MEMORANDUM: July 17, 1997

SUBJECT: Review of selections of CWSs for acetochlor sampling and analysis by the Acetochlor Registration Partnership **(D218244)**

TO: Don Stubbs
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Introduction:

As one of the conditions of registration, the Acetochlor Registration Partnership (ARP) agreed to monitor a number of surface water source Community Water Supplies (CWSs) for acetochlor for several years. This is a review of the methodology the ARP employed in selecting CWSs for inclusion in the surface water monitoring program.

CWS Selection Methodology

A stratified random sampling methodology was used to select CWSs for sampling and analysis. The ARP developed 60 strata representing 12 states (IL, IN, IA, MN, NE, KS, WI, OH, MO, PA, MD, and DE) X 5 types of waterbodies/watersheds (Great Lakes, Continental Rivers; small watersheds with 5-10%, 11-20%, and >20% corn intensity).

Corn intensity was defined by the authors as the % of the total area in the watershed planted to corn. It was estimated using GIS methods and was used as a surrogate for acetochlor usage.

All surface water source CWSs identified in the 12 states that were also willing to cooperate and fit into any of the 60 strata were identified and placed into the applicable stratum as possible candidates for selection. Of the 1042 surface water CWSs identified across the 12 states, only 306 were possible candidates that were both willing to cooperate and fit into one of the 60 strata.

To ensure that a greater number of selected CWSs had potentially higher than lower acetochlor concentrations, the ARP decided to select a higher percentage of CWSs from waterbodies/watersheds representing potentially higher overall acetochlor concentrations than from those potentially representing lower overall acetochlor concentrations. Consequently, the ARP decided to randomly select:

(1) 100% of 76 candidate CWSs = 76 CWSs across the 12 state strata representing small watersheds with > 20% corn intensity.

(2) 66% of 47 candidate CWSs = 31 CWSs across the 12 state strata representing small watersheds with 10-20% corn intensity.

(3) 49% of 87 candidate CWSs = 43 CWSs across the 12 state strata representing small watersheds with 5-10% corn intensity.

(4) 43% of 40 candidate CWSs = 17 CWSs from the 12 state strata representing continental rivers.

(5) 14% of 56 candidate CWSs = 3 CWSs from strata representing the Great Lakes.

The selection process resulted in the stratified random selection of 175 CWSs of 305 candidate CWSs over 12 states for the surface water monitoring program.

General Characteristics of the CWSs Selected

The distribution of the 175 CWSs selected for the surface water monitoring program with respect to state and type of waterbody/watershed is provided in Table 1 (Table 1 of the study report). Each of the 60 strata representing 12 states X 5 types of waterbodies/watersheds is represented by a box in Table 1. The 20 empty boxes represent strata for which no candidate CWSs were available for selection. In the boxes representing the other 40 strata, the top number is equal to the total number of surface water source CWS candidates in the stratum, the middle number is equal to the number of CWSs randomly selected from the stratum, and the lower number is equal to the percentage of total CWSs in the stratum that were selected.

The 175 CWSs selected for the monitoring program represented 175/306 = 57% of the 306 candidate CWSs residing in the 40 of 60 strata having at least one CWS. At least one CWS was selected from each of those 40 strata.

Of the 175 CWSs selected, the following percentages represented the 5 waterbody/watershed classes:

(1) 76/175 = 43.4% represented drainage from small watersheds with > 20% corn intensity.

(2) 31/175 = 17.7% represented drainage from small watersheds with 10-20% corn intensity.

(3) 43/175 = 24.6% represented drainage from small watersheds with 5-10% corn intensity.

(4) 17/175 = 9.7% represented intake from continental rivers (Missouri, Mississippi, and Ohio Rivers).

(5) 8/175 = 4.6% represented intake from the Great Lakes

Of the 175 CWSs selected, the following percentages represented the 12 states:

(1) 42/175 = 24% represented IL
(2) 22/175 = 12.6% represented IN
(3) 16/175 = 9.1% represented IA
(4) 9/175 = 5.1% represented KS
(5) 4/175 = 2.3% represented MN
(6) 4/175 = 2.3% represented NE
(7) 6/175 = 3.4% represented WI
(8) 30/175 = 17.1% represented OH
(9) 25/175 = 14.3% represented MO
(10) 10/175 = 5.7% represented PA
(11) 5/175 = 2.9% represented MD
(12) 2/175 = 1.1% represented DE

The maximum, minimum, mean, and median watershed acres, population served and corn densities overall and for the 5 types of waterbodies/watersheds are provided in Table 2 (Table 2 of the study report). The CWSs selected represent a wide range of watershed size (83 to 4.4 X 10^8 acres), population served (167 to 5.1 X 10^6), and corn intensities 0.0% to 44.4%)

The geographic distribution of the CWSs selected, the boundaries of the watersheds from which they receive water, and the corn intensities within the 12 states considered are graphically provided in Figures 1, 2, and 3 (Figures 3, 2, and 1, respectively, of the study report.

