Preliminary N-Methyl Carbamate Pesticides Cumulative Risk Assessment

II.D Appendices: Drinking Water Exposure

2. Summary of State Monitoring for N-Methyl Carbamates

The EPA Office of Pesticide Programs (OPP) contacted the lead pesticide agencies in each state during the summer of 2004 to determine whether any of the N-methyl carbamates (NMC) in this cumulative assessment group have been included in ground- or surface-water monitoring programs over the last decade. When monitoring programs were performed by agencies other than the lead pesticide agency, OPP contacted them as well. If NMC monitoring data were available for a particular state, OPP inquired whether the data could be accessed via the Internet. Many state agencies offered to provide data if information has not yet been made available online.

The majority of State monitoring programs included few, if any, NMCs in their analysis. The majority of States have focused monitoring efforts on ground-water monitoring, particularly monitoring of five herbicides under the Pesticide Management Plan. With few exceptions, State monitoring programs have not specifically been targeted to the areas and timing of NMC application. Because of this, and because many NMCs are not required by the Safe Water Act to be included as analytes in drinking water sampling, data from State monitoring programs are used as important supplemental data for the NMC cumulative drinking-water risk assessment.

One exception to his is private well monitoring data conducted by the Florida Department of Environmental Protection (FL DEP), which proved to be valuable in developing and evaluating the ground-water modeling approach the Agency used for this cumulative exposure assessment.

This is a draft appendix which includes only brief summaries of state monitoring programs pertinent to the NMC CRA. It does not include any analyses or discussion of data. Such work will be included in the revised NMC CRA, which is expected to be released by the end of 2005. The status of those State programs which responded to the Agency's queries is summarized below.

Arizona

Wang Yu of the Arizona Department of Environmental Quality Groundwater Monitoring Unit provided a data set based on statewide monitoring efforts routinely undertaken by the Pesticide Contamination Prevention Program and Ambient Groundwater Monitoring Program of ADEQ. There were very few detections of carbamates in the last decade of monitoring data.

Arkansas

Charles Armstrong of the Arkansas State Plant Board Pesticides Division said that they monitor for carbamates but they have never had any detections.

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Colorado

Greg Naugle, the Groundwater Quality Coordinator for the Colorado Department of Public Health and Environment, sent a summary of the carbamate sampling conducted by the Colorado Agricultural Chemicals in Groundwater Program. The carbamate screen that was run included aldicarb, aldicarb sulfone, aldicarb sulfoxide, carbaryl, carbofuran, 3-hydroxycarbofuran, methiocarb, methomyl, 1-napthol, oxamyl (vydate), and propoxur (baygon).

Mr. Naugle reported that since 1992, the program has analyzed approximately 570 samples with detection limits varying between about 0.23 and 4 ppb. To date, no samples have been analyzed with concentrations above the detection limit.

Michael Lewis, a Water-Quality Specialist with the U.S. Geological Survey, Water Resources Division Colorado District, sent two spreadsheets with separate statewide pulls from the database for GW and SW data. He also said that the data is most likely limited to the South Platte and Upper Colorado NAWQA study units.

The spreadsheets contain all available carbamate data for ground water and surface water sites sampled by the USGS WRD in Colorado from 01/1990 through 06/2004. The spreadsheets are formatted to highlight the "hits", which he believes are all reported as estimated (E) concentrations. These typically are for carbaryl and carbofuran. The values are reported as estimated, because of variable method performance with the analytical method.

Mr. Lewis also noted that any data reported for the 2004 water year (October 1, 2003-present) should be considered provisional and subject to revision pending final review and approval by the USGS.

Florida

Andrew Priest of the Florida Department of Environmental Protection provided the agency with two spreadsheets. The carbamates that the Florida DEP monitors for in groundwater are aldicarb, aldicarb sulfone, aldicarb sulfoxide, carbaryl, carbofuran, 3-hydroxycarbofuran, methiocarb, methomyl, oxamyl, and propoxur (baygon). Mr. Priest stated that they have taken over 6,000 samples and no carbamates have been detected except for aldicarb.

