UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

MAR 30 1989

OFFICE OF
PESTICIDES AND TOXIC SUBSTANCES

MEMORANDUM

SUBJECT: Second Round Review for Simazine - Leaching Assessment

FROM: Michael Barrett
Chemist, Ground-Water Section, EFGWB (H7507C)

THRU: Patrick W. Holden
Head, Ground-Water Section, EFGWB (H7507C)

THRU: Henry Jacoby
Chief, Environ. Fate & Ground-Water Branch
Environmental Fate & Effects Division (H7507C)

TO: Janet L. Auerbach
Chief, Special Review Branch
Special Review & Reregistration Division (H7508C)

The following is our statement for the simazine second round review regarding the leaching potential of this pesticide. Note our recommendation below that use and monitoring data be tabulated by registrants in a manner analogous to that specified in the recent data call-in for atrazine.

Conclusions

Although at the current time few ground-water monitoring data exist which are high quality measurements from aquifers underlying known simazine use areas, sufficient environmental chemistry data are available to indicate simazine can leach to ground water in measurable quantities as a result of registered applications.

The preponderance of data indicating the leaching of atrazine to ground water in a variety of use areas also suggests that simazine, which has a chemical structure very closely related to atrazine, if used in similar areas at a similar intensity will also leach to ground water.

Additional information is needed to determine the likelihood of ground-water contamination from specific type registered uses of simazine and the influence on leaching of simazine of hydrogeologic factors such as the presence of karst topography, the depth to ground water, and soil permeability.

Recommendations

The retrospective ground-water monitoring study submitted by Ciba-Geigy Corp. (De Martinis, 1988) does provide useful information on the ground-water contamination potential of simazine in hydrogeologically vulnerable settings (areas with permeable soils, ground water less than 30 feet deep, and/or karst topography), however, the limited extent of the study and the low intensity of sampling (quarterly from each well) do not allow for this study to be used in making a nationwide assessment of simazine leaching potential.

A large-scale retrospective ground-water monitoring study for simazine might be required, but in light of the current status of atrazine (ground-water monitoring data requirements are being held in abeyance pending the registrant's response to a special data call-in that has been issued for specific use information on atrazine on a county-by-county and crop-by-crop basis for major crops and for compilation of existing ground-water monitoring data in a format conducive to relational analysis), enumeration of study requirements for simazine will also not be made at this time. Instead, upon receipt of the data requested below, if additional data are still necessary to identify high use areas with cultural, edaphic, hydrogeologic, climatic, and use conditions which contribute to a high potential for ground-water contamination by simazine, then a a large-scale retrospective ground-water monitoring study designed to answer the remaining questions will be requested.

The following data will be required within 6 months after the registrant is given notification in writing:

> Simazine use information and existing ground-water monitoring data be compiled in the same fashion by the registrant as has been requested for atrazine (Letter dated November 2, 1989 from Edwin F. Tinsworth, Special Review and Reregistration Division to atrazine registrants). An edited copy of the atrazine data call-in letter amended to fit the different use patterns of simazine is attached.

Please note that for cyanazine, another widely used s-triazine herbicide, we are also considering requesting such data.

cc: P. Holden
H. Jacoby

NOTE MAR 27 1989

SUBJECT: Second Round Review for Simazine - Leaching Assessment

FROM: Michael Barrett
Chemist, Ground-Water Section, EFGWB

TO: Silvia Termes
Chemist, Environ. Chemistry Rev. Sect. 2

The following is our statement for the simazine second round review regarding the leaching potential of this pesticide. As you requested, I have also attached a detailed summary of additional background information which I used in the leaching assessment for simazine. This leaching assessment summary is for your information only, it does not need to be included in the Second Round Review document.

Conclusions

Although at the current time few ground-water monitoring data exist which are high quality measurements from aquifers underlying known simazine use areas, sufficient environmental chemistry data are available to indicate simazine can leach to ground water in measurable quantities as a result of registered applications.

The preponderance of data indicating the leaching of atrazine to ground water in a variety of use areas also suggests that simazine, which has a chemical structure very closely related to atrazine, if used in similar areas at a similar intensity will also leach to ground water.

