

**SETTING REVISED SPECIFIC NUMERICAL VALUES  
NOVEMBER, 1988**

PURSUANT TO  
THE PESTICIDE CONTAMINATION PREVENTION ACT

Bruce Johnson  
Environmental Hazards Assessment Program



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EH 88-12

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**Pursuant to the  
Pesticide Contamination Prevention Act**

**By**

**Bruce Johnson**

**ENVIRONMENTAL HAZARDS ASSESSMENT PROGRAM**

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## SETTING REVISED SPECIFIC NUMERICAL VALUES

### INTRODUCTION

The Pesticide Contamination Prevention Act requires the California Department of Food and Agriculture (CDFA) to set certain numeric values for chemical properties of pesticides. Compounds which exceed these values may be placed on a Ground Water Protection List (Wilkerson and Kim, 1986). This report details derivation of specific numeric values utilizing the 90th percentile of distributions of chemical properties.

### METHODS

Based on nationwide ground water studies, two lists of compounds were created. One list contained compounds which had been detected in ground water (contaminants) and the other list contained compounds which have not previously been detected in groundwater as a result of agricultural non-point source contamination (M. Bisbiglia, personal communication).

Four characteristics were determined for each compound: soil adsorption (Koc), hydrolysis half life, soil aerobic metabolism (SAM) half life, and solubility. Estimates of these properties were based on reviewed studies from the open literature and CDFA approved studies which fulfilled the data-call-in requirements of the Pesticide Contamination Prevention Act.

Comparison to expected normal distributions indicated that the distributions for these characteristics were extremely non-normal. A log<sub>10</sub> transformation was used to normalize the distributions. All statistical calculations were performed on log<sub>10</sub> transformed data. The standard t-test, not assuming equal variances, was used to determine mean separation for each chemical characteristic. The percentile calculations were based on the mean, standard deviation and appropriate t-value using 1 less than the number of observations for degrees of freedom. For Koc, the 90th percentile was the point below which 90% of the contaminant population fell. For hydrolysis and water solubility, the 90th percentile was the point above which 90% of the contaminant population fell. For aerobic metabolism, since the two means were not significantly different, the 90th percentile chosen was the point above which only 10% of the combined contaminant and non-contaminant populations fell. This was done in order to reduce the impact of aerobic metabolism on the discrimination process. Estimates were then back-transformed to obtain final values.

One hydrolysis observation was 'winsorized' (Snedecor and Cochran, 1967) because of its extreme value. Hydrolysis half life studies typically last less than 365 days. Therefore, the estimated half live for edp of 100,000,000 was regarded as uncertain and reduced to the next highest value which was 7100 days for DBCP.

The language of the law provides for the following logic in testing each compound:

Classify as a potential contaminant if

(A or B) and (C or D) is true,

where

A = 'Koc less than V1'

B = 'water solubility greater than V2'

C = 'hydrolysis half life greater than V3'

D = 'SAM half life greater than V4'

and V1, V2, V3, V4 are specific numeric values. After determining the specific numeric values, this test was applied to the contaminant and non-contaminant compounds to determine an error rate for the classification procedure.

## RESULTS

Table 1 and Table 2 list the contaminants and non-contaminants, respectively, and their estimated Koc, hydrolysis, soil aerobic metabolism and water solubility properties. Table 3 summarizes the statistics for the two groups. Variances were not significantly different. However, testing power probably was reduced by moderately low sample sizes. Therefore, non-equal variance t-tests were used to determine significance of mean separation. This procedure was slightly more conservative than a procedure based on pooled variance. Means were significantly different between contaminants and non-contaminants except for soil aerobic metabolism.

Table 4 shows the 90th percentile calculations. The back-transformed 90th percentiles are Koc 2400 cm<sup>3</sup>/gm, hydrolysis 9 days, soil aerobic metabolism 730 days and water solubility 4.0 ppm.

