BUREAU OF THE ENVIRONMENT
ENVIRONMENTAL QUALITY BOARD
1615 Washington Street, East, Suite 301
Charleston, West Virginia 25311-2126
(304) 558-4002
Fax: (304) 558-4116

MINUTES
WEST VIRGINIA ENVIRONMENTAL QUALITY BOARD
DECEMBER 16TH & 17TH, 1999

I. General

On December 16, 1999, a quorum of the members of the Environmental Quality Board (hereinafter referred to as the "Board") met at its offices at 1615 Washington St., E., Charleston, West Virginia. Ed Snyder, Co-Chair, called the Environmental Quality Board meeting to order at 1:00 p.m.

Other Board members present were as follows:

Don Tarter, Co-Chair
David Samuel
Bob Jenkins

Whereupon the Board addressed the issues set forth in the Agenda as follows:

I. Administrative Matters

1. Review and approval of meeting minutes:

The minutes of the November 29, 1999, Environmental Quality Board meeting were presented to the Board for consideration. Whereupon, Dr. Jenkins moved and Dr. Tarter seconded that the minutes of the November 29, 1999, Board meeting, as written, be adopted and the motion passed unanimously 4 to 0.

2. Computer Update:

The Board was provided with the specification sheet on the proposed purchase of a new computer for Ms. Chatfield. The Board then requested two modifications to the Engineer Workstation (W/S Option 2) desktop computer, including a 10 GB hard drive instead of the 8 GB listed on the specification sheet, and a DVD drive instead of the CD-ROM Drive. Whereupon, Dr. Tarter moved and Dr. Snyder seconded that the Board request bids on the computer with the new specifications, and the motion passed unanimously 4 to 0. The Board then directed Ms. Chatfield to purchase the computer after the bids are received without further input from the Board.

3. Personnel matters:

The Board noted that the 360 evaluations for Ms. Charles and Ms. Chatfield, and the 90 day evaluation for Ms. Carte would be completed in Executive Session.

4. Budget Report:

Randy Taylor from the Bureau of the Environment appeared before the Board to explain the current Board budget situation and to answer any questions which the Board members had. Mr. Taylor provided the Board with a report on revenues and expenses for the Environmental and Air Quality Boards. That report is attached to and made a part of these minutes as Exhibit "A".

Mr. Taylor informed the Board that the budget would allow the Board to hire an executive secretary at an annual salary of $25,000 plus benefits, and to purchase a new computer for Ms. Chatfield.

He also informed the Board that with some "creative" accounting, i.e. moving money between various funds, the Board's budget may contain enough funds to operate through the current fiscal year. Mr. Taylor then recommended to the Board that, after the beginning of the 2001 fiscal year (July 2000), they approach the Governor's office to procure an emergency supplemental appropriation.

5. Audit Report:

The Board was updated on the progress of the audit being conducted by the Legislative Auditor's office. The audit is on-going and there is no projected completion date at this time.

6. Meeting Dates:

The Board scheduled a meeting for May 11, 2000.

II. Appeals

1. Appeal #98-09-EQB (Wright) - Dismissal of Appeal:

During the November 29, 1999 Board meeting, the Board directed Ms. Charles to draft an Order of Dismissal for Appeal #98-09-EQB for their review. Ms. Charles presented the Board with that draft Order. After discussion, Dr. Jenkins moved and Dr. Tarter seconded that the Board approve the proposed Order of Dismissal and issue such Order in Appeal #98-09-EQB, and the motion passed unanimously 4 to 0.

2. Appeal #99-09-EQB, #99-10-EQB, #99-11-EQB (Knouse foods) - Change of Venue:

Becky Charles presented the Board with a Motion for a Change of Venue in Appeal #99-09-EQB, #99-10-EQB and #99-11-EQB, which was submitted by Appellants McClung (#99-09-EQB) and Mason #99-10-EQB. Knouse Foods, the Appellant in #99-11-EQB submitted a response to the motion in which they oppose the change of venue. DEP's Office of Legal Services did not respond to the motion.