Dr. Chris Wilson, an Environmental Toxicologist at the University of Florida's Indian River Research and Education Center, conducted a study to monitor pesticides in a surface water body located in a citrus rich region of southeast Florida. For the study, Dr. Wilson's team collected one water sample daily at the discharge point for the small agricultural watershed over a one-year period. They analyzed the samples for aldicarb, aldicarb sulfone, aldicarb sulfoxide, carbaryl, carbofuran, methiocarb, methomyl,

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oxamyl, and propoxur. Dr. Wilson stated that his team has a manuscript that has been accepted by the Bulletin of Environmental Contamination and Toxicology detailing the results for aldicarb, aldicarb sulfoxide, and aldicarb sulfone. He said that, based on separate field studies conducted, they have found that aldicarb has a half-life of 2-4 days in Florida surface waters. Dr. Wilson's team also detected carbaryl, methomyl and oxamyl in a few samples. In addition to the carbamates, they have also monitored for organophosphates and copper. He supplied the agency with the poster that he presented at a local watershed meeting in early 2004 that gives a better explanation. The team is hoping to publish the other data towards the end of 2004.

Georgia

Steve Cole of the Georgia Department of Agriculture Pesticide Division reported that their lab is currently running Method 525.5 for groundwater samples. This method recovers carbamates, but the detection method the lab is using to screen for the five target analytes (GC/XSD) does not detect carbamates. Therefore, they have no data on carbamates for the last 18 months or so. In the past, the department did monitor for carbamates and had no detects. Mr. Cole supplied a list of detects from the program in 2001 and 2002. They had no pesticide detects in 2003 and the 2004 samples are still being analyzed.

Illinois

Anthony Dulka of the Illinois Environmental Protection Agency Bureau of Water, Groundwater Section, provided the list of EPA methods that they use to test for groundwater SOCs. Carbamates are not included in these tests.

Ms. Jeri Long from the Drinking Water Compliance Unit of the Illinois Environmental Protection Agency supplied 5 spreadsheets with monitoring data from all Illinois community water systems on aldicarb, aldicarb sulfone, aldicarb sulfoxide, carbofuran, and oxamyl.

Indiana

Ryan McDuffee from the Indiana Department of Environmental Management, Office of Water Quality, reported that their extensive surface water monitoring of pesticides was a 5 year program that was conducted from 1997 to 2001. He sent the laboratory data and the parameters that were included in the analysis; no carbamates were included. Currently they are conducting limited surface water monitoring of pesticides associated with their fixed station monitoring. He also provided the list of parameters that are being analyzed, which did not include carbamates.

George Neely from the Indiana Department of Environmental Management, Drinking Water Branch, provided the agency with information and data from the Drinking Water Compliance database for Indiana. The database contains point of entry

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data (after treatment) for Public Water Systems. The data that Mr. Neely supplied the agency only includes ground water systems and covers the period from1993 to the present.

Mr. Neely reported that Indiana has 656 Community ground water systems and 690 non-transient, non-community (NTNC) ground water systems. He also noted that "transient" public water systems are not included in the data because these systems are not required to sample regulated SOCs.

The Indiana drinking water database has data on seven of the carbamates and five of the carbamates are on the "unregulated SOC" list for Indiana. These are aldicarb, aldicarb sulfone, aldicarb sulfoxide, carbaryl, and methomyl . After the initial sampling for unregulated SOCs , systems are not required to submit these again. However, Mr. Neely reported that roughly 50% of the systems submit both regulated and unregulated every time they sample for SOCs and therefore a significant amount of data on these carbamates exists in the database. The other two carbamates, carbofuran and oxamyl (vydate), are both included on the list of regulated SOCs for Indiana. Therefore, Indiana's database has the most information on these two contaminants.

Mr. Neely stated that the most common SOC sampling frequency for ground water systems in Indiana is once every three years or once during each compliance period. He noted that there are only four entries that show a carbamate detection in the database, and the last detection was in 1997. The following four carbamates were each detected one time over the last 11 years: methomyl, oxamyl (vydate), carbofuran, and aldicarb. For the group of 5 carbamates (aldicarb, aldicarb sulfone, aldicarb sulfoxide, carbaryl, and methomyl) on the unregulated SOC list, a total of 2970 samples have been recorded since 1993 with "zero" results, and only two samples have had detections. For the two carbamates on the regulated list (carbofuran and oxamyl), a total of 6849 samples have been recorded since 1993 with "zero" results, and only two samples have had detections.

Kentucky

Tom VanArsdall, the Water Quality Branch Manager of the Kentucky Department for Environmental Protection, reported that they sample carbamates using Method 531.1 at many of their 70 long-term ambient sites and at approximately 20-25 rotating watershed sites every year. Also, Mr. VanArsdall said they try to collect them in sediments at the same sites, but lately they have not always collected the sediments. Water quality data are in STORET for the long-term sites and currently being loaded for the rotating watershed sites.

Louisiana

Leslie LeMon from the Safe Drinking Water Program of the Louisiana Department of Health and Hospitals will provide a data set to the agency.