Figure 4 (Figure 4 of the study report) shows within each of the 5 waterboby/watershed classes, the number of CWSs serving various population ranges. Figure 5 (Figure 5 of the study report) shows within each of the 5 waterboby/watershed classes, the number of CWSs draining various watershed area ranges. Figure 6 (Figure 6 of the study report) shows for each of the 5 waterbody/watershed classes, the total number of CWSs within the class, the number of CWSs with reservoirs and the number of CWSs with GAC treatment.

All of the 175 CWSs selected for the surface water monitoring program reportedly employ conventional treatment (coagulation, flocculation, sedimentation, filtration) to remove suspended sediments and other suspended solids from the water supply. In addition, 111 CWSs (111/175 = 63.4%) use powdered activated carbon (PAC) and 21 CWSs (21/175 = 12%) use granular activated carbon (GAC) in place of or in addition to PAC to reduce dissolved

organics in their water supplies. Figure 6 (Figure 6 of the study report) shows for each of the 5 waterbody/watershed classes, the total number of CWSs within the class, the number of CWSs with reservoirs and the number of CWSs with GAC treatment.

Individual Characteristics of Selected CWSs

Various individual characteristics of the 175 CWSs selected for the surface water monitoring program are listed in Table 3 (Appendix A of the study report). The characteristics include the system name and address, the population served, the area and corn intensity of the watershed from which they receive their water, whether or not they use granular GAC) and/or powder (PAC) activated carbon, and the state and type of waterbody/watershed they represent.

Conclusions:

1) The main problem with the selection methodology used is that it resulted in an apparently much higher percentage of the 306 candidate as well as 175 selected CWSs with powdered and/or granular activated carbon treatment than in the overall population of 1042 surface water source CWSs within the 12 states from which selections were made.

2) The high percentage of candidate and subsequently selected CWSs with PAC and/or GAC treatment may be due to CWSs with no PAC/GAC treatment being more reluctant to cooperate in a voluntary monitoring program than CWSs with such treatment processes in place. CWSs unwilling to cooperate were of course not included in the pool of candidate CWSs.

3) Although the ARP could not include CWSs unwilling to cooperate in the pool of candidate CWSs, the ARP could and should have increased the number of selected CWSs with no PAC and/or GAC treatment in place by:

(a) doubling the number of strata by differentiating between systems with and without PAC and/or GAC treatment.

(b) selecting a larger percentage of CWSs (maybe even 100%) from strata containing candidate CWSs with no PAC/GAC treatment in place than from corresponding strata containing candidate CWSs with such treatment in place.

4) A comparison of acetochlor concentrations in raw and finished water for CWSs using PAC/GAC treatment as reported in the first annual report indicate that such treatment can reduce acetochlor concentrations several fold in some cases.

5) Although acetochlor is registered for use on corn in 42 states, CWSs were selected for monitoring from only 12 of the states.

Although the selection of the 12 states was presumably based on corn acreage and/or corn intensity, little information or justification was provided in the document. Although the rationale for selecting the highest corn producing states such as IL and IA is clear, the rationale for selecting some of the other states over states with comparable corn acreage is not.

6) The rationale for the ARP deciding to select a higher percentage of CWSs from waterbodies/watersheds representing potentially higher overall acetochlor concentrations than from those potentially representing lower overall acetochlor concentrations is clear. However, the selection of the specific percentages in each case is not.

7) The CWS selection procedure generally resulted in a higher number of CWSs being selected from the waterbodies/watersheds with potentially higher acetochlor concentrations. However, 43 CWSs were selected for small watersheds with 5-10% corn intensity compared to only 31 CWSs for small watersheds with a higher corn intensity of 11-20%.

Recommendations

1) Including some CWSs in the monitoring program with PAC and/or GAC treatment in place is fine. However, we believe that the percentage of selected CWSs with such treatment in place is substantially greater than surface water source CWSs in general. In addition, such treatment processes are apparently capable of reducing acetochlor concentrations several fold in some cases. Consequently, we believe that in future monitoring, some CWSs that have PAC and/or GAC treatment in place and for which to date there are mostly or all non-detects for acetochlor be replaced to the extent possible by CWSs having no PAC and/or GAC treatment in place.

We are not recommending that the total number of CWSs being monitored be increased. Rather, we are recommending that some of the CWSs with PAC and/or GAC treatment in place that are currently being monitored and appear to be of little or no concern with respect to acetochlor be replaced in future monitoring by CWSs with no PAC and/or GAC treatment in place. See conclusions #1-#4 above.

2) Some additional rationale should be provided for state selection (see conclusion #5 above).

Acetochlor EFED review

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