After a review of the Motions, the Response Motion and the Board's budget, Dr. Jenkins moved and Dr. Samuel seconded that the Board deny the Motion for a Change of Venue, and the motion passed unanimously 4 to 0. The Board noted that while the Hearing will be held in Charleston, if it is determined that an on-site inspection is necessary, the Board will make arrangements for such inspection at that time.

3. Appeal #99-03-EQB (7-11) - Motion to Correct and Revise Transcript:

Becky Charles presented the Board with a Motion to Correct and Revise Transcript in Appeal #99-03-EQB which was submitted by the Appellant. The Motion outlined various mistakes contained in the Hearing transcript but did not contain an exhaustive list of errors. The Appellant requested that the Board review the taped proceedings in the presence of counsel for both Appellant and Appellee and settle all differences arising as to whether the transcript truly discloses what occurred at the Hearing.

Craig Giffin, from DEP's Office of Legal Services submitted a reply brief. While the Appellee did not object to the Motion to Revise and Correct the Transcript, it did however, object to the method proposed by the Appellant.

Ms. Charles informed the Board that they are charged with correcting and revising the transcript in order that it conforms with the whole truth. She is in the process of obtaining the tapes of the Hearing and the parties may obtain copies of the tapes from the Board.

After Discussion, Dr. Samuel moved and Dr. Tarter seconded that the parties to the Appeal review and identify the incorrect language in the transcript and attempt to reach an agreement as to the correction needed. When no agreement can be made between the parties, the Board's legal counsel will listen to the Hearing tapes and make the decision regarding the correction.

III. Other Business

The Board requested that in the future, the Board Meeting Notices and agendas contain the proviso "The Board may not address the items on the agenda in the order in which they are listed."

Further, Dr. Samuel requested that in addition to the meeting information packet memo sent to the Board members prior to the meeting and the meeting Notice sent via e-mail, that he be sent a "hard" copy of the draft agenda.

Whereupon the Board members adjourned the meeting until Friday, December 17th, 1999.

On December 17, 1999, a quorum of the members of the Environmental Quality Board (hereinafter referred to as the "Board") met at its offices at 1615 Washington St., E., Charleston, West Virginia. Ed Snyder, Co-Chair, called the Environmental Quality Board meeting to order at 9:00 a.m.

Other Board members present were as follows:

Don Tarter, Co-Chair
David Samuel
Bob Jenkins

Whereupon the Board resumed the meeting of December 16, 1999, and addressed the issues set forth in the Agenda as follows:

IV. Rulemaking

1. 46 CSR 1 - Requirements Governing Water Quality Standards

A. Update on antidegradation stakeholder group meetings:

1. Discussion with Dr. Storch regarding stakeholder group process:

Dr. Storch, who is acting as the facilitator for the Anti-Degradation Stakeholders Group, appeared before the Board to outline his view of the Anti-Degradation Stakeholder Group process and the progress of the group. Dr. Storch informed the Board that the Stakeholder Group's first meeting occurred in August 1999 and since that time has met approximately every other week. The process has been very slow, sometimes discouraging and often frustrating. It obviously can take an extremely long time to reach a consensus on issues when you have such a variety of individuals representing a wide range of industry and environmental groups.

Dr. Storch informed the Board that the most challenging aspect of the process is the tight time schedule with which they are faced. Although the extension which was granted by the Board is helpful, the group still has many outstanding issues to

address. The Stakeholders group may not have enough time to address all of these issues. However, the group is making progress and although they may never reach a consensus on all issues he believes that they will produce a viable document for the Board's consideration. Any items on which they are unable to reach agreement, the group will provide the Board with all opposing views.

2. Update on Agency's authority to promulgate antidegradation regulations:

Ms. Chatfield informed the Board that she and Becky Charles met with representatives of DEP; Allyn Turner, Randy Sovic, Barbara Taylor, Roland Huson and John Johnston to discuss whether the Environmental Quality Board or the DEP has the authority to promulgate the antidegradation water quality standards.

Ms. Turner stated that she and Ms. Charles are going to prepare legal arguments and the group will meet again. However, the DEP has not taken a position on this matter at this time. Ms. Chatfield stated that the representatives of DEP were unable to provide her with the specific reasons or the basis for their concern over whether the Board has the authority to promulgate the antidegradation regulations. Dr. Snyder noted that the initial anti-degradation document that is now being addressed by the Stakeholder group is one that was constructed by a working group from the DEP.

