

Drift Reduction Technologies Program

Information Collection Request

Response to Comment Document

On November 21, 2012, EPA published a Notice in the Federal Register requesting comment on a proposed “Information Collection Request” entitled “Pesticide Spray Drift Reduction Technologies.” (EPA ICR No. 2472.01 and OMB Control No. 2070-NEW. (regulations.gov docket identifier EPA-HQ-OPP-2012-0631). This Response to Comments document summarizes the public comments that EPA received on the notice, EPA’s responses to those comments, and the changes resulting from those comments.

The Commenters

Comments were received from:

- 1 Federal Agency
- 1 State Agency
- 16 businesses/consultants
- 1 private citizen
- 5 associations/trade organizations
- 1 university

EPA reviewed the comments from the Federal Agency. Their comments have been considered and addressed as appropriate.

The names of the commenters and the docket identifier for their comments follow:

Docket Identifier (EPA-HQ-OPP-2012-0631-XXXX)	Commenter
-0005	The Andersons, Inc.
-0006	Loveland Products, Inc
-0007	Aerial Service, Inc.
-0008	Oregon Department of Agriculture
-0009	Private citizen
-0010	Central Planes Aviation Inc.
-0011	Greenleaf Technologies
-0012	Medina Flying Service
-0013	Reabe Spraying Service, Inc.
-0014	Wilbur-Ellis Company
-0015, -0020	Pentair - Hypro
-0016	Wolf Consulting & Research LLC
-0017, -0018, -0019	Micron Group
-0021	AgriFlite Services, Inc.
-0022	CP Products Company, Inc.
-0023	National Agricultural Aviation Association (NAAA)
-0024	Agricultural Retailers Association and Certified

	Crop Advisor Program
-0025	CropLife America
-0026	American Society of Agricultural and Biological Engineers (ASABE) Committee PM 23/6, Application Systems
-0027	Valcore Consulting LLC and Application Insight, LLC
-0028	University of Georgia
-0029	Dow AgroSciences
-0030	Electrostatic Spraying Systems, Inc.
-0031	Council of Producers & Distributors of Agrotechnology

The comments are divided into two main categories: Comments on the Program and Comments on the Protocol. There are subcategories within each of the main categories.

Comments on the Proposed DRT Program

Structure of the DRT Program										
<p>1. One commenter recommended that instead of the 3-star system proposed by EPA, that EPA should use a 4-star system “that provides differentiation between technologies while identifying the very highest performing products.” Another commenter noted that in previous discussions EPA had indicated that it would be proposing a 4-star system, adding that “There is significant evidence from Europe that DRTs exist that are capable of providing 90% drift reduction.” A different commenter asked that EPA use a numerical based scale of 10 to 90%. A fourth commenter believes that the requirement to meet a minimum standard of 25% reduction would prevent many worthwhile products and systems from being recognized. A fifth commenter asked for a 5-star system with DRT**** (90%) and DRT***** (95%).</p> <p>Response: During development of the DRT Program, EPA has worked to be consistent with the efforts that other countries (such as Australia, the UK, Germany, and Canada) are undertaking to reduce spray drift. Some nozzles are sold internationally, so consistency in DRT-ratings means manufacturers can perform fewer tests, and less confusion for purchasers in determining the nozzle suitable for their needs. Therefore, to be consistent with these existing programs which do not acknowledge a drift reduction of less than 25 %, and given the uncertainties of these smaller reductions, EPA intends to have at least a drift reduction of 25% to qualify for a DRT-rating. EPA also agrees that the very highest performing products should be distinguished and therefore is using a DRT **** for products achieving a drift reduction of equal to or greater than 90 %.</p> <p>The 4-star system that EPA will use for the DRT Program is as follows:</p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td><25%</td> <td>No rating</td> </tr> <tr> <td>25 - 49%</td> <td>DRT*</td> </tr> <tr> <td>50 - 74%</td> <td>DRT**</td> </tr> <tr> <td>75 - 89%</td> <td>DRT***</td> </tr> <tr> <td>≥90%</td> <td>DRT****</td> </tr> </table>	<25%	No rating	25 - 49%	DRT*	50 - 74%	DRT**	75 - 89%	DRT***	≥90%	DRT****
<25%	No rating									
25 - 49%	DRT*									
50 - 74%	DRT**									
75 - 89%	DRT***									
≥90%	DRT****									

2. Several commenters indicated that the voluntary program should have a broader view than spray nozzles, shrouds and shields. They asked EPA to consider assigning DRT ratings to other technologies such as (1) Aircraft Integrated Meteorological Measurement System (AIMMS), (2) on-board smoke emitter, (3) the Professional Aerial Applicators Support System (PAASS), (4) reductions in pesticide application rates, (5) turning boom sections and/or nozzles on or off based on GPS based geo-synchronization and precision ag data, (6) flow control that responds to applicator speed and on-board map systems, (7) electrostatic sprayers, (8) adjuvants and other drift reducing chemicals, and (9) Operation S.A.F.E. (Self-regulating Application & Flight Efficiency) Program. Assignment of a rating would properly credit these technological advances.

Response: At this beginning stage, the proposed DRT Program is being deliberately designed for certain technologies that can be verified to significantly reduce the driftable fraction of spray droplets from an application as compared to a reference technology. Using the proposed protocol will provide data to quantify a potential reduction. In addition to the benefits to applicators and the environment from the use of drift reduction technologies, EPA will be able to use the test results in quantifying the potential reduction in spray drift and associated risks for pesticide products labeled for use with DRT-rated technologies.

EPA has developed a protocol for testing various application technologies, such as nozzles and nozzle/adjuvant combinations in a wind tunnel to measure their droplet size distributions (DSD) as compared to a reference technology. The protocol also provides guidance for testing these and larger technologies (e.g. shrouds and shields) in the field to measure quantities of downwind deposition of spray drift as compared to a reference technology. EPA can use the test results from wind tunnel or field studies along with other information about a pesticide's application variables (application rate and method) to estimate potential downwind spray drift deposition for the pesticide when used according to the label and with a DRT-rated technology. The agency uses these deposition estimates, as potential exposures to non-target organisms and sensitive areas, with a pesticide's toxicity values to characterize its potential risks from spray drift and based on these risks to determine appropriate application restrictions for risk management. These measures can include buffer zones, maximum wind speeds and spray release heights. Thus, pesticides labeled for use with DRT-rated technologies will have the potential to be applied with less spray drift and therefore less risk, allowing a reduction in the application restrictions.

Some adjuvant chemicals may be useful for minimizing drift when used in combination with nozzles, and it is very probable that combinations of various nozzles and adjuvants will be tested and qualify for a DRT-rating. However, because a nozzle's spray characteristics can be affected by an adjuvant being used for drift reduction, a specific adjuvant must be tested with a specific nozzle. Therefore, EPA will not establish DRT-ratings for the use of adjuvants only.

EPA agrees that "precision agriculture" such as GPS based geo-synchronization also have tremendous implications for reducing pesticide drift and/or the amount of pesticide applied. The development of even newer technologies such as "intelligent decision spraying systems" with the capability to decide

when, where, and how much spray to be applied offers the potential for significantly reduced pesticide use in the future. EPA also agrees that many applicators are currently using many of the technologies mentioned in the comment to improve the accuracy of applications and reduce spray drift. Programs such as PAASS and a variety of other trainings provide the opportunity for applicators to learn of the latest techniques. The newer boom sprayers often combine several of these technologies, and represent significant reductions over boom sprayers of even 10 to 15 years ago.

However, the focus of this voluntary program is to **quantitatively** measure the driftable fraction of spray droplets from application technologies and to calculate percent drift reduction. Some of these technologies assist the applicator in placing the spray on a target crop rather than affect the application's driftable fraction of the spray. EPA believes this to be desirable, but does not have a method of reliably estimating a reduction in the driftable fraction. Once the DRT Program has gained a certain amount of experience, then it may be possible to develop methods for crediting the use of other types of equipment.

3. The commenter questioned whether a nozzle that had not been tested and rated would be considered an "illegal" spray nozzle.

Response: The proposed DRT Program does not create categories of "legal" and "illegal" spray nozzles. Under this voluntary program, an equipment manufacturer would test their nozzle(s), or other technologies, and then EPA assigns a rating (based on specific criteria) to the nozzle. During these early stages of program implementation, EPA envisions that a pesticide product label may have application instructions for both non-rated nozzles (as on current labels) and DRT-rated nozzles. The applicator may choose to use any nozzle that has been rated within the rating category specified on the label.

4. The commenter questioned the documentation that an applicator would be required to have if he used non-DRT nozzles rather than the label-recommended nozzle.