Additional information is needed to determine the likelihood of ground-water contamination from specific type registered uses of simazine and the influence on leaching of simazine of hydrogeologic factors such as the presence of karst topography, the depth to ground water, and soil permeability.

Recommendations

The retrospective ground-water monitoring study submitted by Ciba-Geigy Corp. (De Martinis, 1988) does provide useful information on the ground-water contamination potential of simazine in hydrogeologically vulnerable settings (areas with permeable soils, ground water less than 30 feet deep, and/or karst topography), however, the limited extent of the study and the low intensity of sampling (quarterly from each well) do not allow for this study to be used in making a nationwide assessment of simazine leaching potential.

A large-scale retrospective ground-water monitoring study for simazine might be required, but in light of the current

status of atrazine (ground-water monitoring data requirements are being held in abeyance pending the registrant's response to a special data call-in that has been issued for specific use information on atrazine on a county-by-county and crop-by-crop basis for major crops and for compilation of existing ground-water monitoring data in a format conducive to relational analysis), enumeration of study requirements for simazine will also not be made at this time. Instead, upon receipt of the data requested below, if additional data are still necessary to identify high use areas with cultural, edaphic, hydrogeologic, climatic, and use conditions which contribute to a high potential for ground-water contamination by simazine, then a a large-scale retrospective ground-water monitoring study designed to answer the remaining questions will be requested.

The following data will be required within 6 months after the registrant is given notification in writing:

> Simazine use information and existing ground-water monitoring data be compiled in the same fashion by the registrant as has been requested for atrazine (Letter dated November 2, 1989 from Edwin F. Tinsworth, Special Review and Reregistration Division to atrazine registrants). An edited copy of the atrazine data call-in letter amended to fit the different use patterns of simazine is attached.

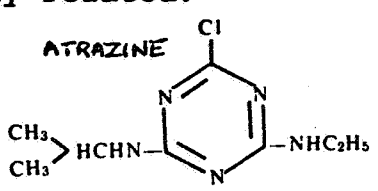
In a separate review to be completed in the next few weeks for cyanazine, which is another widely used s-triazine herbicide, we expect to request similar data for this compound as well.

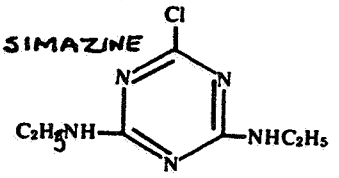
cc: P. Holden
H. Jacoby

Additional Details on the Leaching Assessment for Simazine

1. General.

Simazine is a member of the s-triazine family of herbicides. A leaching assessment has recently been completed for atrazine, which is the most widely used s-triazine herbicide in this country (Note dated November 15, 1988 from Michael Barrett to Silvia Termes). Structurally, these two compounds are very closely related:





The environmental chemistry of these compounds is similar in many ways. Some of the degradates of these two compounds are identical. Therefore, the following discussion makes use of the very large data base on atrazine to augment that for simazine, especially in the case of ground-water monitoring data which is much more extensive for atrazine than it is for simazine.

Differences in the environmental impact of these two compounds are more likely to arise out of differences in use pattern rather than differences in the inherent leaching potential of these two compounds. Atrazine is predominantly used on field corn (83%), sorghum (10%), and sugarcane (1%); whereas simazine is used on corn (29%), aquatic sites (27%), alfalfa (10%, however, registration of this use has recently been canceled), citrus (9%), grapes (4%), apples (3%), and non-crop terrestrial sites (3%). Although corn represents a major use site for simazine in terms of the total annual use of simazine, only 2% of corn production sites are treated with simazine each year (ca. 65% of the corn sites are treated with atrazine annually). For other relatively small acreage crops use of simazine is much more prevalent, for example, over 40% of the acreages of almonds, apples, artichokes, cherries, pears, and walnuts are annually treated with simazine. (The preceding data are taken from the Preliminary Quantitative Usage Analysis of Simazine by Robert F. Torla, 12/88, Economic Analysis Branch, Benefits and Use Division and the same document for Atrazine by Robert F. Torla, 7/88. All data are average estimates for three years, 1985 to 1987.)