Various members of the Anti-Degradation Stakeholders group were present and spoke to the Board regarding their concerns and the impact that this issue has had on the Stakeholder group. The Board informed them that the Stakeholders group will continue the process under the direction of the Board.

B. USEPA recommendations from June 1999 letters to Board:

1. Upper Blackwater River:

Senator Sarah Minear, who represents the 14th Senatorial District, appeared before the Environmental Quality Board to inform the Board members that she intends to amend the water quality standards relating to the Upper Blackwater River. Senator Minear requested the support of the Board in this endeavor. The Board

informed Senator Minear that presentations have been made and data provided to the Board regarding the Upper Blackwater River and that there are several more presentations scheduled before the Board during the January 12, 2000, Board meeting. The Board is attempting to gather all pertinent information prior to making a decision in this matter.

2. Discussion with Representative from Bureau for Public Health on Manganese:

Don Kuntz from the WV Bureau of Public Health appeared before the Board to discuss manganese. (Letter attached as Exhibit "B") Mr. Kuntz informed the Board that there are 650 community public water supplies in the State. Of those, 36 supply 50 percent of the population of the State with water. In the case of source water supplies to drinking water facilities most existing facilities throughout the State have the capability to deal with manganese. However, clearly there are many very small water supply facilities which are the most likely to encounter problems with manganese and the treatment.

Manganese is not a primary contaminant and is not a health related contaminant under EPA regulations. It is a secondary contaminant which means that it is not aesthetically pleasing. There is however, at least an indirect application to potential health affects that manganese can be linked to. It is the oxidized state of manganese (the state before treatment) that is aesthetically unpleasant, however, the manganese treatment process can remove partial amounts of the chlorine that has been added to the water to destroy microorganisms and pathogens.

In extreme cases there are also concerns that distribution system manganese can contribute to micro-organism growth. Also, manganese can lessen the diameter of water distribution pipes which could have an impact on customer service by affecting the water pressure.

In addition, there are treatment cost concerns which would affect the consumer. Because the treatment plants must use a green sand filter treatment, which is an additional process to remove manganese, there are additional costs to the consumer.

3. Review of Body Burden Recommendations submitted in 1997 by Body Burden Committee:

During the November 29, 1999 Environmental Quality Board meeting, the Board voted to remove the existing body burden values from the rule. The Board was provided with comments submitted by individuals regarding that decision. The Board was also provided with another copy of the final report submitted to the Board by the inter-agency committee established to review body burden criteria in the WV water quality standards in 1997. These comments and the committee report are attached to and made a part of these minutes as Exhibit "C".

Dr. Jenkins made clear the Board's intent to remove the existing body burden values from the rule only until correct numeric values which are defensible from a scientific stand point can be established. The Board agreed to review the table created by the US Environmental Protection Agency and instructed Ms. Chatfield to contact EPA about the table.

Dr. Snyder reminded the Board that initially the EQB put a body burden concept in the water quality standards but recognized that the body burden rules that were in existence were scientifically indefensible. That provision was disapproved by EPA. The Board then formed a committee to provide recommendations on defensible body burden language which was then submitted to the Legislature. This proposed language was supported by the Board, the Committee and the EPA. However, the proposed legislation regarding body burden was not approved by the Legislature and the original version disapproved by the EPA remains in the water quality standards. A flow chart regarding the history of the body burden concept is attached to and made a part of these minutes as Exhibit "D".

2. Withdrawal of proposed Legislative Rule:

During the November 29, 1999 Environmental Quality Board meeting the Board directed Ms. Chatfield to withdraw the current legislative rule regarding anti-degradation from consideration during the 2000 Legislative process. This was decided in order to extend the anti-degradation stakeholder process until April 2000.

Ms. Chatfield informed the Board that since the proposed Legislative rule also contains the Weirton Steel variance they must decide between two options, a) modify the Legislative rule after it is taken up by Legislative Committee or b) withdraw the proposed Legislative rule and address the Weirton Steel variance in the emergency rule.

After discussion, Dr. Tarter moved and Dr. Samuel seconded that the Board retain the current proposed Legislative rule and modify it when it is taken up by the Legislative Committee, and the motion passed unanimously 4 to 0.