Tables 5 and 6 show how contaminants and non-contaminants, respectively, are classified using the logic detailed in Methods in combination with the derived

Table 1. List of contaminants. Units are Koc = cm<sup>3</sup>/gm, hydrolysis and aerobic metabolism = days (half life), water solubility = ppm. Data has been rounded to 2 decimal places.

<u>Pesticide</u>	<u>Koc</u>	<u>Hydrolysis Half-Life</u>	<u>Aerobic Metabolism</u>	<u>Water Solubility</u>
alachlor	150	720	18	200
aldicarb	79	140	14	6000
atrazine	180	160	190	33
bromacil	60	110	300	820
carbofuran	48	60	23	320
chloramben	280	370	-1	700
chlorthal dimethyl	4000	-1	-1	3
chlorpyrifos	17000	73	88	0.71
cyanazine	180	260	15	170
dbcp	80	7100	180	1000
dicamba	1.5	30	61	6100
dieldrin	7100	1500	1000	0.12
dinoseb	110	30	-1	75
diuron	460	110	-1	42
edb	44	7100 <sup>1</sup>	44	3400
metolachlor	190	210	-1	530
metribuzin	150	130	110	1100
naled	170	0.68	3	2000
oxamyl	6	6	180	280000
picloram	26	650	350	430
prometon	79	-1	280	720
prometryn	680	75	150	48
propachlor	340	-1	-1	700
propylene dichloride	960	-1	-1	2700
silvex	-1	-1	16	160
simazine	220	110	110	4.9

<sup>1</sup> Winsorized original value of 100,000,000.

-1 indicates no data.

Table 2. List of non-contaminants. Units are Koc = cm<sup>3</sup>/gm, hydrolysis and aerobic metabolism = days (half life), water solubility = ppm. Data has been rounded to 2 decimal places.

<u>Pesticide</u>	<u>Koc</u>	<u>Hydrolysis Half-Life</u>	<u>Aerobic Metabolism</u>	<u>Water Solubility</u>
aldrin	14000	-1	120	0.027
ametryne	380	28	37	190
carbaryl	360	5.2	8	110
chlorthalonil	2500	49	-1	0.6
chlordan	33600	110	54	1.9
ddd	46000	-1	-1	-1
ddt	160000	-1	3800	0.003
diazinon	1200	20	17	61
dimethoate	17	62	-1	25000
disulfoton	940	320	2	14
1 3 d	150	7	13	1000
2 4 d	53	4	8	230
endosulfan	2000	14	-1	0.33
ethoprop	180	-1	25	770
fenamiphos	280	300	22	560
fonofos	5100	110	120	16
heptachlor	16000	180	2000	0.06
lindane	2500	310	790	10
linuron	670	55	78	75
malathion	1000	48	1	140
methiocarb	490	24	-1	27
methyl bromide	390	-1	35	9200
pendamethalin	16000	60	1300	0.28
phorate	2400	3.1	-1	18
toxaphene	-1	110	-1	1.9
trifluralin	9900	110	180	1.8

-1 indicates no data.

Table 3. Statistics for log<sub>10</sub> transformed characteristics of contaminant and non-contaminant pesticides.

	<u>Contaminants</u>	<u>Non-contaminants</u>	<u>Separation</u> <sup>1</sup>
Koc			
Mean	2.24	3.21	p<.0005
SD	0.87	0.96	p<.2875
N	25	25	
Hydro.			
Mean	2.17	1.64	p<.0352
SD	0.91	0.62	p<.4353
N	21	21	
SAM			
Mean	1.87	1.75	p<.6557
SD	0.63	0.97	p<.1266
N	19	19	
Solub.			
Mean	2.39	1.19	p<.0075
SD	1.33	1.70	p<.1875
N	26	25	

<sup>1</sup>Mean separation based on t test not assuming equal variances. Separation for standard deviations (SD) based on Levene's test for equal variances. Values of p less than .05 are considered significant.

Table 4. 90th percentile calculations based on log10 transformed contaminant data. The formula is 90th percentile = mean + (SD)(T), where + was used for Koc and SAM and - for hydrolysis and solubility, SD is standard deviation, and T is the appropriate T value (value where 90% of the distribution is lower for Koc and SAM and higher for hydrolysis and solubility with n-1 degrees of freedom).