Response: There are a variety of reasons for growers or applicators to keep records. Under the 1990 Farm Bill, all private applicators are required to keep record(s) of their restricted use pesticide (RUP) applications. Under the Worker Protection Standard, the agricultural employer is required to retain records of applications on the establishment. Recordkeeping may be required because of a pesticide use inspection or required by a state lead agency. Such an agency may require that the applicator keep certain documentation for each application. In addition, it is a good business practice that can supply evidence that the pesticide product was applied in accordance with the label directions.

As currently envisioned, this voluntary program will not require the use of a specific nozzle or DRT-rated technology. Instead, a pesticide registrant would have the option of selecting one or more categories of DRT-rated technologies (e.g., one star, two star, etc.) that would also appear on the label. Upon EPA's approval of that label, the applicator would follow the label directions for the type of nozzle (non-DRT or DRT-rated technology) that they selected for use. At this time, EPA anticipates labels would have a table, similar to the following, to express possible buffer zones, or other key application parameters such as maximum wind speed or release height.

Label Directions--	Droplet Size	Buffer Zone (ft)	
		Aquatic	Terrestrial
Non-DRT Rated Technology	Fine to Medium	100	25
DRT* Rated Technology	---	25	25
DRT** Rated Technology	---	15	10

The buffer zones for a particular label would be calculated specific to the active ingredients in the product and the use patterns on that label. The buffer zones on any particular label would represent the buffer needed for the most sensitive of the non-target species.

Thus, if the applicator did not have a DRT-rated technology, then his record keeping would likely note that the required buffers for a non-DRT technology were maintained. Similarly, if the applicator used a DRT-rated technology for his application, then he would note that fact in his application records.

5. The commenter expressed concern that registrants would only specify DRT*** for their labels. They asked that labels have multiple options to give applicators the greatest flexibility.

Response: During these early stages of program implementation, EPA envisions that a pesticide product label may have application instructions for both non-rated nozzles (as on current labels) and DRT-rated nozzles. However, in the future, as more technologies are tested and more DRT-ratings are assigned, it is possible, given the specific circumstances needed for a particular pesticide product, that the pesticide registrant could request that his label only specify the use of a DRT-rated technology and not offer the option of using a non-rated technology. If that occurs, then the applicator would be required to use the appropriately rated technology. Even if only DRT-rated technologies are on the label, EPA believes that applicators would still have a variety of options, such as:

(1) Applicators could choose to purchase the nozzles needed. Nozzle prices vary with many costing less than \$10.00.

(2) The applicator in consultation with the grower could determine to use another pesticide product that has use directions for DRT-rated technology already available to the applicator.

EPA agrees that some registrants may choose to put use directions on their products that only specify the highest DRT-rated technologies, provided the registrants are confident the use of these technologies are suitable for product performance. It is possible that a registrant will need to label their product with a lower rated DRT category for product performance. As more technologies are tested and receive DRT ratings, EPA envisions there may be a large number of different technologies with the same DRT rating, and registrants will have more options from which to choose which category(ies) of DRT-rated

technologies are appropriate for their products. In addition, some registrants may choose to not put use directions for DRT-rated technologies on their labels while other registrants may choose to put use directions for both DRT and non-DRT-rated technologies on their product labels. Overtime, registrants and applicators will have increasing flexibility.

6. The commenter asked if a nozzle tested at different pressures would have different DRT rating. Another commenter asked how the DRT would be defined on the label. If a nozzle is rated as “a ***DRT (3 star) at 30 psi/120 mph, is it a ***DRT at 40 psi or 50 psi or 125 mph when the pressure or speed changes during the application?”

Response: It is important to remember that a DRT rating is a measure in the reduction of the driftable fraction of spray droplets from an application using a submitted technology as compared to a similar test using a reference technology. So a new technology tested at a certain pressure and wind speed will require the reference technology to be tested at the same pressure and wind speed. It is anticipated that the effect of different pressures on a technology’s driftable fraction will be similar to the effect the changes would have on the reference technology, such that the reduction would not be substantially different. However, this remains to be seen and until a sufficient number of submissions have been received to support this supposition, DRT ratings will be accompanied by the pressure of the submitted study.

Since an application system’s pressure affects droplet size from a nozzle, EPA expects manufacturers to ask testing organizations to test their nozzles with different pressures. The results may result in EPA assigning different DRT ratings to the same nozzle with different pressures. It is possible that if the same nozzle were tested using different pressures the DRT-rating could be different for the pressures. The DRT protocol recommends that a nozzle be tested according to a “typical” use condition. Most nozzle manufacturers understand the “typical” pressures that would be used for each of their nozzles in the field. So, if the nozzle or nozzle/adjuvant combination were tested at 30, 40, and 50 psi, then the DRT-rating would be reported for each of the studies.

EPA’s protocol does not directly address speed as a variable for testing; however, as explained in the footnotes to Table 1 in the protocol, and the descriptions of the test sites (A6.2.1), two of the three test sites covered under the protocol consider speed as part of the testing parameters. The low speed wind tunnel (LSWT) approximates the application speeds of land-based equipment such as ground booms. The high speed wind tunnel (HSWT) approximates the application speeds that can occur during aerial application. If a drift reduction technology such as a nozzle were to be tested in a LSWT, then the DRT-rating would be specified as for ground application on EPA’s website. Similarly, testing in a HSWT would be specified as for aerial application. Thus, speed is a part of the testing parameters, and thus becomes part of the descriptor of the technology tested.

7. Will wind tunnel studies be required?

Response: To estimate a DRT rating for a technology, EPA must have adequate test data. EPA’s protocol includes test methods for both wind tunnel and field testing. Application technologies can be tested in either wind tunnels or the field. However, the agency believes companies will more likely

choose to use wind tunnels for testing small equipment, such as nozzles, because of the significant cost difference.

8. The commenter expressed concern that EPA would be ending the Program after 3 years, when the information collection request expired.

Response: EPA intends for the DRT Program to continue beyond three years. The commenter is correct that the information collection request (ICR) for the DRT Program would expire three years from the date that it is approved by the Office of Management and Budget. The maximum period for which an ICR can be approved is three years. Since EPA does not intend to stop the voluntary program at the end of three years, EPA would need to begin the ICR renewal approximately a year before the expiration date. At that time, EPA would prepare the needed documentation and publish the request to renew the ICR for the next 3-year period.

9. The commenter asked that EPA get its website up and running, and that EPA review the LERAP (U.K. website), and Canadian website particularly with regards to the buffer zone calculators. The commenter believes that a “buffer calculator could provide a buffer recommendation tailored to the specific DRT without the constrictions of the proposed Star rating system,” thus advancing a state-of-the-art evolution of the DRT Program.

Another commenter asked if EPA would place the first DRT-rated product on the website all alone. That commenter preferred that EPA release several products at one time, so that there is not an unfair advantage to the first DRT-rated product.

Response: The agency has reviewed the United Kingdom’s (<http://www.pesticides.gov.uk/guidance/industries/pesticides/topics/using-pesticides/spray-drift>) and Canadian websites (<http://www.omafr.gov.on.ca/english/crops/resource/spraydrift.htm>) and has considered those websites in developing EPA’s website.

EPA intends to get its website up and running closer to the implementation date of the voluntary program. EPA agrees that incorporating state-of-the-art information technology on the website is an excellent idea, and we will pursue this as a future activity.

We understand the commenter’s concern about an “unfair advantage to the first DRT-rated product.” However, EPA intends to post the results of its review and analysis of each DRT study as soon as reasonably possible after completion. Pesticide registrants will determine their time frame for submitting an application to EPA for including DRT claims on their labels. It is possible that registrants could wait until EPA has rated multiple technologies.

Translation of wind tunnel data to DRT star-rating for use in an Agency risk assessment

10. Several commenters asked what is specifically required to merit a rating. They asked if the aggregate flux values (for a wind tunnel) or drift residues (for field studies) would be compared “against the standard application method and the star rating based on the percent reduction in

aggregate residue.”

Response: To obtain a DRT rating, a manufacturer would need to provide appropriate data to EPA for review and evaluation. The DRT data can be generated using the test methods described in the DRT protocol. EPA would evaluate the study and, based on a comparison of the results from the test technology and the tested reference, EPA would assign a DRT rating. For wind tunnel testing the DSDs of the test technology and the reference technology are measured. The percent reduction of driftable fraction (<141 µm) of the DRT technology compared to the reference will determine the DRT rating. Depending on the percentage difference, EPA will assign the appropriate rating (see response to comment 1). According to the proposed protocol, field studies use the same reference nozzle as wind tunnel studies but measure deposition rather than DSD. EPA intends to compare the reduction in deposition at the edge of the field to determine a DRT rating.

