicted combined deposition at 5-meters from the edge of field was ~ 50-60% lower for the M-1768 formulation (1.29×10^{-5} and 8.95×10^{-6} lb a.e./A deposition values or 2.08×10^{-2} and 8.80×10^{-3} $\mu\text{g}/\text{m}^3$ peak air concentration values, respectively, in Georgia and Texas) compared to the M-1691 applications.

Based on the results from the deposition and air concentration analyses and considering the degree of uncertainty with these analyses (discussed in detail in the deficiencies section below), vapor drift occurring due to volatilization appears unlikely to be a concern for impacts off the treated field. Although the predicted peak air concentration for the M-1691 formulation exceeds the soybean vapor-phase exposure toxicity study NOAEC, it is well below the study's LOAEC. Additionally, the predicted upper bound peak air concentration values for the M-1768 formulation are essentially at or below the soybean vapor-phase NOAEC. Therefore, it is expected that the unidirectional spray drift buffer currently on labels mitigates deposition of dicamba material off the treated field.

The uncertainties associated with the flux data and deposition analysis, especially for the flux data from Texas, could result in underestimates of vapor drift under conditions more conducive

¹ Available on-line: https://www3.epa.gov/ttn/scram/dispersion_prefrec.htm#aermod

² Available on-line: <http://www.exponent.com/experience/probabilistic-exposure-and-risk-model-for-fumigants/?page=NaN&pageNum=0&loadAllByPage=true>

to codistillation than were tested in these studies. These are fully described below but include a) the lack of off-field sample data from the TX studies to determine volatilization flux during the application, b) volatilization flux during the applications measured at the GA site was not considered in the flux profile constructed for the modeling inputs and, and therefore not accounted for in modeling inputs, c) the time duration for deposition values are not specified in the study report and confounds the comparison of accumulated deposition with respect to toxicological endpoints, and d) applications timings occurred later in the day and missing the morning transition window of what would include the greatest differences in relative humidity and heating with conditions vulnerable to codistillation (this is particularly true for both M-1691 and M-1768 TX applications and the GA application with M-1691). However, the amount of uncertainty in the exposure estimates is small enough that it is very unlikely that the exposure will exceed the effect threshold (NOAEC). Refer to the fifth discussion point within the Deficiencies section below for further detailed information.

These uncertainties could be addressed through submission of the additional off-field sample data from TX, additional research on applications conducted during the morning weather transition window described above, and measured flux at the time of application with its incorporation into the deposition modeling analysis. Furthermore, the time duration for accumulation of deposition should be clarified to enable a more definitive comparison of exposure from vapor drift to available toxicological endpoints. Additionally, where incidents occur (that could be a result of either exposure to spray drift or volatilization), submission of information regarding the climatic conditions (temperature, relative humidity, wind speed and direction) both under which the suspect application occurred and following the application would assist with understanding the conditions under which volatilization exposure can occur. Additional incident data that would be informative includes quantitative measurements of damage comparable to EPA's apical endpoints (*i.e.* plant height, biomass, yield, etc.)

Findings As Gathered From Field Volatility (Flux) Studies (MRIDs 49888401, 49888403, 49888501, 49888503) and Results from AERMOD Deposition Modeling (MRIDs 49925701 – 02)

1. **Applications During Flux Studies** - The applications encompassing the M-1691 and M-1768 formulations were less than one kilometer apart in GA (pre-emergent app.) and several kilometers apart in TX (post emergent/foliar app. to cotton crop) and applications for both formulations occurring within 1 -2 hours of each other at each site.
2. **Weather Conditions After Applications During Flux Studies** - The fair weather conditions throughout the study periods for both TX and GA lend themselves to near-idealized conditions for volatilization occurring after applications. First, afternoons throughout all studies at both sites were very warm with maximum temperatures in the low 90's F. Furthermore, conditions for codistillation appear to be ideal with the weather as there is a strong diurnal cycle between the stable nocturnal regime (characterized by high relative humidity, relatively cool temps., and stagnant conditions) and convective daytime regime (characterized by relatively hot, low relative humidity, and more mixed conditions) at both sites after the applications.