	<u>Mean of log10 values</u>	<u>SD</u>	<u>T</u>	<u>log10 90th percentile</u>	<u>back- transform</u>
Koc	2.24	0.87	1.32	3.39	2400 cm <sup>3</sup> /gm
Hydro.	2.17	0.91	1.33	0.96	9 days
SAM	1.81*	0.81*	1.30	2.86	730 days
Solub.	2.39	1.33	1.32	0.63	4 ppm

Note: Back-transformed values may not agree exactly with computations using values in this table due to greater precision in original calculations and round-off differences. Back-transformed values were rounded off to nearest integer or 2 significant places.

\*Based on pooled contaminant and non-contaminant data since no significant differences were detected between the 2 groups.

Table 5. Classification of contaminant compounds based on specific numeric values. See Table 1 for further notes.

<u>Pesticide</u>	<u>Koc</u>	<u>Hydrolysis Half-Life</u>	<u>Aerobic Metabolism</u>	<u>Water Solubility</u>	<u>Class</u>
alachlor	150*	720*	18	200*	C
aldicarb	79*	140*	14	6000*	C
atrazine	180*	160*	190	33*	C
bromacil	60*	110*	300	820*	C
carbofuran	48*	60*	23	320*	C
chloramben	280*	370*	-1	700*	C
chlorthal dimethyl	4000	-1	-1	3	I
chlorpyrifos	17000	73*	88	0.71	N
cyanazine	180*	260*	15	170*	C
dbcp	80*	7100	180	1000*	C
dicamba	1.5*	30*	61	6100*	C
dieldrin	7100	1500*	1000*	0.12	N
dinoseb	110*	30*	-1	75*	C
diuron	460*	110*	-1	42*	C
edb	44*	7100*	44	3400*	C
metolachlor	190*	210*	-1	530*	C
metribuzin	150*	130*	110	1100*	C
naled	170*	0.68	3	2000*	N
oxamyl	6*	6	180	280000*	N
picloram	26*	650*	350	430*	C
prometon	79*	-1	280	720*	N
prometryn	680*	75*	150	48*	C
propachlor	340	-1	-1	700	I
propylene dichloride	960	-1	-1	2700	I
silvex	-1	-1	16	160*	N
simazine	220*	110*	110	4.9*	C

\* indicates value which exceeds specific numeric value.  
 C indicates classified as contaminant.  
 N indicates classified as non-contaminant.  
 I indicates insufficient information to classify.

Table 6. Classification of non-contaminant compounds based on specific numeric values. See Table 2 for further notes.

<u>Pesticide</u>	<u>Koc</u>	<u>Hydrolysis Half-Life</u>	<u>Aerobic Metabolism</u>	<u>Water Solubility</u>	<u>Class</u>
aldrin	14000	-1	120	0.027	N
ametryne	380*	28*	37	190*	C
carbaryl	360*	5.2	8	110*	N
chlorthalonil	2500	49*	-1	0.6	N
chlordane	33600	110*	54	1.9	N
ddd	46000	-1	-1	-1	I
ddt	160000	-1	3800*	0.003	N
diazinon	1200*	20*	17	61*	C
dimethoate	17*	62*	-1	25000*	C
disulfoton	940*	320*	2	14*	C
1 3 d	150*	7	13	1000*	N
2 4 d	53*	4	8	230*	N
endosulfan	2000*	14*	-1	0.33	C
ethoprop	180*	-1	25	770*	N
fenamiphos	280*	300*	22	560*	C
fonofos	5100	110*	120	16*	C
heptachlor	16000	180*	2000*	0.06	N
lindane	2500	310*	790*	10*	C
linuron	670*	55*	78	75*	C
malathion	1000*	48*	1	140*	C
methiocarb	490*	24*	-1	27*	C
methyl bromide	390*	-1	35	9200*	N
pendamethalin	16000	60*	1300*	0.28	N
phorate	2400	3.1	-1	18*	N
toxaphene	-1	110*	-1	1.9	N
trifluralin	9900	110*	180	1.8	N

\* indicates value which exceeds specific numeric value.