11. The commenter questioned the timeframe that would be needed by EPA/OPP to review a submitted DRT data package, assign a DRT rating and have the information publicly available on the website.

Response: If a technology manufacturer submits a DRT report of a wind tunnel study conducted according to the proposed protocol, EPA’s goal is to review, evaluate, and post on the website the DRT rating within 120 days from receipt of the report. Field studies are more complicated to review and therefore EPA’s goal for review of a field study is within 180 days from receipt. These stated review times are goals as other factors, including availability of EPA’s resources, may influence the timeframes.

It is important to note that the submission and evaluation of a study that is independent of an application for pesticide registration is not an action under the Pesticide Registration Improvement Act (PRIA), which has fees and specific review schedules. However, if a pesticide registrant were to include a DRT study report as part of a submission package for a registration action, then the registration action is a PRIA action. EPA’s review and evaluation of the DRT data would be according to the mandated review timeframe for the particular type of PRIA action.

12. Several commenters asked for information on how wind tunnel data would be used in an EPA risk assessment. How will modeling be used to translate the wind tunnel data into a DRT star rating for which EPA would give credit in an EPA’s risk assessment? How does all of this translate into a reduction in the required buffer zone on the EPA-approved label? When does EPA plan to have this methodology ready for review to assure the scientific validity of the approach?

Response: EPA’s review and evaluation of a submitted study begins with a determination of the scientific validity of the study, i.e., can the study be used for its intended purpose? Scientifically valid, well-conducted studies then undergo data analysis. In general, EPA’s risk assessment for the use of a pesticide is quantitative, in that the agency estimates the potential amount of pesticide that could drift from the target site based available spray drift data and/or assumptions and application directions and restrictions specified on a pesticide’s label. That amount is compared to the pesticide’s toxicity values to estimate potential risks and therefore the need for risk management measures, such as buffer zones. EPA intends to use results from wind tunnel studies in the following manner to assign DRT ratings to

verified DRT technologies as described in the response to comment 10.

For risk assessment of a pesticide whose product label specifies application with a technology bearing a specific DRT rating (e.g., DRT***), EPA intends to use the following method to credit the use of a DRT technology in the risk assessment and risk management measures or restrictions, such as a buffer zone, for the product label. The agency will follow its current methods for risk assessment and risk management decisions. The primary difference will be that the agency will have data from validated DRT technologies for estimating potential risks rather than relying on the default assumptions currently used.

EPA typically uses certain groundboom and aerial scenarios of the AgDRIFT model in risk assessments of pesticides when the labels are silent on requirements for spray quality (e.g., DSD). EPA uses default scenarios of the AgDRIFT model to estimate the potential fraction of the application rate that will be deposited downwind from the edge of the application site. The model then estimates the downwind deposition profile on non-target sites at varied distances from the edge of the application site.

The agency uses this deposition profile for a pesticide along with the appropriate toxicity endpoint values (terrestrial and aquatic animals and plants and humans) of the pesticide to estimate potential risks from spray drift from the pesticide's uses. These risks are actually the downwind areas where the amount of pesticide deposition is equal to or greater than the pesticide's toxicity endpoints. EPA uses this comparison of deposition exposures and toxicity values to determine the need for buffer zones and if so, then the appropriate size or any other appropriate risk mitigation measures to protect human health, non-target organisms and sensitive areas.

So, for pesticides labeled for use with a DRT-rated technology(ies), EPA will continue to use a similar approach for conducting its risk assessments, but will replace the default DSD usually used in AgDRIFT (aerial only)/AGDISP model with a different default DSD. This default would be selected to match the DRT claim on the label. However, the current groundboom module in AGDISP has some limitations and the developer of the AGDISP model is working to improve the predictability of the model.

For a field study, a deposition profile will be developed based on the deposition data, and the distance to the appropriate endpoint of concern used in risk assessment. Deposition profiles will be categorized by application method (e.g., aerial or ground) and used specifically for buffer zone reductions for those application methods.

EPA has used the above approach for estimating downwind spray drift, using the AgDRIFT/AgDISP models for many years. The models, as well as the risk assessment approach, have been scientifically peer reviewed and are well established. Improvements are being investigated, as discussed in response to comment 58. The only new aspect of this approach is to use a low end of the DSD for each DRT category for risk assessment purposes.

Bundling/Adding two or more DRTs

13. Several commenters discussed that most pesticide applicators do not use a single DRT, but instead a combination of DRTs. Is there a practical way to bundle or add DRT-rated technologies to achieve a numerically greater DRT that could then be used in a risk assessment? How would this numerically greater DRT be expressed on a pesticide label and how could the accuracy for drift reduction in the field be verified?

Response: EPA is aware that applicators may use a variety of application technologies and methods to manage their applications and manage spray drift. However, the agency is not aware of a valid method to credit a combination of DRTs or application methods without testing the combination. Combinations are not necessarily additive and in some cases, published studies have demonstrated antagonistic effects, i.e., increasing spray drift. As discussed in response to comment 2, bundling is not appropriate for a nozzle/adjuvant combination. Since a nozzle's spray characteristics can be affected by an adjuvant being used for drift reduction, a specific adjuvant must be tested with a specific nozzle. When considering other combinations, EPA has not been able to identify a practical and accurate methodology to bundle or add DRT-rated technologies to give a higher DRT-rating to a combination of two or more technologies without testing that combination. EPA expects manufacturers will focus their testing on nozzles, nozzle/adjuvant combinations, and perhaps certain larger technologies such as shields or shrouds, and electrostatic sprayers. EPA believes that the most practical combination of these technologies is a DRT-rated nozzle (or nozzle/adjuvant combination) and a DRT-rated shroud. Discussions with members of the technical panel indicate that shrouds have the potential to significantly reduce most spray drift. Therefore, the use of a DRT-rated nozzle with the shroud is unlikely to have any significant additive effect.

Costs

14. The commenter asked if EPA would pay for the DRT analysis, or will there be a PRIA fee for the registrant or will the DRT manufacturer pay?

Response: The most likely scenario is that the equipment manufacturer or other interested party will pay to have their technology tested, and then submit that study to EPA. EPA will absorb the cost of reviewing and evaluating the study, determining the DRT rating, and then posting the rating on the website. Once a registrant decides to have a DRT technology on their label, then the registrant will pay a PRIA fee for amending the label to add the DRT-ratings to the label.

15. Several commenters indicated that EPA's cost estimates are too low. One commenter indicated based on their experience that a wind tunnel test costs \$10,000. Several commenters asked if each combination of nozzle types and operating parameters as well as a variety of adjuvants would need to be tested. If multiple combinations such as pressure/angle/flow rate/airspeed/adjuvants were required for a single nozzle, then conceivably testing for a single nozzle could cost upwards of \$500,000. Another commenter indicated that a typical field study would cost \$300,000 and wind tunnel work can run \$10,000 to \$15,000 for one day of work.

Commenters also expressed concern that at this time there is only one US wind testing facility, and that facility is not a commercial facility. Thus, there is a lack of competition to help hold costs down.

According to a different commenter, companies already pay for tests to determine the size classification of their nozzles. Smaller companies may not have the resources for additional DRT testing for this Program. Yet another commenter indicated that the cost estimates were accurate enough for how testing is conducted today, but expected costs to rise significantly since the protocol will add additional requirements and create new compliance costs. The same commenter indicated

their belief that costs for wind tunnel testing could easily double or triple.

Response: EPA agrees that there are some uncertainties associated with the cost estimates for the DRT tests. In the U.S., EPA has identified two commercial wind tunnels that could conduct testing according to the EPA's protocol. The potential testing facilities include Battelle in Ohio and University of Nebraska. Other facilities in the U.S. that have the capability of conducting this testing are also likely to exist.

EPA believes that in the future, competition means that other wind tunnel testing facilities will also be able to conduct such studies in the U.S. It is possible that equipment manufacturers or adjuvant manufacturers have in-house facilities. Additionally, there is no requirement that the studies must be conducted in the U.S. Because, similar drift reduction programs already exist in Europe and Australia, testing facilities are also available there. Two potential testing facilities are Queensland University in Australia and Silso in England.

At this time, EPA will not require testing of nozzles under multiple combinations of pressure/angle/flow rate/airspeed. Testing nozzles or nozzle/adjuvant combinations in low and high speed wind tunnels will include using the typical pressures that would be used for each nozzle in the field. Pressure is an important variable in DSD, which can vary according to the application.