2. Environmental chemistry.

Simazine does not have all of the classic characteristics of a compound which would be expected to have a very high potential to contaminate ground water. In a compilation of published environmental chemistry data by Rao and Davidson (1980)

soil organic carbon Freundlich adsorption coefficients averaged 138 for simazine and 163 for atrazine, this put these pesticides in a class of moderate mobility compared to other important pesticides. Rao et al. (1985) found essentially no difference in the soil mobility of simazine and atrazine, ranking them 15th and 16th, respectively, of 41 pesticides in mobility in a loamy sand soil. Simazine has a water solubility of only 3.5 ppm at room temperature, which is lower than atrazine (33 ppm) and much lower than the solubility of most pesticides which have been found to leach to ground water. Nevertheless, this solubility level is still sufficiently high to allow the leaching of residues in the part per billion range in soil solution, a level generally associated with leaching of mobile and persistent pesticides after agricultural use.

Like atrazine, simazine is stable in sterile aqueous solution. Simazine photodegrades at a moderate rate on soil, with a half-life of 21 days. Simazine is persistent in soil, with a half-life of a few months typically occurring under aerobic conditions at soil moisture levels optimum for microbial degradation of simazine. In a summary of data from published literature the average laboratory and field half-lives, respectively, for simazine were 75 and 64 days, compared to 48 and 20 days for atrazine (Rao and Davidson, 1980). Monodealkylated simazine (G-28279), didealkylated simazine (G-28273), and hydroxy simazine (G-30414) are the most common degradates in soil, the first two of these compounds are also degradates of atrazine.

Based on the data discussed in preceding paragraphs, simazine is expected to be at least as great a threat to enter ground water in agricultural use areas as atrazine is. The mineralization half-life of atrazine has been estimated to be ca. 19 years; simazine would be expected to have a similar mineralization rate. Therefore, the degradates of simazine may be persistent in soil as well. With the exception of hydroxy simazine, the degradates have a soil mobility similar to simazine per se. The relatively great persistence of simazine to biological and chemical degradation in soil is the primary factor contributing to its leaching potential.

3. Ground-water monitoring

In most ground-water monitoring studies simazine has been found in samples at a much lower frequency than atrazine. However, this is not indicative of a lower ground-water contamination potential for simazine because total annual use of simazine is only about 6.5 million pounds active ingredient compared to about 88 million pounds for atrazine and, as discussed above, the use pattern for simazine is quite different from atrazine. For many ground-water studies discussed below the failure to detect simazine in the overwhelming majority of

samples was probably a predictable outcome because the studies did not target simazine use areas which must be more locally concentrated than atrazine because of the relatively large amount of use of simazine on minor acreage crops which are produced in only a relatively small area of the country best suited for commercial production of these crops.

Ciba-Geigy Corp. has submitted to the Office of Pesticide Programs several reports concerning residues in ground or surface waters:

Balu, K. 1985. Ridomil groundwater monitoring study results during 1983-1984: Report no. EIR-85023. Unpublished report submitted by Ciba-Geigy Corp., MRID 00156010.
(This report summarizes limited groundwater monitoring of metalaxyl at three locations in Florida, North Carolina, and Oregon. Simazine monitoring results were presented from "Florida", "Washington State", "North Carolina", "Oregon" and FL Citrus Nursery Avon Park, Highland county, Florida. No details of the sites, well construction, simazine use, etc. were provided.)

De Martinis, J. 1988. Summary of simazine monitoring program: laboratory study no. CG 0281.3.88. Unpublished study conducted by Roux Associates, Inc. and submitted by Ciba-Geigy Corp.

Ross, R.H. and K. Balu. 1985. Summary of the metolachlor water monitoring for 1979 - July, 1985: Report no. EIR-85024. Unpublished study submitted by Ciba-Geigy Corp., MRID 00154870.
(This report summarizes surface water monitoring study results from several locations on the Mississippi River and its tributaries and the Sacramento River in California. The Gulf of Mexico was also monitored. Results for other pesticides such as atrazine and simazine are also presented. At several sites samples were taken over a few years at approximately weekly intervals. Simazine analyses were apparently only conducted for selected samples, and the results were only reported on raw data sheets.)