3. Review of written comments received by the Environmental Quality Board regarding the Emergency Rule:

Prior to the meeting, the Board was provided with copies of the written comments received regarding Category "A" in the Emergency Rule. During the meeting, Ms. Chatfield provided the Board members with a written summary of these comments. That summary is attached to and made a part of these minutes as Exhibit "E".

After review and discussion of the comments and summary, the Board decided to move forward with the Emergency Rule on Category A without changes or amendments.

V. Executive Session

Whereupon, Dr. Jenkins moved and Dr. Tarter seconded that the Board go into Executive Session to conduct interviews and personnel evaluations. Upon return the Board announced that no votes were taken during Executive Session.

Whereupon, the December 17, 1999 meeting of the Environmental Quality Board was adjourned.

I hereby certify that the forgoing is a true and correct record of the proceedings of the meeting held on December 16th & 17th, 1999, by the West Virginia Quality Board. The minutes were amended and approved by the Environmental Quality Board on January 12th, 2000.

Melissa Carte, Clerk

REPORT ON REVENUES AND EXPENSES
ENVIRONMENTAL/AIR QUALITY BOARDS
AT NOVEMBER 30, 1999

FUND 3275- NON-APPROPRIATED SPECIAL FUND

Beginning Cash at 07/01/99		3,695.60	
INCOME:			
Transfer from Water Resources per agreement	50,000.00		
Payments for FOIA copies	261.26		
Total income for FY 2000		50,261.26	
TOTAL INCOME			53,956.86
EXPENDITURES:			
Salaries (July-November)	16,242.50		
Increment	255.50		
Benefits (FICA match)	3,269.69		
Other (FY 1999 & 2000 expenses pd in 2000 FY)	7,565.03		
TOTAL EXPENDITURES			27,332.72
CASH BALANCE AT 11-30-99			26,624.14

Projected Salaries and Beneifts for remainder of fiscal year:		
Monthly $ 3,805.19 for seven months	29,236.50	
Benefits:		
Work Comp/ qtr.2 qtr. @ 175.48		
Personnel Fees/qtr.2 qtr. @ 28.72	408.40	
Projected Excess or (deficeit) @ 06/30/2000	(3,020.76)	2
Current Spending Authority (Budget)	55,000.00	
Current and Projected Expenditures For yr 2000	56,977.62	
Overspend Budget	(1,977.62)	1

1.STATE BUDGET OFFICE WILL NOT ALLOW AGENCIES TO OVERSPEND THEIR BUDGETS
2.STATE AUDITORS OFFICE WILL NOT ALLOW AGENCIES TO OVERSPEND THEIR CASH IN THE FUND

Libby,
I can adjust the spending authority to cover the estimated expenditures. However, I can't adjust the potential cash problem that this fund will have. I have instructed Greg Null not to process any payments that are not payroll related on this fund. Even with this remedy, I still project a negative cash balance.
With the projected balance I am showing in 0270-001 you may want to adjust the percentage paid for personal services from 3275 and have 0270 pay some of the salary of the individual(s) that are now being paid from 3275.
If you have any questions, please call me. Thank you.

EXHIBIT "A"

REPORT ON REVENUES AND EXPENSES
ENVIRONMENTAL/AIR QUALITY BOARDS
AT NOVEMBER 30, 1999

FUND 0270- APPROPRIATED GENERAL REVENUE FUND

Beginning FY 2000 APPROPRIATION

Activity 001-Personal Services		64,819.00	
Salaries (July-November)	20,891.02		
Projected Salaries (Dec.-June)	27,174.00	48,065.02	
Projected Balance			16,753.98
Activity 004-Increment		523.00	
Increment	367.00	367.00	
Projected Balance			156.00
Activity 010-Benefits		23,858.00	
Benefits (July-November)	4,910.89		
Projected Benefits (Dec.-June)	7,639.72	12,550.61	
Projected Balance			11,307.39
Activity 099-Unclassified		30,106.00	
Expenditures (July-November)	11,647.67		
Projected Expenditures (Dec.-June)***	18,458.33	30,106.00	
Projected Balance			-

***Even though the Boards annalized projected expenditure for unclassified activities do not reflect the entire appropriation will be spent (projected amount is $ 16,308 for Dec.-June, I have shown that the entire appropriation will be used in this activity.