C indicates classified as contaminant.

N indicates classified as non-contaminant.

I indicates insufficient information to classify.

90th percentiles. The errors associated with this technique are shown in Table 7. About 35% of the compounds were misclassified with the most errors resulting from misclassification of non-contaminants.

### CONCLUSION

A list of 26 contaminant and 26 non-contaminant pesticides were analyzed to determine specific numeric values. Significant mean separation of log<sub>10</sub> transformed values occurred for Koc, water solubility and hydrolysis, but not for aerobic metabolism. Based on the log<sub>10</sub> transformed means, 90th percentiles were computed. Back-transformed 90th percentiles were Koc 2400 cm<sup>3</sup>/gm, hydrolysis 9 days, soil aerobic metabolism 730 days and solubility 4 ppm. The compounds were classified as potential contaminants if ((Koc <2400) or (water solubility >4.0)) and ((hydrolysis half life > 9) or (soil aerobic metabolism half life > 730)). This procedure resulted in a 35% misclassification rate.

APPENDIX I  
COMMENTS

DEPARTMENT OF FOOD AND AGRICULTURE  
1220 N Street, P. O. Box 942871  
Sacramento, California 94271-0001



September 9, 1988

Dr. James Seiber  
Department of Environmental Toxicology  
University of California  
Davis, CA 95616

Dear Jim:

Thank you for attending our meeting on August 31, 1988 to discuss the development of the Specific Numeric Values (SNV) for AB 2021. Your effort in this process will be very valuable.

You received the data on KOC and solubility during our meeting. I have enclosed with this letter, the data on hydrolysis and aerobic metabolism. You agreed to evaluate the data from the open literature and make a scientific judgement on whether the data could be used to develop the SNV's. I would appreciate completion of your evaluation by October 3, 1988 if possible.

If you have any questions regarding the data please call Bruce Johnson at (916) 324-8916.

Sincerely,

A handwritten signature in cursive script, appearing to read "Ron".

Ronald J. Oshima  
Branch Chief  
Environmental Monitoring and  
Pest Management, Room A-149  
(916) 324-8916

Enclosure

## DEPARTMENT OF FOOD AND AGRICULTURE

1220 N Street, P. O. Box 942871  
Sacramento, California 94271-0001



September 9, 1988

Dr. Walter Farmer  
Dept. of Soil & Environmental Science  
University of California  
Riverside, CA 92521

Dear Walt:

Thank you for attending our meeting on August 31, 1988 to discuss the development of the Specific Numeric Values (SNV) for AB 2021. Your effort in this process will be very valuable.

You received the data on KOC and solubility during our meeting. I have enclosed with this letter, the data on hydrolysis and aerobic metabolism. You agreed to evaluate the data from the open literature and make a scientific judgement on whether the data could be used to develop the SNV's. I would appreciate completion of your evaluation by October 3, 1988 if possible.

If you have any questions regarding the data please call Bruce Johnson at (916) 324-8916.

Sincerely,

A handwritten signature in dark ink, appearing to read 'Ron'.

Ronald J. Oshima  
Branch Chief  
Environmental Monitoring and  
Pest Management, Room A-149  
(916) 324-8916

Enclosure

Seiber - work copy

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COLLEGE OF AGRICULTURAL AND ENVIRONMENTAL SCIENCES  
AGRICULTURAL EXPERIMENT STATION  
(916) 752-1142

DEPARTMENT OF ENVIRONMENTAL TOXICOLOGY  
DAVIS, CALIFORNIA 95616

October 11, 1988

Mr. Ron Oshima  
1220 N Street  
California Department of Food and  
Agriculture  
Environmental Monitoring Rm A-149  
Sacramento, CA 95814

Dear Mr. Oshima:

Enclosed are my comments on the Specific Numeric Values (SNV) lists you provided for my evaluation in connection with AB 2021, the Groundwater Contamination Prevention Act. I am returning the lists with my comments written in at the appropriate places. I will summarize the most important and general comments here:

Solubility

In many instances, the SNV list averages individual water solubilities from different temperatures. I suggest compiling summaries using 20°C data only or, if it is not available, data from 30°C or 25°C. But data from more than one temperature should not be averaged.