3. **Flux/Concentration Magnitudes Observed in Flux Studies** - Very small concentrations (on the order of $<0.06 \mu\text{g}/\text{m}^3$) and resulting fluxes (on the order of $<0.0081 \mu\text{g}/\text{m}^2\text{-sec}$) found throughout the studies appear to be well supported by good recoveries from the Polyurethane Foam (PUF) analytical method evaluation and field spikes.
4. **Flux Events Observed in Flux Studies** - In most instances over both TX and GA, the highest levels of flux occurred at the time of application which occurred throughout the morning to early afternoon. Furthermore, there appears to be a strong diurnal signal with the timings of subsequent peak flux events. These subsequent events may be dependent on both the maximum heating of the day and/or the transitional periods between morning (relatively cool, high relative humidity, stagnant conditions) and afternoon (hot, low relative humidity, more mixing conditions). In most cases, peak flux events occurred between the hours of 7 – 20 after the application.
5. **Summary of AERMOD Deposition Modeling Estimates:**
Upper-bound estimates of deposition indicate reduced deposition and air concentrations following the M-1768 formulation applications as compared to the M-1691 formulation. **Table 1** shows the AERMOD and PERFUM estimates of the upper bound 90th percentile deposition and concentration, respectively, 5-meters from edge of field:

Table 1. AERMOD estimates of the upper 90th percentile 5-meters from edge of field

Deposition and Air Conc. Model Runs**	Study Site Flux Basis	AERMOD Dry Deposition* (lbs. dicamba a.e./A)	AERMOD Wet Deposition* (lbs. dicamba a.e./A)	AERMOD Upper-Bound Combined (Dry + Wet) Deposition (lbs. dicamba a.e./A)	PERFUM Upper-Bound Peak Air Conc. *,*** ($\mu\text{g}/\text{m}^3$)
Dicamba DGA Formulation (M-1691)					
1-3	Georgia	2.08 x 10 ⁻⁵ – 3.10 x 10 ⁻⁵	2.60 x 10 ⁻⁸ – 2.34 x 10 ⁻⁷	3.12 x 10⁻⁵	6.03 x 10⁻²
4-6	Texas	9.99 x 10 ⁻⁶ – 1.89 x 10 ⁻⁵	4.92 x 10 ⁻⁸ – 1.78 x 10 ⁻⁷	1.91 x 10 ⁻⁵	2.48 x 10 ⁻²
Dicamba DGA VaporGrip Formulation (M-1768)					
7-9	Georgia	8.52 x 10 ⁻⁶ – 1.28 x 10 ⁻⁵	2.03 x 10 ⁻⁸ – 1.14 x 10 ⁻⁷	1.29 x 10⁻⁵	2.08 x 10⁻²
10-12	Texas	5.15 x 10 ⁻⁶ – 8.86 x 10 ⁻⁶	2.43 x 10 ⁻⁸ – 8.68 x 10 ⁻⁸	8.95 x 10 ⁻⁶	8.80 x 10 ⁻³

Maximum values shown in **bold**.

*Range of upper 90th percentile estimates presented of AERMOD estimates from 3 model runs (see next note below).

**Three iterations of model runs encompass different weather conditions coupled with flux profiles input into AERMOD (deposition) or PERFUM (air concentrations). One year of weather data from Lubbock,

TX (surface) and Amarillo, TX (Upper Air); Peoria, IL (Surface) and Lincoln, IL (Upper Air); Raleigh, NC (Surface) and Greensboro, NC (Upper Air) used in analysis only during time of year with dicamba application windows. Phoenix, AZ weather data are also briefly cited but uncertain how that was used based on the study report alone.

***Peak estimated concentrations are one-hour concentrations.

Deficiencies with Field Volatility (Flux) Studies (MRIDs 49888401, 49888403, 49888501, 49888503) and AERMOD Deposition Modeling Analysis (MRIDs 49925701 – 02)

1. Air Sampling during Application with Flux Studies - Flux during the application was captured in the GA field volatility studies for both formulations using off-field samplers (indirect method). However, this was not done in any of the TX field volatility studies. While off-field samplers were included as part of the studies in TX, the data were discarded by the study authors briefly stating that samples possibly contained dicamba from other sources than volatilization. Submission of this discarded data would reduce some of the uncertainties discussed in this document.

2. Weather Conditions During Application with Flux Studies

The application timings for each flux study on each formulation is presented in the table below. As mentioned above, there are two weather phenomenon which may contribute to loss of dicamba via volatilization-related processes. The first is codistillation which may occur during the transition from high relative humidity (rh) conditions in the early morning to low relative humidity conditions in the late morning to early afternoon. The second is direct volatilization which may occur during the heating of the day.

The Georgia flux studies, particularly for the M-1691 formulation, may have only partially captured the impact of the transition from high rh to low rh conditions, and therefore losses could have been greater if applied earlier. Average relative humidities did fall from levels of 68 percent at 9 am to 51 percent at 10 am then to 34 percent at 11 am. However, rh was substantially higher earlier around 7 am with a maximum value of 94 percent observed. The M-1691 formulation was applied later in the morning, while the M-1768 formulation was applied more encompassing the morning transition (**Table 2**). Therefore, given that this transition may drive codistillation, comparisons in flux between the M-1691 and M-1768 may be confounded by the fact that the M-1768 formulation was possibly applied under potentially more vulnerable conditions for enhanced volatilization and resulting vapor drift.