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Massachusetts

Damon Guterman from the Drinking Water Program of the Massachusetts Department of Environmental Protection provided the agency with a spreadsheet of the seven carbamates that are included in their Safe Drinking Water Act monitoring program (five were part of the previous unregulated SOC list). These include aldicarb, aldicarb sulfone, aldicarb sulfoxide, carbaryl, carbofuran, methomyl, and oxamyl (vydate). Only 14 total detections were made over the last decade.

Mr. Guterman stated that "the Drinking Water Program makes every attempt to ensure that this data is accurate, complete and current. However, no guarantee is given that this data is error free. In addition, since updates and corrections are occurring at all times this data is time sensitive. Any published use of this data should include this disclaimer and acknowledge the Massachusetts Department of Environmental Protection, Drinking Water Program."

Michigan

Sainey Drammeh, from the Department of Information Technology of the Michigan Department of Environmental Quality, provided the agency with monitoring data from 1994 to present. Ms. Drammeh stated that this monitoring was conducted to ensure that the state's water quality is up to EPA standards. The data set includes drinking water, ground water, and surface water.

Dennis Bush from the Water Division of Michigan Department of Environmental Quality stated that they do not routinely monitor for carbamates in their surface water program. In 1997, Mr. Bush co-wrote a staff report which summarized the results of some pesticide analysis which was conducted in 1992 for some of the tributaries to the Saginaw Bay. Here is the summary he provided the agency: "In 1992, a total of 103 water samples were collected from the Saginaw

Bay watershed. The samples were collected primarily from the mouths of 27 tributaries to the Saginaw Bay. The samples were analyzed for 27 pesticides. Carbofuran, the only carbamate pesticide studied, was detected in 16 out of the 103 samples at concentrations ranging from 0.54 to 4.04 ug/L (the detection limit for carbofuran was 0.5 ug/L)."

Mr. Bush also referred the agency to a paper published by USGS (Environ. Sci. Technol. 2002. 36: 1202-1211) which looked at pharmaceuticals and pesticides throughout the country. He said they analyzed for carbaryl in the Boardman River in Michigan.

Missouri

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Dianne Holtmeyer of the Public Drinking Water Branch of the Missouri Department of Natural Resources provided the agency with a data set that contains the results for monitoring conducted using Method 531 from 1995 until mid-May 2004 on surface and ground water. There were no detections of carbamates.

Nevada

Jon Carpenter, the Groundwater Program Coordinator for the Nevada Department of Agriculture, said he would look at the data and get back to the agency. He said he was almost certain they haven't detected any carbamates though. (6-29-04)

New Hampshire

Pat Bickford from the New Hampshire Department of Environmental Services provided the agency with a data set for public water systems from 1996 to 2004. The department monitors for aldicarb, aldicarb sulfone, aldicarb sulfoxide, carbaryl, carbofuran, methomyl, oxamyl, and 3-hydroxycarbofuran. Based on this data set, there have been no carbamate detections. Ms. Bickford also stated that she had no way to tell if it was surface or ground water for each field. She advised the agency that this data was generated by the Department of Environmental Service's laboratory only and that public water systems can use any accredited commercial labs. Any hits from public water systems using these labs would be in the Water Supply Engineering Bureau's database.

New York

Jeff Myers, the Director of the Bureau of Water Assessment and Management for the New York State Department of Environmental Conservation, stated that they have conducted very little sampling for carbamates and have never had any "hits."

North Carolina

Dr. Henry Wade, who is the Environmental Programs Manager of the North Carolina Department of Agriculture and Consumer Services, Pesticide Section, reported that from 1991-1995 they tested water samples from shallow groundwater monitoring wells across the state. Dr. Wade stated they had 13 wells on different farms where aldicarb was used within 300 feet of the wells up to 5 years before the water samples were collected. There were no detections of aldicarb or its degradates. Some new shallow monitoring wells were installed on one farm where the department had previously tested for pesticides. In January 1996, they had detections in 3 wells:

G73: aldicarb sulfoxide 7.4 ppb; aldicarb sulfone 3.2 ppb
G212: aldicarb sulfoxide 1.0 ppb; aldicarb sulfone 1.0 ppb
G215: aldicarb sulfoxide 3.0 ppb; aldicarb sulfone 1.5 ppb

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These wells were sampled again in March and July of 1996 and twice in 1998. The two aldicarb degradates were not detected.

Also from 1991-1995, Mr. Wade reported they had 20 wells on farms where carbaryl was used, 6 wells on farms where carbofuran was used, and 13 wells on farms where methomyl was used. These pesticides were not detected in any of the sampling.