Ross, R. and K. Balu. 1985. Summary of the metalaxyl surface water monitoring for 1983-1985: Report no. EIR-85020. Unpublished study submitted by Ciba-Geigy Corp., MRID no. 00156009.
(Surface waters analyzed for simazine included the Sacramento and Mississippi Rivers, background information was not provided.)

Ross, R., and K. Balu. 1985. Summary of the simazine surface water monitoring for 1975 - July, 1985 (Including referenced residue reports): report no. EIR-85021. Unpublished study

submitted by Ciba-Geigy Corp., MRID 00155188.
(This report summarizes monitoring data from surface waters taken in 1975, 1983, 1984, and 1985. Waters sampled included the Mississippi River (25 locations), Gulf of Mexico, Tombigbee River, Alabama River, Suwanee River, Colorado River, Republican River, Arkansas River, Sacramento River, and San Joaquin River.)

Roux Associates, Inc. 1984. Ground-water sensitivity analysis for pesticide application. Unpublished study submitted by Ciba-Geigy Corp., MRID 00158899.
(This is a report of a process to select areas with ground water sensitive to pesticide contamination which considered soil, geologic, and climatic conditions. Only selected counties in Illinois, Kentucky, Delaware, Indiana, North Carolina, Maryland, Michigan, New Jersey, New York, Ohio, Pennsylvania, South Carolina, Virginia, West Virginia, Florida, California, Washington, Oregon, Idaho, Utah, and Texas were evaluated. No monitoring data are presented in this report.)

Regional scale monitoring of surface water for simazine residues was conducted between 1975 and 1985 (MRID 00155188). Residues were not detected at 1 ppb or greater in the majority of samples taken from 12 states (the bulk of the samples were taken from the Mississippi River or its tributaries), however, many samples bore residues of greater than 0.1 ppb (it was unclear from the report whether the analytical method allowed for a high degree of confidence of detections in this range).

Ciba-Geigy Corp. has conducted a retrospective ground-water monitoring study including 19 wells from 11 sites in 11 counties across the United States rated as high in hydrogeologic vulnerability and with simazine use histories (De Martinis, 1988; for details of the study set-up please see previous review of an interim report of this study by Michael R. Barrett, Ground-Water Team, Exposure Assessment Branch, dated 3/8/88). Simazine had been applied for 4 to 16 years at rates ranging between 1 and 10 lb ai/A at the 11 sites. Simazine was detected at 0.25 ppb or greater in at least one of eight quarterly samples from 6 of the 11 sites. Detections at one site in West Virginia were attributed to rapid leaching in a karst terrain. Detections at three California sites were believed by the author to be a result of agricultural drainage wells in citrus groves serving as a direct conduit for residues from the surface to the ground water. A single detection of simazine from a well in Indiana was attributed to direct channeling of residues from the soil surface facilitated by a defect in the well construction.

The Ciba-Geigy study suggests that simazine might not leach to ground water in significant quantities (>0.25 ppb) in <u>some</u>

hydrogeologically vulnerable areas, but the limited number of monitoring sites and limited hydrogeologic data supplied with this report make. However, methods with lower detection limits are available for analyzing for ground-water and would have more useful in following temporal variations in simazine residues associated with agricultural or other registered uses.

According to the Office of Pesticide Programs "Pesticides in Ground Water Database" (Williams et al., 1988), ground-water monitoring data have been collected from 20 states, with only about 4% of approximately 1800 wells bearing samples containing detectable residues (the detection limits vary between studies, but were typically less than 1 ppb). Most of the detections occurred in Pennsylvania or Virginia. Unfortunately, none of the available studies provide sufficient information to make conclusions regarding the likelihood of simazine reaching ground water as a result of registered uses. A brief synopsis of some of the available studies follows.