EPA's original protocol for low speed wind tunnels offered the option of measuring flux with monofilament lines or measuring droplet size distribution (DSD) with a laser diffraction. Based on comments received, EPA is modifying its protocol to standardize on the laser approach. The laser method can provide the information needed by EPA for DRT-rating and risk assessments. Additionally, use of results from the flux measurement would require the use of modeling which is not sufficiently developed for use. However, if a manufacturer wishes to conduct a study to measure flux, the agency recommends the testing facility and manufacturer consult with agency prior to the initiation of such a study.

EPA acknowledges that most nozzle manufactures already pay to have their nozzles tested to determine droplet size classification. However, this test and classification does not identify the driftable fraction of the droplets as compared to a reference nozzle. A goal of the DRT Program is to identify through verification those nozzles and other technologies that have the potential to significantly reduce spray drift, including nozzles in the various size classifications.

The most recent cost estimates available to EPA reverified that to test a single nozzle in a wind tunnel according to the revised protocol (i.e., the laser approach) at three typical pressures could vary up to \$6000.

For field studies, the agency agrees that costs for conducting field studies will be significantly more than wind tunnel studies due to the increased complexity of conducting such studies. These costs are estimated to vary up to \$100,000.

Legal Issues

16. One commenter wanted to understand potential liability issues. The commenter questioned if EPA's evaluation and then rating of a technology based on a study conducted according to an EPA-approved protocol created an endorsement. What are the implications for applicators and registrants regarding how the technologies may legally be used? Will EPA assume responsibility and liability if there is a spray drift problem when the applicator is using an EPA-approved DRT? The same commenter asked if EPA would be dictating the exact parameters for an application.

Response: Placement of a DRT star rating on the agency's DRT website is not considered an agency endorsement. EPA is developing a criteria-based program. The DRT-rating does not mean that EPA endorses a particular technology, such as a particular nozzle, shroud or shield, or nozzle/adjuvant combination, but rather that the product has been reviewed by EPA and found to meet the criteria required for the DRT-rating.

When a DRT-rated technology is offered on a pesticide label, this means that EPA's risk assessment (conducted according to proper procedures) has estimated the appropriate spray drift risk management measures, such as buffer zones, based on the available, reviewed data.

There are many factors to consider when making a pesticide application. The grower or applicator continues to bear the responsibility as the person making or supervising the application to make sure that all labeling requirements are followed, including instructions related to spray drift. The use of DRT-rated technologies is one of a number of tools applicators can use to reduce and manage spray drift to meet federal and state pesticide application requirements. The use of a DRT-rated technology does not alter the grower or applicator's liability when making a pesticide application.

17. The commenter is concerned about data compensation, particularly with regard to field studies. If "registration of a proposed product use depends on the use of a DRT that has been tested as part of a registrant data package supporting the use of the DRT, there could be data compensation issues." Will EPA provide for summary disclosure to protect the rights of the registrant and provisions to protect CBI?

Response: The DRT Program does not have a data compensation component for DRT study reports (data) submitted to EPA directly by an equipment manufacturer and independent of an application for pesticide registration, rather than by an applicant or registrant to support or maintain registration. When submitted independent of a registration action, the information in these studies is not evaluated as part of a PRIA submission, do not require payment of a fee, and are not subject to data compensation. The technology manufacturer submits a study to obtain a DRT-rating for his technology. As explained in response to comment 12, EPA will "credit" the DRT-rated technology in the risk assessment-management decision (i.e., use a drift reduction factor in the risk assessment) instead of using a conservative default assumption that does not assume any spray drift reduction. Pesticide labels that include use directions that specify use of a DRT-rated technology(ies) would also specify spray drift risk management measures, such as buffer zones if necessary, maximum wind speed or release height. Under these circumstances pesticide product labels will only specify, for example, to use a technology

with a particular DRT rating, never a specific technology, so, as the program develops, applicators will have a variety of technologies from which to choose.

It is also possible that a pesticide applicant or registrant to support or maintain a product registration could submit a DRT study for a particular technology, for example, a nozzle/adjuvant combination to EPA. EPA would review and evaluate the study, determine the percent drift reduction, and then assign the technology to a DRT category. The DRT-rating for the nozzle/adjuvant combination would be posted on EPA's website as part of that category. There is not a data compensation component to posting the DRT-rating on the website, because EPA would not be using the submitted data in the risk assessment to determine the spray drift risk mitigation measures for other registrants. Instead, as described in response to comment 12, EPA would use the DSD for the DRT-rating claimed on the label, a default DSD for that DRT category, for developing the risk assessment.

There is only one possible circumstance for the DRT Program to have a data compensation component. If the DRT study were to be conducted with a specific pesticide product/technology combination and the circumstances were so unique that the pesticide product/technology combination would need to be claimed on the label, then there would be a data compensation component. However, it is extremely unlikely that EPA would find this data useful for evaluating any other product. Therefore, there would be very few circumstances of DRT data being cited.

18. The commenter noted that the protocol stated that the testing organization would retain all test-specific documentation and records for 7 yrs after the final payment of the funding agreement. This concerns the commenter since “[d]ata and materials supporting registration action under FIFRA must be retained as long as the product is registered.”

Response: For studies submitted to EPA directly by an equipment manufacturer, rather than by an applicant or registrant to support or maintain registration, EPA would “archive” the submission using our internal system of issuing an “MRID” (master record identification) number. For DRT data submitted to support a registration, EPA would also issue an MRID for the data submitted to EPA. However, the commenter is correct that under FIFRA, the data submitted by a registrant to support a product registration must be retained as long as the product is registered. To account for these differences, EPA will change the statement in the protocol to read “the testing organization will retain all test-specific documentation and records for at least 7 years (or longer as needed) after the final payment of the funding agreement between the technology manufacturer and testing organization.”

19. The commenter expressed concerns about manufacturer liability. If the DRT does not achieve the tested reduction under conditions of actual use, would the manufacturer have liability?

Response: EPA acknowledges that DRT-rated technologies may perform somewhat different under actual use in the field for a variety of reasons, such as use of worn DRT nozzles, physical-chemical characteristics of tank mixes, and applicator behavior. There are multiple factors that can affect pesticide application whether it is DRT-rated or not. If EPA determines that a DRT-rated technology is, in fact, not providing appropriate drift reduction in practice, EPA may remove the technology from the listing of DRT-rated technologies on the website. To the extent the commenter is speaking to manufacturer tort liability for harm caused by potentially defective products, EPA suggests that such questions be directed to the manufacturer's own legal counsel.

Use of Existing Data

20. The commenter asked how EPA would approach the past efforts to reduce spray drift and give credit for or consider data from previously conducted studies. According to the commenter: "Large amounts of effort, time, and money have been expended in the past by several entities to find better ways to make applications more efficient and safe. Any future efforts in drift management must be able to consider these past successes in reducing drift." One commenter believes that EPA should consider adopting/using the data from comparable rating programs such as those in the U.K., the Netherlands, and Germany. A different commenter acknowledges the usefulness of adopting the U.K. LERAP data, but has concerns about the potential advantages companies that do business in the U.K. could have over those that are solely within the U.S. Could EPA provide a 6-month or longer timeframe to give manufacturers time to conduct DRT studies and thereby reduce the unfair advantage.

Response: EPA understands that numerous published and unpublished studies have been conducted to characterize potential spray drift due to a number of variables. The studies most applicable to the DRT Program would be those concerning the use of drift reduction technologies. EPA believes that some of the published and unpublished studies may be acceptable provided these studies are well-conducted, scientifically-sound, provide a comparable baseline or reference so that it is possible to calculate the percent reduction, and the raw data would be available to EPA for review.

EPA's protocol was specifically designed to include a reference nozzle. By requiring the use of a specific reference nozzle EPA can compare technologies and make sure that, for example, a 25 percent reduction for one technology is consistent with the same 25 percent reduction for another technology. Therefore, if a study has a comparable baseline, then EPA may be able to calculate a drift reduction percentage that would be consistent with the results of studies conducted using the EPA protocol.

EPA also understands that some of these studies have been assigned DRT ratings under the programs in the U.K. and Germany. There are differences in application techniques in the US as compared to Europe, such as fewer aerial applications in Europe. Some of the testing in the U.K. or Germany was performed using monofilament string method. However, as discussed in response to comment 15, EPA is standardizing its protocol based on laser diffraction droplet size analyzer for wind tunnel studies. One of the most substantial reasons for standardizing on laser testing is the lack of a model for using flux measurements. The U.K. does have such a model; however, their model is not publicly available, and EPA's policy is that the models used for EPA risk assessment should be publicly available.