Jim Blose from the Division of Water Quality of the North Carolina Department of Environment and Natural Resources provided findings from limited pesticide analyses that were carried out for a series of watershed investigations. Mr. Blose reported that the only two carbamates analyzed were carbaryl and carbofuran. Both baseflow and storm samples were collected. Mr. Blose reported that carbaryl was detected in one of the ten watershed studies (detection at two sites during a single storm event) and carbofuran was not detected. The highest concentration of carbaryl observed was 3.62 ug/L. Mr. Blose provided a file that contains site information only for the two locations where carbaryl was detected.

South Carolina

Kathy Stecker, from the South Carolina Department of Health and Environmental Control, Bureau of Water, confirmed that South Carolina does not monitor for carbamates in their ambient surface water monitoring program. The website with the list of parameters sampled by the program, including pesticides, is http://www.scdhec.net/eqc/water/pubs/appd.pdf.

Peter Stone from the South Carolina Department of Health and Environmental Control, Bureau of Water, will supply the agency with drinking water information.

Jerry Moore from the South Carolina Department of Pesticide Regulation reported that they only test for aldicarb, carbaryl, and carbofuran. He said the department has been monitoring groundwater for these compounds since 1991 (approximately 2500 samples from private wells), and they have had no detections thus far. Their detection limits are not very low for the carbamates, and he was not sure about the lower detection limits for their lab.

South Dakota

Trish Kindt from the South Dakota Department of Environment and Natural Resources reported that their ambient surface water quality monitoring program does not include pesticide sampling.

Matthew Noonan, a Hydrologist from the South Dakota Geological Survey, reported that carbofuran is the only carbamate that they test for in South Dakota. He supplied the agency with a link to a publication with the results of ground water testing from 1989-1997, on page 34 there is a list of the pesticides that were tested for during this time period. (http://jurassic2.sdgs.usd.edu/pubs/pdf/UR-89%20-%20text.pdf)

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Mr. Noonan also noted that their web page has a database of the results from ground water testing and it is searchable by location and well name, as well as several other parameters. (http://www.sdgs.usd.edu/database_selection.html)

He also sent a list of the pesticides that the South Dakota Geological Survey is testing for in 2004. Carbofuran is the only carbamate on the list.

Texas

Alan Cherepon, who is a Resource Conservation Specialist for the Texas Commission on Environmental Quality, reported that they keep the Interagency Pesticide Database (IPD) for Texas within their agency's FIFRA Grant group; however, they hope to make it available in the future, possibly on a website. He searched the database of nearly 20,000 analytes and found that aldicarb (total) is the only carbamate that has ever been monitored in the past. However, they do not regularly monitor for carbamates because their standard EPA Method 525.5 analysis run on the samples does not include carbamates.

Mr. Cherepon reported that aldicarb (total) was sampled by Rone Poulenc in 1979, 1987, and 1988. He also found 3 other carbamates sampled for and analyzed by the USGS in 1993-1994, which include methiocarb, oxamyl, and propoxur.

Mr. Cherepon stated that the USGS samples are from around the Fort Worth area, while the Rone Poulenc has no specific locations indicated. There are no detects indicated; however, these were taken long enough ago that detection levels may have been much higher than they are now, as is the case with many of the pesticides that they typically monitor for. Mr. Cherepon stated that around 1998-1999, they started using Method 525.2

Mr. Cherepon also reported that the Public Drinking Water Program does not monitor for any carbamates because they use the same method of analysis, EPA Method 525.2.

Gary Regner from the Public Drinking Water Section of the Texas Commission on Environmental Quality provided the agency with drinking water monitoring data. Mr. Regner reported that Texas no longer monitors drinking water for carbamates, but they have in the past with EPA method 531. When the carbamates were monitored in the past, they were part of the SOC4 chemical analysis group. This group included aldicarb sulfoxide, aldicarb sulfone, oxamyl, aldicarb, carbofuran, methomyl, 3-hydroxycarbofuran, baygon, carbaryl, and methiocarb. Mr. Regner reported that of the 6183 samples collected over the time period of roughly 1992 to 2002, there were no carbamate detections. Samples were collected at public water systems from entry points. Mr. Regner reported that this is treated drinking water before it enters the distribution system.

Washington

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Ginny Stern and Jack Eden of the Washington Department of Health supplied a data set of carbamate monitoring data from January 1996 to December of 2003. This monitoring data mainly consists of groundwater, but includes several surface water samples, and focuses on pre-determined at-risk water bodies used for drinking water.

West Virginia

Doug Hudson, from the West Virginia Department of Agriculture, reported that they have conducted carbamate groundwater monitoring in the past and have never had any detections.