III. Appendices

E. Water Appendix

9. Spray Drift Loadings Used in the Cumulative Assessment

Spray drift loadings for the Index Reservoir scenario were developed using AgDRIFT 2.01 (Teske et al 2001), a spray drift model developed through a cooperative research and development agreement with EPA, USDA, and the Spray Drift Task Force. The aerial portion of AgDRIFT consists of the US Forest Service model, AGDISP (Bilanin et al 1989), while the ground boom and airblast parts of the model are empirically based on spray drift data developed by the Spray Drift Task Force. Spray application parameters entered into AgDRIFT were estimated from a number of sources shown in Table III.E.9-1. The Aquatic Assessment feature of AgDRIFT (Teske et al 2001) was used to calculate spray drift loadings to the Index Reservoir and its associated feeder streams (Jones et al 1999).

Table III.E.9-1 AgDRIFT / AGDISP input values for OP cumulative assessment

Input	Value	Relative Importance	Justification
Aerial: Droplet size	ASAE 572 fine/medium (254 mm volume median diameter)	high	Appropriate size for efficacy using contact insecticides. U Nebraska Lincoln (http://pested.unl.edu/catmans/aerial.skp/aerch6.htm) suggests insecticide applications normally occur in the 150 - 300 mm volume median diameter range.
Aerial: Boom height	8 feet	moderate	AgAir Update recommends flying with a wheel height of 3 to 5 feet above crop. Assuming the wheels are 4 feet from the boom gives an estimate of 8 foot boom height. (http://www.agairupdate.com/aau/wannabe/pilot.html)
Aerial: Boom length	76.3% of wingspan	moderate	Standard practice for drift management
Aerial: Swath displacement	20 feet (1/3 swath width)	small	Applicators typically very swath displacement with wind speed and other parameters. This value is expected to be a typical swath displacement.
Aerial: Carrier type	water	small	Typical for agricultural applications of OPs.
Aerial: Volume	5 gallons / acre	small	Typical volume used in fixed wing aerial application.
Aerial: Nonvolatile rate	3 lbs / acre	small	Nonvolatile rate varies with application rate and formulation type. This value is consistent with a range of possibilities.
Aerial: Aircraft	Air Tractor AT-401	small	Commonly used application aircraft.

Input	Value	Relative Importance	Justification
Aerial: Wind speed	3.58 m/s (8 mph)	moderate	Selected to be representative of median application wind speed. Most agricultural aerial labels prohibit applications at winds speeds above 10 mph.
Aerial: Relative humidity	50 %	small	Default
Aerial: Temperature	30 degrees C	small	Default
Ground boom: Boom height	Low boom (20 inches)	moderate	Good practice for minimizing drift.
Ground boom: Drop size distribution	ASAE very fine to fine	high	Efficacious drop size for most organophosphate insecticides.
Ground boom: Data percentile	50th	moderate	Selected to be representative of most applications.
Orchard airblast: Combination orchard	Dense	moderate	Representative of dense and tall orchards. Also expected to be similar to sparse and young orchards.
Vineyard airblast: vineyard	foliated vineyard	moderate	Representative of 6 ft tall vineyard under typical drift conditions
Aquatic Assessment: Downwind water body width	4 m (stream) 82 m (reservoir)	high	EFED Index Reservoir Manual 11/16/99
Aquatic Assessment: Distance to water body from field edge	4 m (stream) 4 m (reservoir)	high	The normal value used with the reservoir stated in “EFED Index Reservoir Manual 11/16/99" was changed to be consistent with the distance used for streams. This is expected to be less conservative but representative more reservoirs.

Drift loadings to the index reservoir scenario were calculated using the following formula:

$$Loading_{Total} = (0.5)\ Loading_{reservoir} + (Area_{streams} / Area_{reservoir}) Loading_{streams}$$

The areas of the reservoir and associated streams are 5.3 and 0.6 hectares, respectively. Calculated spray drift loadings are shown in Table III.E.9-2. Concentrations in the Index Reservoir (not feeder streams) were multiplied by a factor (0.5) in order to account for the effects of varying wind direction over many applications. Using a factor of 0.5 implies it is equally likely for the wind to blow

from a field to the reservoir as away from the reservoir. The factor was not applied to the feeder stream component of the Index Reservoir scenario because it is assumed streams are likely to have fields on both sides. The Multiple Application Assessment feature of AgDRIFT (Teske 2000) could potentially be used to account for the effects of meteorology within the regions modeled by modeling site specific meteorology and wind rises. However, the Multiple Application Assessment feature has not been fully evaluated and thus was not used in this assessment.

Table III.E.9-2 Spray drift loadings calculated using AgDRIFT / AGDISP and the formula above

Application method	Loading as fraction of the application rate		
	Reservoir	Feeder streams	Total
Aerial	0.068	0.184	0.055
Ground boom	0.0049	0.022	0.0049
Orchard Airblast	0.008	0.041	0.0087
Vineyard	0.001	.0065	0.0012

References

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