EPA has no basis for translating these assigned ratings to an EPA-assigned rating without some comparison studies. EPA encourages equipment manufacturers or testing facilities to conduct wind tunnel studies, using EPA's protocol, of some of those technologies with DRT ratings from the U.K. and/or Germany to provide EPA with a basis for comparability. It may be possible for EPA to adopt/translate the U.K. and/or Germany rated technologies if the studies performed using EPA's protocol provide the basis for translating the test results.

General/Miscellaneous Comments

21. One commenter believes that there is no incentive for applicators to buy DRTs “until enough pesticide registrants change their label to make the DRT cost effective to the applicator.”

Response: For the agency’s DRT program to be a success, technology manufacturers and pesticide registrants must be willing to voluntarily participate. It is likely that the voluntary program will start slowly until the first technologies are tested, the website begins to be populated with DRT-rated application technologies, and the first labels are amended to include DRT claims. After this early adopters/transition stage, it is likely that more manufacturers would test their technologies.

Once products with DRT-rated technologies on the label are more common, EPA believes that benefits would also accrue to applicators. Applicators will be able to make applications with legally reduced buffer zones or other less restrictive applications. Additionally, it is likely that many of the existing DRT technologies currently in use will qualify for a rating, and there would be no need for all applicators to buy new DRTs.

The agency believes that in addition to the benefits of reduced application restrictions there would be benefits of economics, pesticide application efficacy, and reduced liability. Application technologies and methods that lessen spray drift are likely to reduce the loss of pesticide product to off-target areas, as well as increase pesticide deposition on the target crop or site. This improves product efficacy. Additionally, applicators that significantly reduce spray drift are less likely to cause off-target drift problems and become subject to liability issues and insurance claims.

22. In 1982, Wisconsin adopted a performance standard law for drift. The commenter suggested that EPA should adopt a “performance standard for drift enforcement similar to Wisconsin’s.” The commenter believes that “moving to a performance standard system for drift enforcement and eliminating the operational restrictions,” such as buffer zones, nozzle and pressure restrictions, and boom height would promote innovation and thus increase adoption of DRTs.

According to the Wisconsin Agriculture, Trade and Consumer Protection (ACTP):

ATCP 29.01

(29) “Pesticide drift” means pesticide deposited outside a target application site as a result of pesticide movement caused by air currents or diffusion.

Note: See s. ATCP 29.50 (2), which prohibits any person from using a pesticide in a manner that results in significant pesticide drift.

(30) “Pesticide overspray” means pesticide deposited outside a target application site as a result of an applicator’s failure to control the direct flow or application of pesticide from the application equipment so as to confine it to the target application site.

Note: See s. ATCP 29.50 (2), which prohibits any person from using a pesticide in a manner that results

in significant pesticide drift.

ATCP 29.50 Pesticide use; general. (2) OVERSPRAY AND DRIFT. (a) No person may use or direct the use of a pesticide in a manner that results in pesticide overspray or significant pesticide drift.

Response: EPA presumes the commenter is referring to the following regulations by the Wisconsin Agriculture, Trade and Consumer Protection – ATCP 29.10 (29 and 30) and ATCP 29.50. These regulations define pesticide drift and pesticide overspray and prohibit “a person from using a pesticide in a manner that results in significant pesticide drift” and “that results in pesticide overspray”. EPA has considered performance standards for spray drift in a variety of internal and external discussions, but has not yet been able to reach a consensus position. On November 4, 2009, EPA published a notice in the Federal Register (74 FR 57166) seeking comment on a draft Pesticide Registration Notice entitled “Pesticide Drift Labeling.” The documents are available at <http://www.regulations.gov> using docket identifier EPA-HQ-OPP-2009-0628.

However, even if EPA were to adopt some form of performance standards to prevent drift, EPA believes applicators need readily available information on potential drift reduction technologies. Labels, of course, would provide the specific measures for that particular pesticide product. EPA believes that it is important to identify drift reduction technologies, quantify the percent reduction, and then make this information available to applicators.

23. The commenter indicated that in the future, drift reduction technologies could be needed for ground spraying in orchards, vineyards, etc.

Response: The commenter raises a good point. EPA limited the protocol to technologies for application to row and field crops because a large majority of agricultural pesticides are applied to these crops by groundboom and aerial equipment. Thus, a focus on encouraging the use of DRTs for row and field crop uses should have an overall greater benefit to drift reduction.

Orchard and vineyard crops may require the use of significantly different application equipment. The Agency believes that certain ground spraying applications (i.e., technologies having the nozzle directed at the ground) in orchards and vineyards could be conducted using EPA’s protocol. However, at this time, EPA believes that the test protocol for spraying orchards and vineyards with the nozzle directed upwards as in some air blast applications is different from the current draft protocol for row and field crops. The reasons for these differences include significantly different crop geometries, and a diversity of sprayer configurations for orchard and vineyard crops. For example, application equipment used for orchard tree and vine crops typically direct sprays horizontally and upwards into the foliage, although some equipment, such as tower sprayers direct sprays in a downward angle. These methods of applications are quite different to those for row and field crops that are directed downward to the ground or crop canopy. There is also significant diversity of sprayer configurations for orchard and vineyard crops. In consideration of the above variations, EPA may consider expanding this voluntary program to application technologies specific to orchard and vineyard crops in the future.

24. The commenter believes that EPA should do more to reduce the pesticide load on the environment.

Response: EPA fully supports the use of application methods, technologies and integrated pest management that offer the benefit of fewer pesticide applications and/or reduced application rates,

which can reduce the pesticide load on the environment. For example, current pesticide label rates are stated as maximums as recommended by pesticide registrants. The construct of the federal pesticide law, the Federal Insecticide, Fungicide and Rodenticide Act, requires EPA to determine whether or not a pesticide's risks from the maximum labeled rates and other use restrictions meet safety standards. If the risks are acceptable the pesticide is eligible for registration. FIFRA also allows applicators to apply less than the maximum, as circumstances allow, as long as all other label requirements are followed. GPS and other automated technologies when used with application equipment offer the option of turning off the spraying equipment for areas that do not need the pesticide application, or in circumstances such as turning-around at the end of a row.

EPA agrees with one of the commenters, that the competing factors of biological control efficacy, airborne spray drift, and spray losses on the ground must be carefully balanced to reduce the total amount of pesticide use.

Similarly, EPA believes that the DRT Program can work to reduce the pesticide load on the environment. By increasing the use of technologies that decrease pesticide drift, applicators can reduce the off-target drift and deposition of pesticides. Thus, this works to decrease the pesticide load to the environment.

25. Several commenters indicated that they do not support the creation of the DRT Program. One commenter indicated their belief that "the cost of testing DRTs under the current plan will exceed the potential rewards from marketing them." Another commenter indicated that they did not need more unnecessary rules and restrictions or arbitrary buffer zones; instead, "the best way to ensure proper, targeted applications is through the use of modern technologies, continued research into these technologies and by the education of aerial (and ground) applicators nationwide and the continuous advancement of application technologies, DRTs, and flying techniques." A different commenter stated their belief that "voluntary incentives and recognition of best management practices along with proper education and training are the most effective mechanism for implementing the safest, most effective application practices."

Response: EPA believes that the DRT Program will inform and educate applicators, registrants, and the public on the advancements in pesticide application equipment and techniques. The continued education of applicators on application techniques and best management practices, including the use of DRTs, is a very important component of managing spray drift. Applicators will have readily-available and up-to-date information on which application technologies have the potential to provide superior spray drift reduction. The program is also a way of giving credit to those applicators who purchase and use these newer techniques. EPA financially supports applicator education and training programs, including the Professional Aerial Applicators' Support System program.

EPA believes that use of DRT technologies offers the potential for (1) fewer/reduced application restrictions needed to mitigate spray drift from the intended application site(s), (2) application of more of the spray on the target site or crop which can improve efficacy, (3) a potential reduction in the associated potential risks, and (4) a reduction in costs to the applicator and grower (reduced potential for insurance claims and enforcement penalties). Thus, applicators and growers will have incentives to use these drift reduction technologies. As applicators and growers use DRTs on a more routine basis,

benefits will accrue. Whether or not the costs of the program will exceed the benefits will be determined by the degree of participation in the program.

Another important aspect of the DRT Program is that the results of DRT studies on a variety of technologies will provide EPA with high quality science to improve our quantification of spray drift from a variety of applications. This enables EPA to make its decisions on managing risks, such as calculating buffer zones, with greater precision and that reflect the use of specific application equipment and the underlying scientific data.