In several cases, the same numeric value is used several times in the average compilation because it was cited in several literature sources. For example, carbofuran lists 700 ppm 4 times, and thus 700 ppm counts 4 times in the average. The problem with this is that the 4 sources may be parroting what is really a single number, from a single original source. This is particularly true for references like T0001, T0009, and T0014 which represent compendia of prior published values. I am not sure how to handle this, because anything you do to clean up redundancy will involve a judgement call.

In some cases, no temperature at all was provided with solubilities. Perhaps a re-search should be made and, if temperatures are truly missing, these should be discarded.

Use of significant figures should be checked and standardized. 2,4-D is given as 673 (average) from 3 entries none of which exceed 2 significant figures. It is also done inconsistently in several cases. I suggest that 2, at most 3 significant figures is all that can be justified from water solubility data.

## Koc

There are several "outliers" which need to be checked. Aldrin, for example, with a Koc of 191 is questionable. Perhaps this is a  $K_d$  value. There is one for chlordane also. Dicamba has a value of 0.0000 listed--sounds suspicious. Simazine has a 3890 value which seems too high--needs checking. Same with fenamiphos at 1350 and methylbromide at 1900.

Again, the use of significant figures needs standardizing.

## Hydrolysis

General comment: You should not average  $t_{1/2}$  run at different temperatures or (for most classes of compounds) at different pH's. You should retain the individual data at different pH and temperature, and use them in site-specific cases where the pH of the soil (and perhaps its average temperature) is known.

Values which appeared as "outliers" in a set of data are noted, and need to be checked. I will try to check them here, or perhaps you could send a staff member over to use the library here to check them. Examples are:

Aldrin	14 days
Atrazine	3
EDB	108 days
Naled	14
Fenamiphos	5 or 300

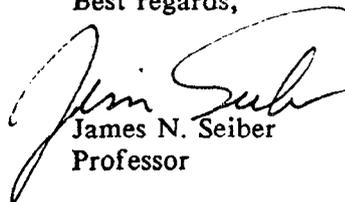
## Aerobic Metabolism

I have only a few notations on this list. Aerobic degradation rates are subject to much variation, so it is hard to pick out true outliers.

In general, you have too many significant figures in the averages. Two figures is the most which could be supported.

I will continue to look at these lists, but I wanted to get these comments to you as a start.

Best regards,

  
James N. Seiber  
Professor

JNS:jg  
oshima.2

cc: Walter Farmer, UC Riverside



COLLEGE OF NATURAL AND AGRICULTURAL SCIENCES  
CITRUS RESEARCH CENTER AND  
AGRICULTURAL EXPERIMENT STATION  
DEPARTMENT OF SOIL AND ENVIRONMENTAL SCIENCES

RIVERSIDE, CALIFORNIA 92521

October 18, 1988

Ronald J. Oshima, Branch Chief  
Environmental Monitoring and  
Pest Management, Room A-149  
1220 N Street  
Sacramento, California 94271-0001

Dear Ron:

I have received from you data on Koc, solubility, hydrolysis and aerobic metabolism to be used for the development of Specific Numeric Values (SNV) for pesticides. I note the data base continuing to expand with many of the data gaps on individual pesticides beginning to be filled.

There continues to be the anticipated variability in the data for individual compounds. We can expect this variability to be reduced as the data base is updated on a regular basis. Much of the data will show improved precision as sources of error are identified and corrected through the continual process of review and testing.

There is an additional source of variability associated with the Koc and aerobic metabolism data. These values are highly dependent on the type of soil used for the test. Improved values for Koc and aerobic metabolism will result as methods are developed to account for variability in soil properties. The Koc concept has been developed to account for adsorption of neutral compounds by soils. This assumes that soil organic matter will control adsorption. This assumption works well for many combinations of soil and pesticide. However, for many situations, such as soil with a low content of organic matter, other soil properties may be important. As these additional factors are investigated, improvements in the Koc concept will be forthcoming.