REPORT ON REVENUES AND EXPENSES
ENVIRONMENTAL/AIR QUALITY BOARDS
AT NOVEMBER 30, 1999

FUND 0550- APPROPRIATED GENERAL REVENUE FUND

Beginning FY 2000 APPROPRIATION	BUDGETED	July-November Spent	Dec.-June Projection	Projected Balance
Object Code 001-Personal Services	55,082.00	14,454.72	22,639.26	17,988.02
Object Code 002-Personal Services w/o Deductions	-	2,700.00	3,780.00	(6,480.00)
Object Code 004-Increment	228.00	-		228.00
Object Code 010-Personnel Fees	500.00	144.50	144.50	211.00
Object Code 011-FICA Match	3,400.00	1,125.00	1,575.00	700.00
Object Code 012-Insurance	5,000.00	1,666.65	3,619.65	(286.30)
Object Code 014-Wrk Comp	1,000.00	467.55	469.14	63.31
Object Code 015-Unemply. Comp.	-	3,513.03	-	(3,513.03)
Object Code 016-Retirement	5,200.00	1,090.80	2,354.39	1,754.81
Total Personal Services & Benefits	70,410.00	25,162.25	34,581.94	10,665.81
Other Expenditures (020-171)	9,318.00	7,742.95	10,840.13	(9,265.08)
TOTAL BUDGET & EXPENDITURES	79,728.00	32,905.20	45,422.07	1,400.73

STATE OF WEST VIRGINIA
DEPARTMENT OF HEALTH AND HUMAN RESOURCES

Cecil H. Underwood
Governor

Joan E. Ohl
Secretary

November 15, 1999

Donald Tartar, Ph.D.
Edward Snyder, Ph.D.
Environmental Quality Board
1615 Washington Street, East, Suite 301
Charleston, West Virginia 25311-2126

RE: Comments on Public A Use Category and Manganese Water Limits

Dear Dr. Tartar and Dr. Snyder:

The West Virginia Bureau for Public Health (WV BPH), Office of Environmental Health Services (OEHS), Environmental Engineering Division (EED) has prepared a list of concerns regarding the Public A Use Category and Manganese Water Limits issue.

Based on information obtained through and discussions with the Environmental Quality Board (EQB), we understand that the Board would entertain adopting the Source Water Assessment and Protection (SWAP) program's Time-of-Travel (TOT) guideline for surface water bodies, primarily rivers, reservoirs, and streams. The SWAP program uses a TOT of five (5) hours for the distance between a public water supply intake and the outer boundary for potential contaminant sources. This area is referred to as the Zone of Critical Concern (ZCC). The ZCCs were established as a safety mechanism to provide sufficient time for water treatment works operators to respond to spills and to provide an area for the development of the potential contaminant source inventories.

In adopting the ZCC for surface water, the EQB would require surface water quality to meet drinking water or surface water quality standards within the ZCC of the affected public water supply system. Several issues relative to this use of the ZCC are as follows:

1. If a surface water contaminant entering the ZCC is above a drinking water standard or water quality standard, what mechanism(s), within the ZCC, will lower it to drinking water standards or evaluate these discharges causing the higher chemical concentrations? Mixing and/or dilution may impact the concentration, but no assurance can be given without modeling, etc.

BUREAU FOR PUBLIC HEALTH
Office of Environmental Health Services
815 Quarrier Street, Suite 418
Charleston, West Virginia 25301-2616
Telephone: (304) 558-2981

EXHIBIT "B"

2. If a new system is constructed outside of an ZCC, what mechanism would be used to define new areas or to existing lower constituent concentrations that exceed drinking water standards in the new ZCC?

3. Would the application be only to discharges physically located within the defined area?

4. How would the Department of Environmental Protection issue permits inside and outside the ZCC? How would the WV BPH be involved with this process?