As a result of the voluntary program, EPA hopes that industry will test their existing technologies/equipment. The DRT Program could also lead to the development of application technologies with far superior drift reduction capabilities. Such information would eventually be incorporated into training programs and education materials for applicators.

Technical Comments for the Proposed DRT Program

In responding to these Technical Comments EPA consulted with several members of the technical panel EPA established in 2006 to develop test methods to verify the potential effectiveness of drift reduction technologies. At a later date, their comments were evaluated in internal EPA discussions to determine how to respond to these Technical Comments.

General Comments

26. In addition to the protocol, the commenter suggested a FIFRA-type guidance document which would include detailed information on reporting requirements. The commenter believes this would provide for standardization. A different commenter asked why EPA needed the raw data submitted. Another commenter asked that EPA provide detailed reporting requirements for DRT studies.

With regards to conducting DRT field studies, other commenters advocated for a FIFRA-type guidance document for these studies and asked for “the option for registrants or manufacturers to conduct these studies to support regulatory approval under GLPs should they choose to do so.” Additionally, one commenter asked if manufacturers and producers would be able to conduct their own testing. Would EPA provide for certification of in-house labs?

Response: Although the protocol for DRT studies has guidance on reporting results of studies, EPA agrees that additional information would be helpful, and intends to develop a template type of format for reporting DRT data to EPA. This format would be posted on EPA’s DRT webpage. While providing information to equipment manufacturers and testing facilities that wish to submit study results to EPA for evaluation, the format would also standardize submissions, thus potentially decreasing costs and time for preparing study reports and the agency’s review of those reports.

EPA requires the submission of raw data for all studies to enable our scientists to determine the quality of the study. The raw data is needed to ensure that any submitted analyses or computations were done correctly and can be transparently reproduced during EPA’s review and evaluation.

The DRT protocol includes general guidance for the conduct of field studies. EPA encourages companies who wish to conduct a field study to consult with EPA about the proposed study protocol prior to the conduct of the study. Because the conduct of field studies can be complex and expensive, companies would benefit from having a mutual agreement of the protocol with the agency. Also, companies may choose to conduct these studies with GLP standards which are higher standards than those included in the agency’s DRT protocol.

27. The commenter questioned the need for additional testing, if testing has been performed to categorize the droplet size (as per ASABE S572.1).

Response: The American Society of Agricultural and Biological Engineers (ASABE) provides a standardized test method to classify the spray from nozzles into six spray categories under static conditions (no wind). The testing needed for a DRT rating is not performed under static conditions. As discussed in response to comment 6 wind speed is a parameter that does become part of the testing parameters for the LSWT and HSWT.

28. The commenter believes that EPA should consider submitting the DRT protocol to a standard setting organization such as the American Society of Agricultural and biological Engineers (ASABE). Another commenter asked about the possibility of future ISO technical specification or International Standard status.

Response: EPA agrees that, at some time in the future, submission of the DRT protocol to a standard setting organization would be appropriate. At the present time, EPA will use the existing protocol to implement the DRT Program.

29. According to the commenter, the following variables can impact performance of a spray nozzle concerning the droplet spectrum: “changes in pressure, temperature, humidity, cross wind applications, airspeed, nozzles angle with the slipstream, various tank mixes, adding fertilizers to the mix, and adding drift reduction agents.” The commenter believes that nozzles should be evaluated to verify “their performance pertaining to all of the above variables before recommending them on a label.”

Response: All of these factors, as well as applicator behavior, can impact the DSD of a spray application in the field. Certain variables can be controlled by the applicator, including nozzle, use of a drift reduction adjuvant, and system pressure, while other factors are environmental, including temperature and humidity. Studies provided to EPA and in the published literature demonstrate the relative importance each of these variables can have on DSD and spray drift. Certain variables, such as nozzle characteristics, system pressure, applicator speed, effective drift reduction adjuvants and application rate, are primary variables while temperature and humidity are secondary. For this reason, and in consideration of practicality and costs, the agency developed the DRT protocol for wind tunnel tests to focus on nozzles, nozzle/drift reduction adjuvant combinations, and system pressures. Temperature and humidity are to be at typical application levels and should be recorded and reported with the study. Field studies will also measure these and other variables.

30. According to the commenter, drift analysis recognizes Dv0.1 measurement when assessing DRT rating. Providing a DRT rating solely from VMD (volume median diameter) does not accurately represent the spray droplets which are most prone to drift and off target movement.

Response: The VMD is often referred to as $D_{v0.5}$. A $D_{v0.5} = 200$ microns means that the diameter of half the spray droplets are greater than 200 microns, and half are less than 200 microns. In a similar manner, $D_{v0.1}$ means that 10% of the droplets are smaller, and $D_{v0.9}$ means that 90% of the droplets are smaller. The DRT rating represents the percent reduction between the driftable fraction of the reference nozzle as compared to that of the nozzle being tested. To calculate the percent reduction, the protocol illustrates in Appendix B a suggested table format for providing to EPA, the droplet diameters, including descriptive statistics such as the diameter (volumes) for the 10th, 50th, and 90th percentiles ($D_{v0.1}$, $D_{v0.5}$, and $D_{v0.9}$) including the volume of driftable fraction described in response to comment 10.

31. Provide transparent and justifiable method for DRT categorization consistent with experimental error given the preciseness of the rating bands.

Response: EPA acknowledges that some of the calculated percent reductions will be very close to one side or the other of the “boundary lines” that will define the DRT-rating categories. EPA also understands that all data points have an inherent “plus or minus” that is part of the consideration of the quality of the data. However, considerations for program implementability mean that the star rating categories will need to operate as “hard-lines.” This means that a percent reduction of 24% will not have a DRT rating and that a reduction of 26% will be DRT*. As discussed in response to comment 12, EPA’s process for including the DRT rating in its risk assessment means that an assumption of droplet size distribution from the lower end of each DRT category, (e.g., 25% reduction of driftable fraction) will be used when estimating a pesticide’s potential off-target spray drift deposition for risk assessment and risk management measures.

32. Alternate idea: EPA establish baseline of driftable fines (a reference level); measure an individual aircraft for its amount of driftable fines relative to the baseline and use that differential for assigning a buffer zone to that aircraft.

Response: EPA does not consider this a practical approach for determining appropriate buffer zones for aircraft (fixed or rotary wing) or for ground boom sprayers for multiple reasons. Buffer zones and other use restrictions are a function of each pesticide’s toxicity, the amount of applied pesticide, the application methods and the DSD of the spray. This is discussed in more detail in response to comment 12. Additionally, having a baseline standard of driftable fractions (fines) for aerial applications, and presumably for groundboom applications, would constitute a requirement for all aircraft and groundboom systems to be tested to determine whether their spray systems do not exceed the baseline. As applicators change/modify their systems (e.g., different nozzles, tank mixes, etc.) they would need to retest.

Low speed wind tunnel protocol

33. According to the commenter, Figure 1 in the generic verification “protocol presents the use of monofilament line for measuring and estimating sprayer energy decay which could in principal be

translated to a buffer distance. However, the use of monofilament line is not well accepted as a procedure based our discussion with several application technology experts. Some basic research questions regarding the technique remain such as;

- Quantifying load on the line such that it is not saturated.
- Translation of the line to a meaningful area.
- Appropriate distance per applied spray energy.”

Given their concerns, the commenter believes that the use of lines (or strings) should not be a standardized procedure.

Response: As discussed in response to comment 15, EPA has decided to revise the protocol to limit the low speed wind tunnel study to measuring DSD with laser diffraction equipment. EPA recognizes the WTDISP model that would be needed for the evaluation of flux data from use of monofilament lines, is not yet fully developed. The laser methodology will provide the needed information to calculate the percent drift reduction. Therefore EPA will standardize our testing protocol on the laser methodology.

34. The commenter stated that as described in the protocol, for spray droplet size measurement in low speed wind tunnel (A7.2), the height requirements are not stipulated for the 6 measurements listed in Element B2. The commenter asked if that was an oversight, or if the heights do not matter. (p. 16, table 3)

Response: This comment pertains to the use and height of monofilament stings. As explained previously in responses to comments 15 and 33, EPA revised its protocol to standardize the use of lasers to measure DSDs.

35. According to the commenter, in section B2 regarding wind tunnel parameterization, a series of performance standards are suggested for acceptable wind tunnels. The commenter believes that “it would be much simpler and more verifiable to directly state minimum dimensions since most entities following this guidance will not be able to verify the facility they go to for compliance with performance standards such as boundary layer and blockage effects, turbulence, wind consistency etc. In Tables 4 and 6, there is no detailed guidance with respect to surface roughness setup for the blockage effects.” Also according to the commenter, there is “uncertainty regarding the current availability of wind tunnels meeting the EPA recommended size specifications that can be used for our industry’s testing. EPA mentions ISO 22856 as requiring only 1 x 2 x 2 m. Many experts would agree that this is too small, however there is little reference for the suggested low speed wind tunnel dimensions of 1.75 m x 1.75 m x 7 m.”