Likewise, soil factors controlling aerobic degradation are receiving much attention. Certainly temperature and moisture are the major factors due to their influence on microbial activities. As these and other soil influences on the pesticide degradation process are sorted out, improved values for the aerobic degradation rate will appear.

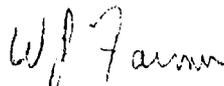
Turning to other aspects of the data base, a greater emphasis should be placed on locating the original reference or original source of the data points. Many of the references that are quoted refer to published lists and compilations compiled from a number of sources. Such listings are valuable and presumably the authors of the listings have made an effort to screen and select reliable data. However, only the original source would contain details of the methodology allowing an independent evaluation of the data.

R. Oshima  
October 18, 1988  
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The use of original sources would assist in alleviating the problem of what appears to be replicate values for the same chemical appearing in the files. Chances are that authors of tabulations received their information from the same original source. As a result, a single value for a chemical property may be counted more than once when published tabulations are used as references.

All of the pesticide properties being considered here are temperature dependent to some degree. A standardized temperature for future measurements could be established that would allow comparisons to be made between different pesticides and, for Koc and aerobic metabolism, between different soils. Alternatively, a temperature range for the measurements could be used so that extrapolations to a standard temperature would allow comparisons. The use of a standard temperature would avoid the current problem of averaging values from different temperatures.

Sincerely,



Walter J. Farmer  
Professor of Soil Science

cc: J. N. Seiber

**APPENDIX II**  
**R E S P O N S E S**

This contains responses to Dr. Seiber's comments.

Soil aerobic metabolism. Generally we will try to indicate 2 significant figures. Comments on specific compounds follow:

Ametryn - I checked the data call in gives 37 days (258-007-54639)

Chlordane (reference 1317) - This was a field study in Florida, temperature and light were not controlled. Material confined to upper 2.5 cm of soil. The values 72 and 27 days are as found in report. In addition another value of 64 was reported. In the absence of other information, we will use these data.

Disulfoton - Data call in value of 1.7 days (164-59648). Ignore reference values which are bounds (high-low).

EDB - Will use average of 99 and 5, which are bounds, as 1 value.

Naled - Data call in provides estimate of 3 days. Ignore lower bounds ('L').

Malathion - The reference number, 2910, is actually about 10 references bundled together. The figures presented on data sheet are correct as found in Gibson and Burns 1977. In addition 3 more data points were obtained from Walker and Stojanoni 1973 which are very close to the existing estimates. These values appear to be correct.

Koc. I modified values in the data sheets by eliminating duplicate values under the assumption that these values referenced the same source, discarding boundary values (denoted by l,b,h,g) when means were available, eliminating calculated values when studies were available and verifiable.

Specific comments follow:

Aldrin - The 191 appears to be wrong. The reference E0011 is Kenaga (1980), where aldrin Koc is shown as 410 (experimental) and 47600 (estimate based on water solubility of .013ppm and using  $\log Koc = 3.64 - 0.55(\log WS)$ ). The experimental values are referenced to Kenaga and Goring (1980), which I did not have time to research. I will omit the 191 value and use the other two values shown on the data sheet.

Chlordane - Reference E0007 is USEPA (1979) as found in Li (1983). USEPA (1979) cites Sanborn et al. (1976). However, latter publication was checked out of library at the time and not further pursued. Therefore, I will not use this value in mean.

Dicamba - 0 value eliminated from mean.

Endosulfan - Unable to look up.

Silvex - Unable to locate source for these two values. Will omit.

