APPENDIX 1-3. Methomyl Scenario Development for Aquatic Modeling

The purpose of this Appendix is to provide supporting information for the aquatic modeling work.

The use sites simulated for methomyl are documented in **Appendix 3-1**. Agricultural modeling simulations are also summarized in **Table 2**. In **Table 2**, the use data layer (UDL) was obtained from information provided in **Appendix 3-1**. The PWC scenario simulated was determined based on the UDLs used in mapping. Unless otherwise noted, aquatic modeling for a HUC2 was simulated when the 2012 National Agricultural Statistics Service Census Data indicated that a crop was grown in that region. Limited data were available with regards to Puerto Rico, Alaska, and Hawaii and some assumptions were made in those areas based on best available information. Most crops were assumed to be grown in these areas when information was not available; however, some crops were assumed not to be grown in HUC-02 region 20 or HUC-02 region 21. For example, tobacco and sunflowers were assumed not to be grown in HUC-02 region 20 and HUC-02 region 21. See **Chapter 3** for additional details on the aquatic modeling.

In selecting application dates for aquatic modeling, EPA considered many factors.  Label directions, such as whether a pesticide application was made during a dormant season, or if it was applied during preemergence or postemergence of the crop, are considered.  Consideration is also given to the timing of the pest pressure, utilizing resources such as the crop profile write-ups (<http://www.ipmcenters.org/cropprofiles/>), agricultural extension bulletins, and/or available state-specific use information. Methomyl labels provide information on treatment based on crop development, such as emergence to harvest, pre-bloom to harvest for majority of crops.  For this reason, Integrated Pest Management (IPM) crop profiles and their characterization of the timing of pest pressures were also considered as an important line of evidence in the determination of application dates.

Methomyl labels, the crop profiles, and an analysis of the model weather files were used to determine the time of year most likely to produce the greatest off-site transport.  The meteorological information is considered as pesticide loading to surface water may be directly affected by precipitation events. The wettest month (*e.g.*, the month with the highest average daily precipitation) within each HUC2 was identified (**Table 1**), and a random date (*e.g.*, the 15th of each month) was considered in an effort to maintain the probability of the distribution of environmental exposure concentrations generated. The 15th of the given application month was arbitrarily selected and consistently used as the random date selection. Preharvest intervals specified on labels were also considered, so that applications were not modeled so that they occur within the pre-harvest window.

In HUC2 regions with differing amounts of rainfall across the region, an additional location was selected with substantially different meteorological conditions to represent the range of conditions across the HUC2 region **Table 1.** These HUC2 regions with differing conditions are 10, 11, 12, 15, 16, 17, 18, and 20.

Though methomyl is applied foliarly in agricultural settings, there are no other determinants restricting the timing of application as insect pests are wide ranging in their seasonality.  In some instances, a known and predominant pest pressure with a well-identified window of treatment may define the application window for uses with lower application rates.  In the absence of definitive pest pressure information, the wettest month during the growing season for a particular crop group and in a particular region is selected (**Table 1**).

Table 1.  Month with highest total precipitation in each 30-year weather file in each HUC2

| **HUC2** | **City, State** | **Meteorological File** | **Average Wettest Month in 30 years of data** |
| --- | --- | --- | --- |
| 1 | Hartford, CT | w14740 | May |
| 2 | Lynchburg, VA | w13733 | July |
| 3 | Atlanta, GA | w13874 | March |
| 4 | Milwaukee, WI | w14839 | August |
| 5 | Covington, KY | w93814 | May |
| 6 | Knoxville, TN | w13891 | March |
| 7 | Des Moines, IA | w14933 | June |
| 8 | Fort Smith, AR | w13970 | July |
| 9 | Fargo, ND | w14914 | June |
| 10a | Grand Island, NE | w14935 | June |
| 10b | Sheridan, WY | w24029 | May |
| 11a | Fort Smith, AR | w13964 | May |
| 11b | Amarillo, TX | w23047 | June |
| 12a | Fort Worth, TX | w03927 | May |
| 12b | Abilene, TX | w13962 | September |
| 13 | El Paso, TX | w23044 | September |
| 14 | Rock Springs, WY | w24027 | May |
| 15a | Flagstaff, AZ | w03103 | July |
| 15b | Phoenix, AZ | w23183 | December |
| 16a | Salt Lake City, UT | w24127 | April |
| 16b | Winnemucca, NV | w24128 | November |
| 17a | Eugene, OR | w24221 | December |
| 17b | Pocatello, ID | w24156 | May |
| 18a | Sacramento, CA | w23232 | January |
| 18b | San Diego, CA | w23188 | January |
| 19a | Big Delta, AK | w26415 | July |
| 19b | Talkeetna, AK | W26528 | August |
| 20a | Hilo, HI | w21504 | November |
| 20b | Honolulu, HI | w22521 | December |
| 21 | Puerto Rico | w11641 | May |

# Use Scenarios

**Table 2** provides a listing of the methomyl uses that were modeled in this BE, along with the maximum single application rate, number of applications, and retreatment interval. More information on the assumptions used in aquatic modeling, and which HUC2 regions were modeled for each use pattern is available in **Appendix 3-2**.