Response: As previously noted, EPA’s protocol was developed using a technical panel composed of technical experts external to the agency. The protocol is considered to be guidance, not a mandatory requirement that must be met in order to submit a DRT study to EPA for evaluation. However, use of

EPA's protocol means that such a study is likely to meet the needs of EPA for high-quality information. EPA readily acknowledges that other protocols exist. Data generators are free to use a protocol of their choosing as long as the submitted data supplies the information needed by EPA.

Regarding the commenter's suggestion the protocol give the dimensions for wind tunnels as minimum dimensions, the protocol for the low speed wind tunnel does give the dimensions as minimums: "... dimensions at least 1.75 meter (m) wide" Without being too prescriptive on the dimensions, this provides some flexibility and accommodation for wind tunnel setups. However, it is important as noted in the protocol "The tunnel must be of sufficient width so that the spray pattern does not impinge on the walls of the tunnel." to avoid wall effects affecting the DSD. EPA recommends technology manufacturers and testing organizations consult with the agency prior to testing if there are questions about these or any other test parameters.

36. The commenter believes that the protocol for low speed wind tunnel (LSWT) testing should include an adequate description of reference nozzles similar to section C.I. in the high speed wind tunnel (HSWT) testing section.

Response: In EPA's protocol both sections B1 and C1 provide a description of the nozzle reference system, which is described as "ASABE S572.1 fine/medium boundary reference nozzle [Flat fan 110° at 300 kPa (43.5 psi)]." A single reference nozzle is appropriate to allow consistent comparisons across different technologies for assigning DRT ratings and for risk assessments as described in response to comment 12.

37. As described by the commenter, on "page 10, an optimal sampling distance for collection of droplets for characterization of DSD at the nozzle is given as 20-60 cm. It is not clear whether this is a vertical, horizontal, or downwind distance. The range of 20 to 60 cm seems fairly broad for the purpose; therefore, supporting documentation indicating that a collection distance of 20 to 60 cm provides similar results should be provided. The footnote for section B.I. (p. 14) refers to measurement of droplet size spectrum and flux volume. It states that the flux value may be estimated as the "droplet size spectra taken near the nozzle with the sprayer flow rate". In order to confirm that a fully developed spray pattern has been captured, measurements should be taken at several distances (10-50 cm) downwind of the nozzle. It is unclear whether this recommendation conflicts with the recommendation to take measurements at 20-60 cm, or whether it refers to a different measurement."

Response: Published literature suggests that a collection distance of 20 to 60 cm downward from the tip of the nozzle represents the range where the test substance is fully atomized and is therefore the "optimal sampling distance." The comment regarding flux measurement is now moot since EPA has revised the protocol to measure only DSD in wind tunnels.

38. The commenter believes that "for droplet size distribution at the nozzle, the continuous traverse

method is suggested as optimal but also recommended are multiple chordal measurements, two or three dimensional mapping of droplet size and velocity through the spray plume. There is some concern that different measuring equipment/facilities will provide different results for the same system, but this can be alleviated by always comparing to a standard.”

Response: EPA agrees that one of the most important aspects of data collection is the use of a standard reference nozzle as described in prior responses to comments and in the protocol. The use of a single reference nozzle by all testing facilities will provide a consistent standard for making comparisons of DSDs, DRT ratings and the agency’s risk assessment and risk management decisions for pesticide product registration.

39. The commenter noted that the low speed wind tunnel DRT testing is conducted at 15 mph. The commenter expressed his concern that “[l]esser wind speeds have been proven to measure small ‘driftable’ droplets more than once, hence skewing droplet size data.”

Response: EPA notes that the protocol specifies air speed for low speed wind tunnel testing as “Between 2 m/s and 10 m/s”. This is equivalent to 4.5 mph and 22.4 mph” (see Table 3. DQIGs for Low Speed Wind Tunnel Testing). This air speed range simulates typical speeds of ground boom sprayers while applying pesticides. EPA believes this upper range of air speed and suggested tunnel dimensions and laser measure will allow proper measurements of DSDs.

The testing speed is important; however, EPA believes that small changes in a variety of testing variables due to the “set-ups” in different testing facilities are evened-out by the use of a single reference nozzle. As previously discussed, the use of a reference nozzle provides a consistent standard for measuring percent drift reduction.

40. Expand LSWT to include capability in the 0-2 m zone to incorporate canopy in place of turf (e.g., synthetic plants) to account for non-conventional technologies (pneumatic nozzles, certain air-assist technologies, shields, and electrostatics).

Response: EPA believes that testing the impact of a canopy is more complex than a LWST can accommodate. Before initiating a drift reduction study for a canopy, EPA suggests the technology manufacture and testing organization consult with EPA.

41. According to the commenter, the low speed wind tunnel protocol proposes “that droplet size should be measured at same distance as drift flux using a laser; most laser systems will not easily fit around low speed working section; this distance must be flexible for droplet size measurement.”

Response: As explained in responses to comments 15, 33 and 34, EPA revised its protocol to standardize the use of lasers to measure DSDs. However, if an equipment manufacturer prefers to measure flux, then EPA suggests the manufacturer and testing organization consult with EPA before testing begins.

42. LSWT should allow higher speeds to address proper laser diffraction measurement for nozzle drop size ratings and use of multiple ref spray parameters that address multiple use options on labels.

Response: As discussed in response to comment 39, the protocol specifies an air speed from 2 m/s (4.5 mph) up to 10 m/s (22.4 mph) in low speed wind tunnels for testing nozzles or other technologies. As discussed in various responses, the agency believes a single reference nozzle is critical for the reasons provided. However, the agency supports and expects technology manufacturers will want to conduct tests with multiple pressures.

High speed wind tunnel protocol

43. According to several commenters, a high speed wind tunnel should accommodate higher wind speeds (more than 165 mph) since many aircraft fly faster. The maximum speed listed is too low.

Response: The 165 mph is not a maximum; testing can be conducted at higher speeds. We recognize that fixed wing aircraft often apply the pesticide product at speeds greater than 165 mph.

Field studies protocol

44. The commenter is concerned about the statement that there has been "no evaluation of the applicability of the site characteristics to verification of data generated and how it is acquired." Such a statement suggests that manufacturers are being asked to collect a lot of information that will not be used and that there is little understanding of how it could be used. If that is the case, it may be possible to forgo the cost associated with collection of these data.

Response:

The correct text from the protocol is "Note, the applicability of the site characteristics to verification data generation and acquisition have not been evaluated." (*A6.2.1 Test Site Description, Field testing.*) EPA acknowledges this sentence is unclear and is unnecessary therefore, the agency has deleted it. The text of this section includes some parameters for field study design and measurement. The intent of the sentence was to convey that, because field studies are complex to design and conduct (e.g., test site variability and changes in metrological conditions) and are unique, the specific parameters mentioned may not be applicable to all field studies. The protocol recommends that the testing organization collect many measurements of the study. These measurements are typical of well-conducted and published field studies and they can be critical for interpretation of the study results and reaching sound conclusions.

45. According to the commenter, for field tests, there are often multiple heights used for the collection of downwind samples. The collection of samples at multiple heights should be indicated as either required or optional and height recommendations should be made.

Response: The purpose of a field study for DRT verification is to measure deposition of spray drift downwind from the treatment site. For this reason, measuring downwind samples of airborne spray drift at multiple heights is not necessary.

46. According to the commenter, “[w]ind direction variance is specified in section D.I. However, acceptable vector variance is actually a function of field design geometries, and the flexibility to use these geometries would be helpful for timely conduct of these field studies. In characterizing a downwind area, wind direction could frequently vary over time. Instead of wind direction variance being specified, specifying an acceptable averaged vector range or acceptable frequency range could be an alternative approach.

Response: Test guidance in ASABE S561.1 provides sufficient information on wind speed and direction.

47. The commenter believes that there “is inconsistency in turbulence between wind tunnel and field testing. Turbulence is part of spray drift modeling process as atmospheric stability classification. It is guided in the high speed wind tunnel for aerial application but there is no guidance provided for field testing (in Table 8). The turbulence term is equivalent to mixing height in the atmosphere. Mixing height can be measured or theoretically calculated using RH, wind fields, temperature and other parameters. The measurement or estimation of mixing turbulence can be specified in Table 8.”