For both Texas studies, both dicamba formulations occurred after the morning transition and into the more convective part of the day. While heating may have been a driver for volatilization, applications prior to the morning transition could have provided a more vulnerable set of conditions for loss of dicamba from the field.

Table 2. Dicamba formulation application timing and relative humidity

Formulation Applied	Application Timing	Average RH Range During Day of Study After Application Start	Maximum RH During Day of Study
Georgia Studies			
Dicamba DGA (M-1691)	9:54 am May 5, 2015	68 percent falling to 10 percent	94 percent 7 am
Dicamba DGA VaporGrip (M-1768)	8:05 am May 5, 2015	87 percent falling to 10 percent	
Texas Studies			
Dicamba DGA (M-1691)	11:10 am June 8, 2015	38 percent falling to 18 percent	96 percent 7 am
Dicamba DGA VaporGrip (M-1768)	1:15 pm June 8, 2015	23 percent falling to 18 percent	

3. Potential for Cross-Contamination Between M-1691 and M-1768 Plots During Flux Studies To determine flux values ultimately used to estimate air concentrations and deposition, flux values need to be determined from a single field of application in order to arrive at an accurate amount of dicamba material that volatilizes and is ultimately driftable. This stated, it appears that the Georgia M-1691 and M-1768 application plots are very close to each other, within 500 meters of each other. In Texas, the two treated plots for each formulation are farther apart, about 5 kilometers from each other. In both cases, the plots with the M-1768 formulations could potentially have been influenced by dicamba material blowing downwind from the plots treated with the M-1691 formulations (**Figure 1**). Furthermore, the typical logarithmic decrease of concentrations with height for flux studies was not strong immediately after the application for the Texas M-1768 application, indicating that there may have been some confounding impacts from cross-contamination. However, this was also the case immediately after the application for the Texas M-1691 application which was applied before the M-1768 application. There were no such anomalies in the vertical concentration profile in the Georgia studies where the concentrations with height over the field exhibited the expected logarithmic decreasing trend.

While cross-contamination can theoretically exist with dicamba applications to multiple fields over a local area, the deposition analysis submitted by the registrant includes up to an 80-acre field treated with each dicamba formulation. This is a large area treated and the resulting exposure to plants off the treated field conveyed in the registrant's analysis would be expected to capture any potential impacts of cross-contamination that can occur accumulated from smaller fields. However, to reiterate, results from a discretely treated field is desired considering the purposes of a field volatility study described above.

- 4. Environmental Chemistry Methods and Method Validation Supporting Flux Studies –**
Upon review, it appears that the field volatility study reports include an adequate evaluation of the polyurethane foam (PUF) sampling procedure employed in air samples for these studies. However, an independent laboratory validation demonstrating repeatable performance could not be found. A GLP compliance statement was submitted.
- 5. Flux Modeling.** Flux during the application period was not modeled for either the GA or TX site. Flux was not reported for the application period in TX; the measured flux in GA was 1.6 to 1.7 times higher (M-1691 and M-1768, respectively) than in any later measurement period. Even if additional flux of this magnitude was included in the modeling exercise, the total exposure from volatilization would still be below the vapor-phase LOAEC and vegetative vigor NOAEC for M-1691. Modeled exposures would also be below vapor-phase and vegetative vigor endpoints for M-1768.
- 6. Interpretation of AERMOD Deposition Values –** In all AERMOD deposition values provided by the registrant, the time durations of the deposition values (e.g., one-hour, four-hour, or 24-hour) is not specified. Since deposition reflects a cumulative value of mass accumulation over time, it becomes difficult to compare exposure impacts to toxicological impacts over a period of time if this information is not provided. However, for the PERFUM air concentration modeling analysis, the registrant did provide sufficient air concentration time averages (e.g., 1-hour, 4-hour, 8-hour, and 24-hour period averages) for appropriate comparisons to the toxicological endpoints.