Table 2. Modeled Crop Groups with Maximum Single Application Rate, Application Types, and Application Timing and/or Target

| **Filename** | **Use Data Layer** | **PWC scenario** | **HUC2s** | **Crop Group** | **Specific crops included in this group** | **Max. Single App. Rate**  **(lb a.i./acre), # of Apps, RTI** | **Application**  **Type** | **Application Timing/ Target** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Alfalfa | Alfalfa | Grassland | 1-11, 13, 14, 16, 17, 19, 20 | Alfalfa | Alfalfa1 | 0.9, 12, 5 | air/ground/ overhead chemigation | post-cutting to harvest |
| 12 | 0.9, 14, 5 |
| 15 | 0.9, 18, 5 |
| 18 | 0.9, 16, 5 |
| Bermuda Grass, pasture | Bermuda Grass | Grassland | 3,6,8,11-13, and 18 | Bermuda Grass | Bermuda Grass2 | 0.9, 6, 5 | air/ground | post-cutting to harvest |
| 15 | 0.9, 9, 5 |
| Citrus | Citrus | Citrus | 15, 18, 20 | Citrus | Grapefruit, lemon, orange | 0.9, 3, 5 | air/ground | pre-bloom to harvest |
| Corn | Corn | Corn | All but 12, 18, and 20 | Corn | Corn | 0.45, 5, 5 | air/ground | emergence to harvest |
| 12, 18, 20 | 0.45, 10, 5 |
| Cotton | Cotton | Cotton | 3, 5, 7, 8, 10, 11, 12, 13, 15, 18 | Cotton | Cotton | 0.675, 2, 53 | air/ground | emergence to harvest |
| Lentils | Vegetable/  Ground Fruit | Vegetable | All but 21 | Vegetable/  Ground Fruit | Lentils6 | 0.9, 1 | air/ground | emergence to harvest |
| Peach | Other Orchard | Orchard | All but 20 and 21 | Other Orchard | Apple4, nectarine, peach, tangelo, tangerine | 0.9, 6, 5 | air/ground | pre-bloom to harvest |
| Peanut | Other Row Crop | Other Row | 1-8 | Other Row Crop | Peanut | 0.9, 4, 5 | air/ground | emergence to harvest |
| Pear | Other Orchard | Orchard | 1, 2 | Other Orchard | Pear, pomegranate | 0.9, 2, 5 | air/ground | pre-bloom to harvest |
| Pecan | Other Orchard | Orchard | 2, 3, 5, 6, 8 | Other Orchard | Pecan | 0.9, 7, 5 | air/ground | pre-bloom to harvest |
| Sorghum | Other Grains | Other Grain | All but 20 and 21 | Other Grain | Sorghum | 0.45, 2, 5 | air/ground | emergence to harvest |
| Soybean | Soybean | Soybean | All but 20 and 21 | Soybean | Soybean | 0.45, 3, 5 | air/ground | emergence to harvest |
| 8 | 0.9, 3, 5 |
| Sugar beet | Other Row Crops | Other Row | All but 215 | Other Row Crop | Sugar beet | 0.9, 5, 5 | air/ground/ overhead chemigation | emergence to harvest |
| Tobacco | Other Row Crops | Other Row | 1-12, 14-185 | Other Row Crop | Tobacco | 0.45, 5, 5 | air/ground | emergence to harvest |
| Sod, turf | Other Crops | Other Crop | 2, 3, 4, 5, 10, 11, 125 | Other Crop | Turf | 0.9, 4, 5 | air/ground | emergence to harvest |
| Vegetable | Vegetable/  Ground Fruit | Vegetable | All but 20 and 21 | Vegetable/  Ground Fruit | Anise, asparagus, avocado, bean, beet, blueberry, broccoli, brussel sprout, carrot, cauliflower, celery, chicory, chinese cabbage, collards, cucumber, eggplant, endive, garlic, horseradish4, leafy greens, lettuce, melon, mint, onion, pea, pepper, potato, spinach, summer squash, sweet cron, tomato, tomatillo | 0.9, 16, 2 | air/ground | emergence to harvest |
| 15 and 18 | 0.9, 24, 2 |
| Wheat | Wheat | Wheat | 17 | Wheat | Wheat | 0.45, 4, 5 | air/ground/ overhead chemigation | emergence to harvest |

1 Assumed 6 cuttings for all HUCs based on growing periods in the HUC 2 region except HUCs 12, 15, and 18. Seven cuttings for HUC 12. Nine cuttings for HUC 15 as described in labels. Eight cuttings for HUC 18. Assumed 2 crop cycles per year.

2 Assumed 6 cuttings for all HUCs based on growing period except HUC 15. Nine cuttings for HUC 15 as described as per labels.

3 Retreatment interval 3 days in HUCs 15 and 18.

4 Only ground EECs are applicable.

5 Based on 2015 CDL.

6 Since methomyl can be applied 40+ vegetable crops, application rate of cauliflower was used as an upper-bound assessment for aquatic exposure.

Two crop cycles for all HUCs except 15 and 18. Three crop cycles for HUCs 15 and 18. Application rate for lentils was used as a lower-bound assessment for aquatic exposure.