1. MD003 - Survey was not statistically designed. Both private domestic wells and ground-water monitoring wells were used to collect samples. Selection of wells for sampling was restricted to agricultural areas and biased towards areas with nitrate-contaminated ground water and shallow depth wells. Simazine was found in samples from 1 of 30 wells (at 0.1 ppb) compared to atrazine in 3 of 30 wells (minimum quantitative reporting limits were 0.1 ppb for both compounds). There was no indication of the extent of simazine use agriculturally near any of the wellheads.

2. ME002 - Well selection process was not statistically based. Preference was given to sampling of existing ground-water monitoring wells for sampling; some private domestic wells were also sampled. Selection of wells was restricted to agricultural use areas and was biased towards those drawing from surficial sand and gravel aquifers. Most wells were resampled; all wells with samples bearing detectable pesticide residues were resampled the following year. Simazine was not detected in any of 159 samples from 88 wells; however the minimum reporting limit was 8 ppb, which is well above what a typical concentration in contaminated ground water would be expected to be. The extent of simazine agricultural use near each wellhead was not determined (major crops were, however, determined).

3. MN002 - The well selection process was not statistically based. Samples were collected from observation, irrigation, and private drinking water wells as well as from drain tiles on a time-series basis. A separate part of the study was to sample public drinking water wells. Selection of wells was restricted to agricultural use areas and for the non-drinking and private drinking water wells was biased towards drawing from unconfined, surficial sand and gravel aquifer regions with a depth to the water table of less than 30 feet and karst regions. The

selection process for public water supply wells used similar criteria, but was also biased towards wells with known water quality problems, proximity to facilities which handle bulk quantities of pesticides, and those in areas with a depth to bedrock of less than 50 feet. Atrazine was the most commonly detected pesticide in well water samples in both parts of the survey. In the survey of non-drinking and private drinking water wells atrazine was detected at least once in 47% of the wells in the range of 0.01 to 42.4 ppb whereas simazine was detected in only 1 well with a minimum reporting limit of 0.08 ppb. Atrazine was detected in water samples from 27% of the public water supply wells in the range of 0.01 to 9.7 ppb whereas simazine was not detected at all. Although specific site-by-site pesticide use data were not provided, corn was indicated to be a major use crop and atrazine a major use herbicide on corn in many areas of the state where wells were selected to be sampled. Little can be concluded about the likelihood of simazine contaminating ground water from agricultural use in these areas because it is not known how much simazine was used in the vicinity of each site. Nevertheless, the frequent occurrence of atrazine in ground water samples suggests that other triazine herbicides with similar environmental chemistry such as simazine would likewise probably be a frequent contaminant of ground water if they were used to the same extent as atrazine is. Proximity to an agricultural chemical storage facility was not associated with a significant increase in the proportion of wells with detectable pesticides as compared to wells without such a facility nearby, however, the authors indicated that other point sources which were not identified may have contributed to some detections.

4. ND004 - This study used regularly spaced observation wells drilled over a 7600 acre test site to observe pesticide residues in ground water. The test site soils are generally of sandy loam to loamy sand texture although underlying silt loam strata occur in some areas; the soils are poorly to moderately well drained. The wells drew from ground water perched over a 6 to 10 m deep till barrier. Corn was said to occupy 30% of the land area, with atrazine the most common herbicide used on corn (51% of the corn crop was treated); simazine use data were not specified, but this herbicide was apparently used much less frequently. In spite of the high vulnerability of the test site and extensive use for agricultural purposes, there was a very low frequency of occurrence of corn herbicides; alachlor was detected at 0.2 ppb or greater concentration in samples from only one well; simazine, atrazine, and metolachlor were not detected in any samples from 95 different observation wells.

5. PA003 - Observation wells were previously established to evaluate changes in ground-water quality in eastern Lancaster County, "located so that the most significant data are obtained from the fewest wells in the most important aquifers." Depth to the ground water was monitored at each well. Well depth, casing

SPECIAL DATA CALL-IN FOR SIMAZINE

Dear Sir or Madam:

This Notice requires you and other registrants of pesticide products containing the active ingredient simazine to submit certain data as noted herein to the U.S. Environmental Protection Agency (EPA, the Agency). These data are necessary to maintain the continued registration of your product(s) containing this active ingredient. Within 90 days after you receive this Notice you must respond to this Notice as set forth in section III-A of this Notice. Your response must state:

1. how you will comply with the requirements set forth in this Notice (see section III-A and III-B); or

2. why you believe you are exempt from the requirements of this Notice (see section III-C) or

3. why you believe EPA should not require your submission of data in the manner specified by this Notice (see section III-D).

