Drift Reduction Technology (DRT)
Field Studies
Submission Review Guide

This guide is meant to aid in the review of drift reduction technology (DRT) reports for field deposition studies and submitted under the Office of Pesticide Programs (OPP) DRT program.

Field deposition studies are typically conducted for DRTs that are not readily assessed using wind tunnelssuch as modified sprayers (*e.g.,* hooded sprayer). The measure of performance for the DRT in field studies is directly determined by deposition measured on horizontal fallout collectors, as discussed in OCSPP Guideline 840.1200. The specific placement of collectors allows for an estimate of the integrated deposition from 0 to 61 m (200 ft) and the point deposition at 30.5 m (100 ft) downwind of the application site. The treatment area and spray track is typically 100 m long and perpendicular to wind direction. This arrangement allows for the outermost samplers to be downwind of the treatment area when the wind direction approaches ± 30 degrees relative to the length of the treatment area. The conditions of the study are selected to allow for the measurement of the DRT and the reference spray systems under identical or similar conditions (*e.g.*, wind speed, wind direction, temperature, relative humidity, release height). While the measurements of deposition are the critical measurements for this type of study, measurements of field and application conditions are also important for establishing the limitations of the verification test design. In order to assess the relative drift reduction of the technology, measurements of candidate test systems are compared to those obtained using a reference spray system. **Whenever possible, applicants should meet with the Agency to discuss the parameters associated with the field deposition study and any issues that may be encountered prior to the conduct of the study**.

Sections I, II, and III of this document provide additional details regarding data, formatting, and issues to consider in developing report reviews. Although this guide is not intended to strictly prescribe where and how to present the data, an example DRT report review template is provided in Section II for guidance. In general, reviewers should follow the example template. However, reviewers may modify the template as needed or disregard it in the case of multilateral reviews (*i.e.*, reviews with other agencies participating) in which an alternative format is agreed upon by the participating agencies. Lastly, a list of review considerations (Section III) is provided to help reviewers focus on critical DRT report issues and to identify any common deficiencies.

Section I. Data to Include in the DRT Review Template

Reviewers should include the following information to increase its utility to the Agency:

First page

- A statement should be included indicating whether the analyses were conducted in compliance with FIFRA GLP standards (and if not, how not or why not) and whether signed and dated Data Confidentiality, GLP Compliance, Quality Assurance, and Authenticity Certification statements were provided.

- The study classification and a concise statement of any deficiencies that impacted the classification should be provided on the first page of the review.

- A signature line(s) for the final reviewer(s) should be added to the first page of the report review. If this is unacceptable for other agencies participating in a multilateral review, then a cover page with the signature line(s) can be attached to each individual review submitted to EFED's files.

- An Executive Summary should be added to the review.

Principle of Method

- DRT characteristics and field study parameters should be summarized.

Results

- Results from study analyses should be tabulated for different technologies.

Deficiencies and Reviewer's Comments

- This section should list any deficiencies with the method, the validations, and the documentation.

References

- A References section (Section V) should be added that lists any literature references other than the DRT reports cited in the study review.

Section II. Example DRT Report Review Template, Field Deposition Studies

Method for analyzing drift reduction technolgy via field deposition studies

Reports:	[Provide full citation. Provide the MRID (first) if the review is unilateral.]
Document No.:	[MRID xxxxxxxx]
Guideline:	Non-guideline
Statements:	[Indicate whether the study was conducted in compliance with FIFRA GLP standards and whether signed and dated Data Confidentiality, GLP Compliance, Quality Assurance, and Authenticity Certification statements were provided. If the validations were not conducted in compliance with FIFRA GLP standards, indicate why or how they deviated.]
Classification:	This study is classified as [provide classification and very concise statement of any deficiencies that impacted the classification] [E.g.: *"…acceptable for (application method). However, the study indicated this DRT is only applicable for nozzle pressures of XXX psi."*] [If study is considered acceptable, indicate the DRT * rating.]
PC Code:	[xxxxxx, if applicable]
Reviewer:	[Provide final reviewer(s)'s name and title.] **Signature:** **Date:** [Type date of signature.]

Executive Summary

A field deposition study was conducted in support of [company and technology] classification as a drift reduction technology (DRT) under the Office of Pesticide Programs DRT program.

[Provide a brief discussion of the technology and the conduct of the study.]

[Insert one of the following]
This study has been found to be scientifically acceptable and the technology has been given a DRT rating of [star number].

Or

This study has not been found to be scientifically acceptable and, as such, the technology has not been given a DRT rating.

Table 1. Specifications of tested technology

Manufacturer	Nozzle	Model	Pressure Tested (psi)

Manufacturer	Nozzle	Model	Pressure Tested (psi)

I. Principle of the Method

[Briefly describe the method used to assess the drift reduction potential of the technology, how deposition was measured. Note any differences between the method used and those specified in the DRT protocol.]

[Provide brief description of testing conditions: name, location, deposition area setup and orientation, etc.]

[Briefly indicate whether study conditions were within protocol acceptance criteria requirements.]