Response: The focus of the testing is to achieve a comparison, i.e., the reference nozzle versus the technology being tested. There is no need for additional data on turbulence.

48. The commenter noted that surface roughness (vegetation height) setup is guided in Table 8. DQIGs for Field Testing. However there is no surface roughness specified in wind tunnel study where it is also a factor to be considered.

Response: Yes, vegetation height is listed in Table 8 as a consideration for conduct of a field study. EPA does not believe that such a consideration is needed for a wind tunnel study to measure DSDs.

49. According to the commenter, in “Table 9, comments in the table regarding spray tank mix and ambient temperature for the field conduct of a DRT study are unrealistic and should be removed. For many reasons it is not practical to make sure the tank mix temperature is about the same as the air temperature. Simply reporting these temperatures should be sufficient. Similarly, comments on air temperature ranges are not useful.”

Response: EPA agrees the tank mix and ambient temperatures do not need to be the same. Temperatures of both, however, should be recorded and reported. EPA will revise the protocol to reflect this.

Testing of Adjuvants

50. The commenter discussed that for testing of adjuvants, the nozzle is just as important as the tank mix. Some adjuvants can decrease fines for fine nozzles and increase fines for coarser nozzles. References to the 11003 reference nozzle can be misleading in that testing should be done with the 11003 nozzle for adjuvants and tank mix. This could result in an adjuvant being classed as a DRT but if used with coarser nozzle actually increase drift. Therefore the 'worse case' nozzle is not always the same and therefore recommend several nozzles be tested as described in ASM standard test for adjuvants (ASTM E2798).

Response: As previously discussed, EPA believes that combinations of various nozzles and adjuvants will be tested and may qualify for a DRT-rating. However, it is more problematic to test a percent reduction for just an adjuvant because adjuvants are used with nozzles, and therefore EPA will not establish DRT-ratings for adjuvants only. This means that there will not be specific information for testing of adjuvants only in the protocol.

51. The commenter indicated that EPA's protocol was only developed for nozzles. They asked for modifications consistent with proving the drift reduction capabilities of drift reducing tank-mixed chemicals.

Response: EPA developed the protocol for many types of application technologies; this is described in section A6.1. The agency expects a variety of small technologies can be and will be tested in wind tunnels. EPA expects nozzles will be the most commonly tested technology for the following reasons: (1) all spraying requires nozzles; (2) the large number and variety of nozzles manufactured and available in the market; (3) compared to some other technologies, nozzles are easy and relatively inexpensive to replace; and (4) nozzle testing can be performed in wind tunnels and is less expensive than field testing. For these reasons, much of the protocol does focus on testing of nozzles. However, the protocol can also be used for testing other drift reduction technologies such as nozzle/adjuvant combinations, and other, larger technologies.

If the commenter is suggesting that registered pesticide formulations *per se* be included in the DRT Program, EPA is not planning to include pesticide formulations in the program for a DRT rating. While some pesticide formulations may have inherent drift reduction potential when used under certain conditions, EPA does not plan to assign DRT ratings to pesticide formulations. EPA views this approach as impractical given the almost infinite combinations of tank mixes, tank mixes change over time as new pesticides enter the market while others leave the market, and registrants often revise their product formulations which could affect DSDs. A pesticide registrant may submit data supporting a pesticide formulation's drift reduction potential and, EPA will consider those data in conducting its assessments of potential spray drift risk and risk management for the registration decision.

52. The commenter asked that EPA adopt ASTM E2798-11 as the test method for both nozzles and adjuvants. This test method uses the particle size distribution (PSD) of the complete spray system, including the pesticide active ingredient, and measures the performance of DRT tank-mix adjuvants by calculating the percent reduction in the volume of driftable fines based on the measured PDS of a spray solution with and without the adjuvant, or by comparing the PSD measured using a DRT nozzle with the PSD of the standard nozzle.

Response: Under the DRT Program, EPA is not requiring the use of a particular protocol. Equipment manufacturers can use a protocol such as ASTM E2798-11 as stated in the DRT protocol, or develop their own protocol. EPA would likely accept a study that is conducted according to ASTM E2798-11, providing that the data is of appropriate quality and that the percent reduction in the driftable fraction can be calculated. If the equipment manufacturer wishes to develop their own protocol, then EPA suggests that they consult with EPA to make sure that the protocol will provide the data needed by EPA. Including specific pesticide active ingredients as a variable in the DRT test protocol would greatly complicate the testing program and rating system. Data submitted to EPA by the Spray Drift Task Force suggest that the active ingredient plays a relatively minor role in affecting drop size distribution and spray drift.

General/Misc. Comments on Testing

53. Air induction & hydraulic spray nozzles are measured by separate standards. Due to nonlinear correlation between droplet diameter and drift reduction the standard for hydraulic (Teejet XR) is not accurate for air induction. A new air induction reference nozzle should be introduced such as GuardianAIR due to size of air induction droplet.

Response: EPA believes that there can be only one reference nozzle, since this nozzle must be the standard used across the testing, to provide for comparable data. The reference nozzle selected for EPA's DRT Program is the same nozzle recognized by the ASABE. This same nozzle was the standard nozzle used by the Spray Drift Task Force. The UK, Netherlands, and Germany also use the same reference nozzle. Given the nozzle's wide acceptance, there has been a significant amount of data generation with the reference nozzle. This significant data generation forms the basis for the AgDrift Model, which has undergone multiple peer-reviews. Similarly, the data forms the baseline for EPA's quantification of spray drift in its environmental risk assessments.

54. The commenter discussed that the generic verification protocol requires a standard spray test solution of distilled water plus a small amount of surfactant. This is not realistic and, in fact, such test solutions could either over- or underestimate drift reduction compared to tank mixes and actual conditions. The commenter believes that droplet size distributions should be generated using a mixture that includes "a suitable active ingredient or several active ingredients along with a representative adjuvant system." Such a misleading rating system could subject applicators to increased liability.

Response: There are a number of reasons for not adopting the commenter's suggestion: (1) the primary purpose of this program and test protocol is to compare technologies to a standard; (2) the increased number of combinations of multiple pesticide formulations with nozzles and with nozzle/adjuvant combinations; (3) pesticide active ingredients and their formulations marketed to applicators vary of time; (4) greatly increase costs to industry to conducting many more studies; and (5) some wind tunnel testing facilities may not be set-up to process any solution other than the test solution of distilled water plus a small amount of surfactant. EPA believes that the proposed test solution of water and surfactant will provide a reasonable basis for making decisions on DRT ratings.

55. Flux-based wind tunnel measurements do not measure particle size, only drift distance. Industry has

moved to using particle size analysis such as laser diffraction or phase doppler. This is superior over flux measurements. A number of ASTM standards describe how to conduct PSA (particle size analysis) of an ag spray. This type of testing will increase number of labs and reduce costs.

Response: As previously discussed, EPA's protocol will standardize on the laser methodology to measure DSDs.

56. The droplet size spectrum used to classify is the S572.1. EPA DRT certification will be transferable from a single spray tip design regardless of branding or labeling as long as a product (nozzle) can prove identical design.

Response: Using design specifications only, EPA believes that it would be a challenge to prove that two nozzles are exactly the same. Small differences in manufacturing and production could lead to small differences in droplet size, which can result in different percent drift reduction. The proof that the two nozzles operate exactly the same is the DRT testing.

57. Explore 'suitable peer-reviewed alternative' methods that may be cheaper, less burdensome.

Response: EPA would encourage equipment manufacturers and others to discuss these suitable peer-reviewed methods with EPA as part of a protocol review before initiation of the study to assure that the study will provide the information needed by EPA.

58. Would existing dispersion models be accurate enough to predict drift due to nozzle type.

Response: AgDISP and AgDRIFT (for aerial application) are mechanistic models and have flexibility to incorporate DSD and many other variables required to predict spray drift. However, the groundboom scenario in AGDISP has some limitations and the developer of AGDISP model is working on improving the predictability of the model. Since the groundboom scenarios of AgDRIFT are based on empirical curves, which may not be suitable for DSD generated by DRT nozzles, the AGDISP model will be used to assess the relative differences in deposition between the reference nozzle and that of the respective DRT categories.

59. Is there a process so manufacturers can determine if a test facility has an EPA-compliant QA program?

Response: EPA does not recommend laboratories or testing facilities. As discussed in the protocol, the submitted report should contain information on the facility's Quality Assurance/Quality Control activities. The protocol states that EPA may conduct assessments of test facilities.. The company wishing to contract with the testing facility should carefully review and judge the suitability of the laboratory.