If you do not respond to this Notice, or if you do not satisfy EPA that you will comply with its requirements, or should be exempt or excused from doing so, then the registration of your product(s) subject to this Notice will be subject to suspension. We have provided a list of all of your products subject to this Notice (Attachment A), as well as a list of all registrants who were sent this Notice (Attachment B).

The authority for this Notice is section 3(c)(2)(B) of the Federal Insecticide, Fungicide and Rodenticide Act as amended (FIFRA), 7 U.S.C. section 136a(c)(2)(B).

SECTION I. WHY YOU ARE RECEIVING THIS NOTICE

Data were submitted by registrants and reviewed by the Agency in response to the simazine Registration Standard. As a result of the studies submitted, and other data submitted to the Agency, substantial concerns have arisen regarding simazine's potential and actual ground water and surface water contamination, and potential oncogenic and chronic risks resulting from exposure to simazine.

EPA is requiring the data listed in section II of this Notice for use in assessing both the risks and benefits resulting from the use of simazine. The risk analysis will examine the potential for ground water and surface water contamination. The Agency is also concerned with the potential for simazine to accumulate in ground water and its effect on future water supplies. You have been sent this Notice because you have product(s) containing simazine.

The two classes of information required by this Data Call-In Notice are: (1) monitoring data, and (2) use data.

SECTION II. DATA REQUIRED

1. Monitoring Data. The Agency requires submission of a comprehensive listing and specific information for all available ground water and surface water monitoring data on a county by county basis for simazine and its degradates. While data have been submitted on detections of simazine in ground and surface water, in compliance with FIFRA section 6(a)(2), more detailed information is required than has already been provided. Specifically, information is needed to better determine the origin or pathway of contamination for positive detections of simazine in ground or surface water, such as pesticide use histories, proximity of application to contaminated well or site, location of any mixer/loader operation in the vicinity of the site, and well characteristics (e.g., depth, age, condition, etc.) for ground water detections. Information is also required on water samples as to method and location of sampling (e.g., tap, raw surface water grab sample, treatment plant outflow).

2. Use Data. The Agency is requiring use data to assist in ground water and surface water assessments which correlate geomorphic and other factors with sales, distribution and use data.

II-A. DATA NEEDED

At the present time, you are not required to conduct new

research to collect the information required for these categories; however if the required data are not submitted, you must explain why they are unavailable. By currently available data and information, the Agency is referring to data, information and studies currently in your files, or otherwise in your possession or under your control, or of which you have knowledge, as well as information available in public literature.

Information which is available in readily accessible public literature need not be submitted, although you may do so if you wish. Instead, at the least, a bibliography of these documents must be submitted. Examples of readily accessible public literature include, but are not limited to, journals of scientific societies, marketing surveys, and monographs available in a research library such as the National Agricultural Library. Published data not readily accessible to the public, such as experiment station field trial results, local extension service publications, and local and regional marketing surveys should be transcribed onto the attachments.

Information which is available only through your company, such as non-published results of research and marketing data, must be transcribed onto the attachments for submittal to the Agency. Reference is made herein to several attachments (C, D, E, G, H) which provide formats for reporting the requested data. The data may be submitted as electronic media, but must also be submitted as hard copy. You may alter the layout of these attachments or design a different format as long as all of the information requested is included. Consistency is required once the layout is configured.