Table 2. Field Study Parameters

Parameter	Value	Acceptance Criteria
Dry bulb air temperature (ºC)		Between 5 and 35 °C, measured to an accuracy within 0.5 °C
Wet bulb and dew point temperature (ºC)		Temperature measured to an accuracy within 0.5 ºC or within 5%
Relative humidity (%)		20 to 80% with maximum variation of 5% during test
Horizontal wind speed (m/s)		At least 1 m/s for all applications, measured at an accuracy within 0.2 m/s at nozzle height
Horizontal wind direction (degrees)		90° ± 30° to the spray track or the downwind edge of the sprayed area during the spray application
Nozzle flow rate (cm^3/s)		Repeat measurements for individual nozzles within ± 2.5%
Horizontal wind angle relative to sample line (degrees)		Mean angle between the sample line and the horizontal wind direction should not exceed 30º
Frequency of meteorological measurement sampling		≥ 1.0 Hz sampling rate
Dynamic surface tension of spray liquid (dynes/cm)		Measured to within ± 5% at surface lifetime age of 10 to 20 ms

Parameter	Value	Acceptance Criteria
Surface vegetation height (cm)		< 7.5 cm absolute height for all vegetation surface heights in drift sampling areas with typical uniformity not to exceed ± 10% standard deviation.
Sample line and collection station locations (m)		± 2.5% of required location distances (at a minimum 2 m downwind of nozzle)
Sampling media area for individual collectors (cm^2)		≥ 1000 cm² for deposition cards
Collector orientation for flat card or plate or cylindrical collectors (degrees)		Horizontal ± 15º relative to spirit level instrument or for vertical towers (optional additional collector), vertical ± 15º
Diameter of cylindrical collectors (mm)		2 mm ± 5%
Number of samples at each sampling location		Determined from tests for the specific setup to produce confidence interval of ± 10%
Boom length (cm)		Measured with accuracy within 1.0 cm when stationary
Boom height above ground (cm)		Measured with accuracy within 1.0 cm when stationary
Application rate of tank mix in treated area (lbs/A)		Within 2.5% of intended application rate
Forward speed of sprayer (mph)		Within 10% of target speed throughout entire application period. For aerial, at least 140 mph, and measured to an accuracy within 5 mph.
Spray pressure (psi)		± 0.5 psi of values specified in the ASABE[1] standard for reference and manufacturer recommended values for the test nozzles.
Solvent volume for extraction of tracer if using collectors (ml)		5% of volume required for analytical recovery and assessments (*i.e.*, all samples should be washed with the same volume of solvent within 5% of the target volume)
Stability of tracer under conditions of study (light intensity, relative humidity, temperature, sampling media, storage conditions and duration, etc.) measured as the amount recovered relative to the amount mixed for control samples		Tracer must exhibit adequate photostability (documented or published) allowing within 10% of the initial mixture detection values for all samples (note: samples should be collected in minimum possible time after exposure to drift sampling, stored in dark containers, and analyzed as soon as possible after collection)

1. ASABE – American Society of Agricultural and Biological Engineers

[Briefly describe any analytical methods that were used to assess the deposition amounts.]

II. Results

Application Conditions

Summarize the application rates used, application equipment parameters (*e.g.*, boom length and nozzle orientation, travel speed, nozzle pressure and flowrates), deposition field parameters, and meteorological conditions.

Deposition Measurements

[Discuss the results of the deposition, both for the standard and the DRT.]

QA/QC of Analysis

[Discuss the results of any method validation work conducted in support of the analytical work conducted in this study.]

III. Method Deficiencies and Reviewer's Comments

[List any deficiencies with study, particularly those that are not in line with the protocol.]

IV. References

[List any references cited in the review.]

Attachment 1: Deposition Analysis

[Attach figures and tables depicting the deposition curves developed for the various DRT. The following is an example.]