With respect to the issue of manganese, we offer the following comments. When manganese is present in water, chlorine (used of water treatment) oxidizes manganese and other metals before it attacks carbon-based molecules. Quite often systems have problems with manganese in the finished water because many systems do not routinely test raw waters for the manganese or fail to recognize increased chlorine demands. Plant operators are also reluctant to feed $KNmO_4$ (potassium permanganate) because of cost and possibility of overfeeds which turns the water pink. Chlorine will oxide manganese, but it takes time and some plants with short treatment times may find the reaction takes place in the filter, clear well, and distribution system. Manganese will coat the filter media grains until the media no longer meets the uniformity coefficient nor effective size as required by our design standards. Carried over into the distribution system, it will also coat the interior walls of piping, thus reducing both the effective size and increasing friction which affect flow characteristics.

The WV BPH also notes that if manganese is released into streams above the appropriate water quality standard, the concentration of manganese is not lowered by any natural processes other than mixing/dilution. If the source water at the intake is high in manganese, three consequences can occur: First, if the increased chlorine demand goes unrecognized, the possibility of the water not being completely disinfected before distribution arises. Some types of bacteria and other pathogenic organisms are more resistant to chlorine therefore, the concentration and contact time must be sufficient to remove them. The rough surfaces on the interior of pipelines, in the distribution system also provide sites for promotion of bacteria regrowing which maybe detrimental to public health.

The second issue deals with the additional chlorine treatment necessary to oxidize the manganese. Additional chlorine treatment promotes a reaction with naturally occurring organic compounds, halogenating them, and creates disinfection byproducts such as Trihalomethanes (THM's) and haloacetic acids (HAA_5). These byproducts are potential or known carcinogins. The Environmental Protection Agency has promulgated the Disinfectant/Disinfection ByProducts Rule to deal with these newly regulated compounds. To avoid formation of THMs and HAA_5 more costly alternative oxidizers must be used. Such treatment requires more technically competent and generally more highly paid water treatment works operators.

Thirdly, additional costs are associated with treating contaminated raw water to drinking water standards. The more treatment required, the greater the cost. The municipal and public water supply systems (PWSS) will normally pass the additional costs on to the consumers based on Public Service Commission (PSC) approval. There is also the issue of allowing a NPDES permit holder to discharge high levels of manganese and cause the PWSS consumers to pay for the additional, required treatment in the form of higher rates.

We appreciate the opportunity to provide our comments. If you have additional questions or comments, please contact me.

Sincerely,

Chris Gordon

Chris Gordon, Interim Director
Office of Environmental Health Services

CG/cjj

pc: Elizabeth Chatfield, Technical Advisor, Environmental Quality Board
Mike Zeto, DEP/Environmental Enforcement, Chief Inspector
Donald Kuntz, OEHS, Director, Environmental Engineering Director
Victor Wilford, OEHS/EED, Assistant Director
William Toomey, Acting Administrator, Source Water Protection Program

Subject: public comment Fish tissue standards
Date: Mon, 13 Dec 1999 19:26:25 -0500
From: "Vivian Stockman" <vivian@wvadventures.net>
To: <clerk@mail.wvnet.edu>

Vivian Stockman
Concerned Citizens' Coalition
249 Millstone Run
Spencer, WV 25276
vivian@wvadventures.net

To the WV Environmental Quality Board

I understand that EQB will propose to the 99-00 legislature that fish tissue standards must be scrapped. Please do not allow fish tissue standards to be tossed! No one is available to attend your public hearing on this matter, but the members of the Concerned Citizens' Coalition of Roane, Calhoun and Gilmer Counties wish to be heard: We do not want fish tissue standards tossed!

It is imperative that persistent, bioaccumulative substances be measured in a way that addresses their effects on human health. It is clear to CCC from our research on dioxin and like compounds during the Apple Grove pulp mill days that merely measuring the amount of a bioaccumulative toxin in water does not indicate the extent of the toxins within the food web.

Tossing the fish tissue standards smacks of capitulating to polluters at a great cost to human health. Please do not toss the fish tissue standards, for the sake of current and unborn generations.