1. Monitoring Data

a) Ground Water

Information from monitoring studies for simazine in ground water, both completed and ongoing, is to be summarized in the format discussed herein. Monitoring data must include both detections and samples without detectable residues ("nondetects"). The data must be reported in two formats: study overviews and well summaries. The data elements of each format are as follows:

Study Overview

- Study identification number
- Formal reference (author, title, date)
- Purpose of study
- Number of wells tested/number of wells with positive detections and "non-detects"
- Detection limit
- Range of positive concentrations

- Average of positive concentrations
- Period of sampling (month/year - month/year)
- Additional comments
- Irrigation method(s) used, if any.

Well Summary

- Study identification number
- Well identification code
- State (U.S. Postal Service two letter abbreviations)
- County (County codes, Federal Information Processing Standards - FIPS)
- Type of well (as per Attachment C_1)
- Distance from nearest treated field (in feet, as per discussion below)
- Was simazine applied within last 2 years (y or n)
- Last known year of application (yy)
- Depth of well (in feet)
- Seasonal ranges in depths to water (in feet, as per discussion below)
- Suspected origin of pesticide (as per Attachment C_1)
- Period of sampling (mm/yy - mm/yy, with 2-digit numbers representing month mm and year yy.
- Frequency of sampling
- Number of samples taken vs. number of positives found
- Lowest concentration found (in ppb)
- Highest concentration found (in ppb)
- Average concentration of positives (in ppb)
- Confirmed positive (y or n)
- Confirmed by mass spectrometry (y or n)

The Study Overview must be completed as per the form shown in Attachment C_2 and must include your own two digit study identification number. The number of positive wells is defined as the sum of all wells that have had one or more detections of simazine or its metabolites. The concentrations must be reported as total simazine equivalent. Use the comment section to explain any detections of simazine in ground water believed to be due to point sources or direct channeling of residues from the surface into the well. In addition, the comment section must report which, if any, of the metabolites were identified, and state the minimum, maximum and average of all positive detections. Use the comment section to provide additional information on use, history, site characterization, rates, soil type, etc., as well as details on the analytical method used to

detect metabolites (including validation methods, such as fortification recovery data, control samples, storage stability data, etc.).

Enter the Well Summaries as digital data as per Attachment C_3. This format can either be as an ASCII or EBCDIC file, or in LOTUS 1-2-3 or dBASE III Plus format as per Attachment C_4. Cross reference each well to the study identification number specified in each respective Study Overview. Report concentrations as total simazine equivalent for the parent compound and its metabolites. Report traces as the concentration of the detection limit. If a well contains a single positive sample, give the sample concentration in both the maximum and average concentration field. Enter the minimum concentration as "Ø.Ø" ppb. Specify values of "Ø.Ø" for all concentrations for wells having no detections. When character data fields such as type of well or period of sampling are unavailable, enter "N/A" in the appropriate field. For numeric fields, enter unavailable data as "-9". If precise values are unknown for the depth of well or depths to water, report them as one of the following:

- Less than or equal to 3Ø feet as "-3Ø",
- Greater than 3Ø feet but less than 1ØØ feet as "-1ØØ", or
- Greater than 1ØØ feet as "-1Ø1".

Similarly, if precise values are unknown for the distance of the well from the nearest treated field, report the distance as:

- Less than or equal to 5ØØ feet as "-5ØØ" or
- Greater than 5ØØ feet as "-5Ø1".

b) Surface Water

Information from monitoring studies for simazine in surface water, both completed and ongoing, is to be summarized in the format discussed herein. Include monitoring data on both detections and "nondetects". Report data in two formats: study overviews and sampling station summaries. The data elements of each format are as follows:

Study Overview

- Study identification number
- Formal reference (author, title, date)
- Purpose of study
- Number of sampling stations tested/number of sampling stations with positive detections and "non-detects"
- Detection limit
- Range of positive concentrations
- Average of positive concentrations