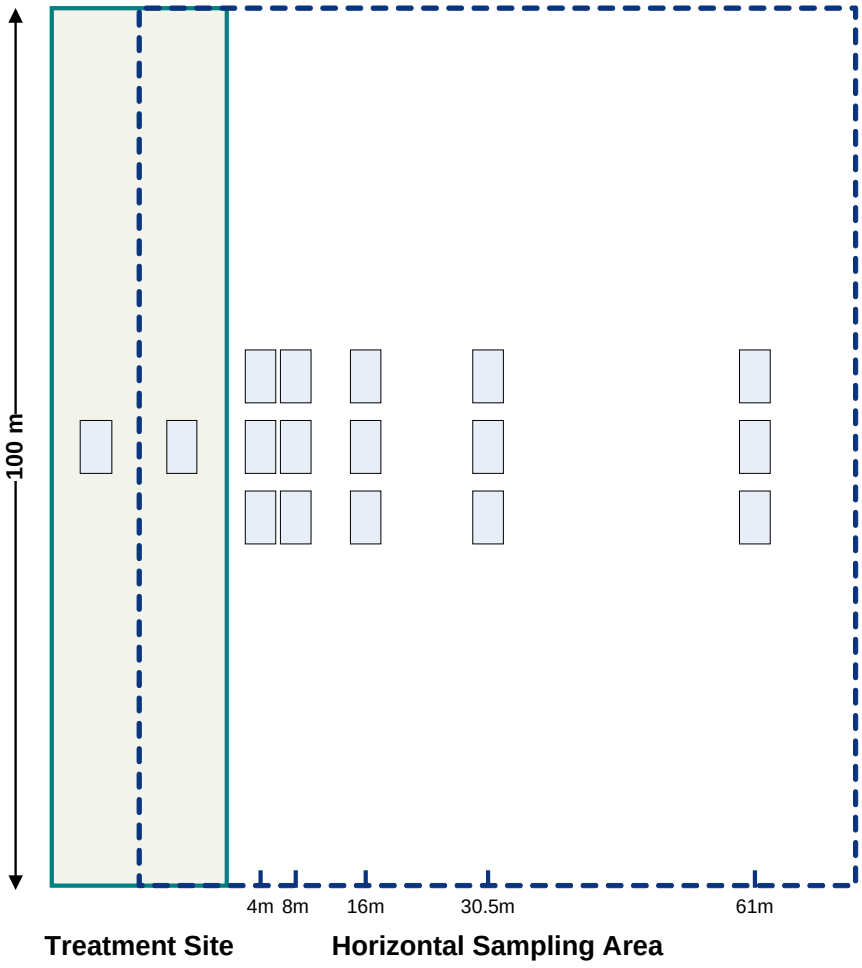

Figure X. Sampling locations for field testing.

Section III. Drift Reduction Technology Report Review Considerations

This list of considerations is provided to help reviewers assess the acceptability of drift reduction technology reports. This list may be used as a screen, but is not meant to be attached to the report reviews. Listed considerations carry unequal weight. Evaluate them using best professional judgment. Consider all information from the reports and from reports for similar methods to determine whether any deficiencies affect the method report classification.

DRT Report – Field Deposition Study

» A protocol for the field deposition study was submitted, reviewed, and approved by the Agency prior to the conduct of the study.

» Three parallel lines of horizontal collectors within the sampling array were used.

» Collector lines in the sampling array were spaced at least 15 m apart.

» The center collector line in the sampling array was in the center of the application area.

» Horizontal deposition samplers were placed at a minimum of 4 m, 8 m, 16 m, 30.5 m, and 61 m from the downwind edge of the treated area.

» At least one collector was placed in the swath and upwind of the treatment area.

» The meteorological conditions were measured in the open within 30 m of the treatment area and away from any obstruction or topographical irregularities.

» A map was provided showing the treatment area, sampler placements, position of the meteorological station(s), and any obstructions or identifying features of the test area.

» Meteorological conditions were measured with at least one weather station during applications.

» The sampling rate for wind speed and direction was at least four samples per minute. The wind speed was at least 1 m/s for all applications.

» The date and time of sample collection and analysis was recorded. Sample holding conditions (*e.g.*, temperature, containers, light) were noted for the period between sample collection and analysis.

» The samples collected during the test program consisted of horizontal samplers (for example, filter paper).

» Tracer materials and sample processing techniques were selected to meet the specified data quality goals.

» Each test lab documented its approach to collecting, storing, and analyzing horizontal sample collectors in its site specific test plan.

» Immediate analysis of samples was conducted. If data collection and analysis were not done on-site, sample custody requirements were part of the test plan.

» Measurement of deposited material occurred by extracting tracer from the horizontal sample collectors followed by measurement of the amount of tracer in the extract.

» Tracer measurements were expressed as the amount of material per unit area of sampler.

» Instruments used to measure tracer (*e.g.*, gas chromatographs) were of adequate sensitivity to measure deposition at the most distant sampler.

» The boom width, intended swath width, nozzle placement, and nozzle orientation of the application equipment were reported.

» Wind direction during and for 2 minutes after application was ± 30 degrees perpendicular to the swath.

» Drive speed for ground equipment was between 4 and 24 km/h (2.5 to 15 mph). Aerial application equipment speed was maintained between 50 and 165 mph.

» Randomly selected, unused horizontal sample collectors were spiked with tracer at 2 and 200 times the level of quantitation for the analytical equipment to be used for measuring tracer. Tracer recovery was within 80 to 120% of the spiked amount.

» Linearity of deposition relative to measurement instrumentation response was demonstrated in the deposition range measured.

» Tracer concentration in the spray material tank was measured and reported before and after testing on each test day and for each tank mix used.

» Analytical instruments used to measure tracer extracts from collectors were calibrated on the same day of analysis. Calibration used a standard curve consisting of at least three points spanning the level of quantitation and the highest measured concentration level. The standard curve was linear (r^2 greater than 0.95).

» Prior to labeling, each sampler was visually inspected and discarded for use if any damage was found.

» The tracer allowed for adequate sensitivity to measure deposition at all test distances. The tracer was stable and nonvolatile in the test frame for testing and analysis.

» Background measurement samples from the testing site demonstrated negligible levels of tracer or other interfering compounds.

» The hardness of water used in spray tanks was documented.

» For data not gathered directly by the testing organization, the testing organization described these measurements in their protocol or the applicant-specific addendum.