Toxaphene - Value of 210000 found in Swann and Eschenroeder (1983) which contains article by Bomberger et al (1983) showing table with 210000 value. This cites Mulkey, L. USEPA, Athens, GA, personal communication. By phone 10/24/88 Dr. Farmer felt Mulkey was reliable source and probably had done the study. Two other references in our data base were provided in Li (1983) but omitted from the data sheets were E0766 and E0007, Leo (1978) and USEPA (1979). The former appears to be related to a large, computerized data base which is commercially available (Technical Database Services, Inc). E Tox library has several listings from this data base. I checked through the data base but could not find any of the 9 empirical formulas shown in USEPA (1979) for toxaphene. The latter reference, USEPA (1979), shows  $\log(Kow) = 3.3 \pm 0.4$  and cites Paris et al. (1977). Paris (1977) shows a 'distribution coefficient' between n-octanol and water of  $(3.3 \pm 2.5) \times 10^3$  and cites Paris et al. (1975). However, the latter article does not provide any information relevant to the derivation of Koc or Kow for toxaphene. In view of the difficulties with this value, I will omit all 3 data, which will cause a missing value.

Chloramben - The decimal point in these values was misplaced. The values should have been 118, 204, 518 which we gave to Margaret in a memo dated 8/18/88. I am still checking on the source of those values.

Methyl Bromide - The 1900 value is correct as found in the data call in (123-097). There was a low soil organic content.

Solubility. Following Dr. Seiber's comments, I went through all the solubility data and used the following rules to determine a subset for finding means:

1. Discarded duplicates.
2. If no temperature, discarded, when measurements with temperature available.
3. Discarded solubilities for temperatures greater than 2C away from 20C, when there was at least 1 measurement at 20C.
4. Averaged solubilities within 2C of 20.
5. If no temperature data provided for any data, all values accepted.
6. If no temperature within 2C of 20, then I took the next higher temperature and all within 2C.

I did not research for missing temperature data.

Methyl Bromide - First 2 values are as found in references.

Hydrolysis. Generally, I used the following rules:

1. I discarded if pH was known and not between 6.5 and 7.5.
2. Discarded boundary values when estimates available.
3. When a 25C temperature measurement available, I discarded others done at different temperatures.
4. Discarded boundary estimates when actual estimate available.

Some hydrolysis data call in values present a difficulty in that the EPA requirement is for a 30 day study. When a compound does not degrade within 30 days, it may be listed as 'stable' up to 30 days. It is not clear how to use this kind of information to derive a mean. Though I have tried to avoid using a lower bound, in some cases the alternative was no data at all.

Specific comments follow:

Aldrin - This reference SW054 as found in Li (1983) is McEwen and Stephenson (1979). I examined all page numbers in the index under aldrin, but found no reference to aldrin hydrolysis. Will omit from data set.

Atrazine - Approved data call in study of 30 days indicated no hydrolysis. Will omit boundaries of 3 and 12 from 02034, combine 42 and 180 and use their mean together with 200 to estimate half life.

Carbaryl - High and low values from reference T0025 eliminated due to pH. Two additional values discovered 10.5 and 15 from Aly and El-Dib (1971) and Wolfe et al. (1978), respectively.

DBCP - Reference checked out of ETox library, unable to obtain. Will take average as shown, assuming monotonic relationship between 2 temperatures.

EDB - Huge value will be 'winsorized' (set equal to next largest value) on the theory that no study can reliably predict such an enormous half life and therefore large uncertainty in the number.

Naled - Eliminated 14 day half life since no temperature or pH values shown.

Alachlor - Data call in summary memo says >24 months. So will use 720 days.

Metribuzin - Data call in indicates stable at 30 days (170 49558). Will eliminate T0015 estimate of 7 days which is from Agrochemicals Handbook, which states 'Half-life in pond water is ca. 7 days.'

Chloramben - Stable at 30 days under all conditions according to data call in (3 49519).

Ametryne - Stable at 30 days according to data call in (7 54636).

Fenamiphos - Will eliminate 5 day estimate from 2478, which is Waggoner and Khasawinih and states '... hydrolysis is observed in natural pond water at pH 7 and 20C under field conditions in the presence of silt. Approximately 50% is hydrolyzed within 5 days under these natural conditions.' (p.82)

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