- Period of sampling (month/year - month/year)
- Additional comments

Sampling Station Summary

- Study identification number
- Sampling station identification code
- State (U.S. Postal Service two letter abbreviations)
- County (County codes, Federal Information Processing Standards - FIPS)
- Type of sampling station (pond vs. stream, as per Attachment D_1)
- Distance from nearest treated field (in feet)
- Seasonal ranges in flow rates (in cubic feet/second)
- Suspected origin of pesticide (as per Attachment D_1)
- Flow rate at sampling station at time of sampling (cubic feet/second)
- Area of drainage basin at point of sampling (in square miles)
- Area with simazine usage upstream from sampling station (in square miles)
- Period of sampling (mm/yy - mm/yy, with 2-digit numbers representing month mm and year yy.
- Frequency of sampling
- Number of samples taken vs. number of positives found
- Lowest concentration found (in ppb)
- Highest concentration found (in ppb)
- Average concentration of positives (in ppb)
- Confirmed positive (y or n)
- Confirmed by mass spectrometry (y or n)

The Study Overview must be completed as per the form shown in Attachment D_2 and must include your own two digit study identification number. The number of positive sampling stations is defined as the sum of all sampling stations that have had one or more detections of simazine or its metabolites. The concentrations must be reported as total simazine equivalent. Use the comment section to explain any detections of simazine in surface water believed to be due to point sources. In addition, use the comment section to report which, if any, of the metabolites were identified, and the minimum, maximum and average of all positive detections should be stated. Provide details on the analytical method used to detect metabolites, (including validation methods, such as fortification recovery data, control samples, storage stability, etc.).

Enter the Sampling Station Summaries as digital data as per Attachment D_3. This format can either be as an ASCII or EBCDIC

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file, or in LOTUS 1-2-3 or dBASE III Plus format as described in Attachment C_4. Cross reference each sampling station to the study identification number specified in each respective Study Overview. Report concentrations as total simazine equivalent for the parent compound and its metabolites. Report traces as the concentration of the detection limit. If a sampling station contains a single positive sample, give the sample concentration in both the maximum and average concentration field. Enter the minimum concentration as "0.0" ppb. Specify values of "0.0" for all concentrations for sampling stations having no detections. When character field data such as flow rates are unavailable, enter "N/A" in the appropriate field. For numeric fields, enter unavailable data as "-9". If precise values are unknown for the distance of the sampling station from the nearest treated field, report the distance as:

- Less than or equal to 500 feet as "-500" or
- Greater than 500 feet as "-501".

2. Use Data

Data submission is required on a county basis for the ground and surface water assessments.

The Agency is requiring information on trends in simazine use over the past 10 years. Present the information in the form of an historical analysis of simazine use patterns across the United States, emphasizing any major changes in the distribution of simazine use on a regional basis. For each registered use, discuss differences between the various formulations of simazine by describing trends in usage as they have been affected by efficacy of pest control, worker exposure, movement through the soil profile, and movement into surface or ground water.

The required use data must be submitted on a county-by-county basis for the entire United States. Use the crop codes listed in Attachment D_5 when supplying the required information on Attachment D_4 (sales, major crop, application rate, etc.). The Agency will will use the county DRASTIC [1] hydrogeologic vulnerability ratings for relational analysis with available ground water monitoring data. The Agency will estimate the proportion of the county treated with simazine by dividing the

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[1] Aller, L., T. Bennett, J. Lahr, R. Petty, and G. Hackeh, "DRASTIC: A Standardized System for Evaluating Ground Water Pollution Potential Using Hydrogeologic Settings", EPA/600/2-87/035, submitted in partial fulfillment of Contract No. CR-81075-01 by the National Water Well Association under the Sponsorship of the Robert S. Karr Environmental Research Laboratory, Ada, Oklahoma, June 1987.

number of pounds of active ingredient sold in the county by the average lb/acre annual rate for the major crops in that county. The result (number of acres treated in that county) will be divided by the total area of the county in acres. The final value obtained will be based on combined sales data in a county for all companies marketing simazine in that county. If possible, estimate the area of each county that has been treated with your simazine product(s), and provide any additional information which will help in estimating use by county. The use and sales data required for the ground and surface water assessments may be submitted either as product-specific information or in terms of total active ingredient of simazine products for your company.

The Agency prefers the data in electronic format, but hard copy of the data must be submitted whether or not electronic media are used. This data may be submitted on magnetic media as a dBASE III, Lotus 1-2-3, or ASCII or EBCDIC file pursuant to the specifications given in Attachment C_4.