References:

- Egan, JF and DA Mortensen, 2012. Quantifying vapor drift of dicamba herbicides applied to soybean. *Environ. Toxicol. Chem.* 31(5) 1023-1031, 2012.
- Gavlick, W.K., 2016. Determination of plant response as a function of dicamba vapor concentration in a closed dome system. Unpublished study prepared by Monsanto Company. Study Number REG-2016-0170. MRID 49925703.
- Jacobson, B., Urbanczyk-Wochniak E., Mueth M.G., Riter L.S., Sall E.D., Honegger J., South S., Carver L. 2016a. Field Volatility of Dicamba Formulation M1691 Following a Pre-Emerge Application Under Field Conditions in the Southeastern USA. Unpublished study performed by Waterborne Environmental, Inc., Leesburg, Virginia; Monsanto Company, St. Louis, Missouri; and Agvise Laboratories, Northwood, North Dakota. Study sponsored by Monsanto Company, St. Louis, Missouri. Monsanto Study No.: WBE-2015-0220; Waterborne Study NO.: 666.10. Study initiation April 30, 2015, and completion January 19, 2016 (p. 7). Amended final report issued March 30, 2016. MRID 49888401.
- Jacobson, B., Urbanczyk-Wochniak, E., Mueth, M.G., Riter, L.S., Sall, E.D., Honegger, J., South, S., and Carver, L. 2016b. Amended from MSL0027609: Field Volatility of Dicamba Formulation M1691 Following a Post-Emerge Application Under Field Conditions in Texas. Unpublished study performed by Waterborne Environmental, Inc., Leesburg, Virginia; Monsanto Company, St. Louis, Missouri; and Agvise Laboratories, Northwood, North Dakota. Study sponsored by Monsanto Company, St. Louis, Missouri. Monsanto Study No.: WBE-2015-0312; Waterborne Study No.: 666.15. Study initiation June 2, 2015, and completion February 10, 2016 (p. 7). Amended final report issued March 30, 2016. MRID 49888403.
- Jacobson, B., Urbanczyk-Wochniak, E., Mueth, M.G., Riter, L.S., Sall, E.D., Honegger, J., South, S., and Carver, L. 2016c. Field Volatility of Dicamba Formulation MON 119096 Following a Pre-Emerge Application Under Field Conditions in the Southeastern USA. Unpublished study performed by Waterborne Environmental, Inc., Leesburg, Virginia; Monsanto Company, St. Louis, Missouri; and Agvise Laboratories, Northwood, North Dakota. Study sponsored by Monsanto Company, St. Louis, Missouri. Monsanto Study No.: WBE-2015-0221; Waterborne Study No.: 666.11. Study initiation April 30, 2015, and completion March 30, 2016 (p. 7). MRID 49888501.
- Jacobson, B., Urbanczyk-Wochniak, E., Mueth, M.G., Riter, L.S., Sall, E.D., Honegger, J., South, S., and Carver, L. 2016d. Field Volatility of Dicamba Formulation MON 119096 Following a Post-Emerge Application Under Field Conditions in Texas. Unpublished study performed by Waterborne Environmental, Inc., Leesburg, Virginia; Monsanto Company, St. Louis, Missouri; and Agvise Laboratories, Northwood, North Dakota. Study sponsored by Monsanto Company, St. Louis, Missouri. Monsanto Study No.: WBE-2015-0311; Waterborne Study No.: 666.14. Study initiation June 2, 2015, and completion March 30, 2016 (p. 7). MRID 49888503.

USEPA 2011. Ecological Risk Assessment for Dicamba and its Degradate, 3,6-dichlorosalicylic acid (DCSA), for the Proposed New Use on Dicamba-Tolerant Soybean (MON 87708). D378444. Environmental Fate and Effects Division, Office of Pesticide Programs, USEPA. Washington, D.C. March 8, 2011.

USEPA 2014. Dicamba DGA: Addendum to the environmental fate and ecological risk assessment for the Section 3 new use of dicamba DGA salt and its degradate, 3,6-dichlorosalicylic acid (DCSA) on dicamba-tolerant soybean. D404138, 404806, 405887, 410802, 411382. Environmental Fate and Effects Division, Office of Pesticide Programs, USEPA. Washington, D.C. May 20, 2014.

USEPA 2016a. Dicamba DGA: Second amendment to the environmental fate and ecological risk assessment for dicamba DGA salt and its degradate, 3,6-dichlorosalicylic acid (DCSA) for the section 3 new use on dicamba-tolerant soybean. D426789. Environmental Fate and Effects Division, Office of Pesticide Programs, USEPA. Washington, D.C. March 24, 2016.

USEPA 2016b. Ecological risk assessment for Dicamba DGA salt and its degradate, 3,6-dichlorosalicylic acid (DCSA) for the proposed post-emergence new use on dicamba-tolerant cotton (MON 87701). D404823. Environmental Fate and Effects Division, Office of Pesticide Programs, USEPA. Washington, D.C. March 24, 2016.

USEPA 2016c. Compliance Advisory. High Number of Complaints Related to Alleged Misuse of Dicamba Raises Concerns. Office of Enforcement and Compliance Assurance, USEPA. Washington, D.C. August, 2016. Available at <https://www.epa.gov/sites/production/files/2016-08/documents/fifra-dicambacomplianceadvisory.pdf>