Sincerely yours,

Vivian Stockman for CCC

EXHIBIT "C"

Subject: **EQB Fish Standards, again**
Date: Tue, 14 Dec 1999 00:06:08 -0500
From: Lew Baker <lab1@ezwv.com>
To: clerk@mail.wvnet.edu
CC: "'Garvin, Don'" <troutguy@msys.net>, "'Gibbins, Helen'" <gibbins@MARSHALL.EDU>, "'Kotcon, Jim'" <JKotcon@wvu.edu>, "'Sconyers, Jim'" <Jim_Sconyers@wvwise.org>, "'Zuckett, Gary'" <gary_zuckett@wvwise.org>, Dianne Bady <dbady@MARSHALL.EDU>, "info@riverkeeper.org" <info@riverkeeper.org>, Janet fout <JFout@ezwv.com>, "Hugh E Bevans, District Chief, Charleston, WV" <hbevans@usgs.gov>, "Kimberly F Miller, Biologist, Charleston, WV" <kfmiller@usgs.gov>, Linda Mallet <lmallet@wvwise.org>, Margaret Janes <MJPAWS@aol.com>, Norm Steenstra <NSteenstra@wvwise.org>, Pam Moe-Merrit <pmoe@neumedia.net>, Pam Nixon <pnixon@mail.dep.state.wv.us>, Perry McDaniel <pmcdaniel@crandallpyles.com>, Pete Costello <PCOSTELLO@mail.dep.state.wv.us>, renae bonnett <bonnett1@newwave.net>, Viv Stockman <vivian@wvadventures.net>, William Sanjour <Sanjour.William@epamail.epa.gov>

Libby Chatfield,

Please excuse my earlier attempt to send comments as an attached file. Here are my comments on the WV EQB's proposal to throw out the fish tissue standards contained in our state's water quality standards.

I say, DON'T DO IT! Instead, simply update to EPA's own newest numeric values. Keep numeric fish criteria in our water quality standards, as this simple but powerful tool has proved its usefulness (remember the Apple Grove pulp mill permit, and the dioxin TMDL 303d listings ?).

EPA Region III gave the WV EQB only two options. Either adopt an unworkable equation to "back-calculate" very uncertain fish values, or throw out the fish values altogether. EPA said our fish tissue criteria were no longer accurate estimates of the one in a million cancer risk. (They refuse to admit their own numeric water standards are no longer good estimates of one in a million risk either)

Their "back-calculation" method proved completely useless, given the Body Burden Committee's own inability to handle the overly complicated math EPA suggested, and the lack of reliable data in EPA's Storet database to insert into that equation.

Therefor the EQB chose EPA's only other option, to throw out our numeric fish tissue standards. But EPA failed to give the EQB a third, and proper option of adopting EPA's own current estimates of the right numeric values for one in a million risk for chemicals in fish tissues.

EPA Region III's own Risk Based Concentration Table can be found on the web, and is attached here as a pdf file. (You may recall I provided the EQB with copies of an earlier version this same table when the Body Burden Committee was still active). EPA Region III's Risk Based Concentration Table listes the one in a million risk levels for hundreds of chemicals, whether the media consumed is fish, water, soil, or air. The bioaccumulative chemicals the EQB has had fish tissue values for (i.e. dioxin, PCBs, DDT, etc) are all listed here, plus many more.

EPA's current numeric value for one in a million cancer risk for dioxin in fish is now 300 times more stringent than the state's old number. Our old number was (is) 6.4 ppt dioxin in fish, and EPA's latest number is 0.021 ppt dioxin in fish. (It would be even more stringent if the dioxin concentration was reported as a "teq" value, so as to include the

toxicity of all dioxins and furans)

I would hope the EQB and EPA are not afraid of allowing citizens to know the truth about dioxin toxicity, or to really have a correct set of standards on the books. If the EQB does not choose to use EPA's own values for one in a million cancer risk for highly bioaccumulative chemicals like dioxin, PCBs, DDT, etc in our fish tissue criteria, please provide detailed reasons.

Lew Baker,
Huntington, WV

rbc.pdf	**Name:** rbc.pdf **Type:** Wpwin File (application/pdf) **Encoding:** base64

Subject: **EPA letters**
Date: Wed, 22 Dec 1999 15:12:46 -0500
From: Lew Baker <lab1@ezwv.com>
To: clerk@mail.wvnet.edu
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Melissa Carte, WV EQB;

Please consider this e-mail a FOIA request for any recent letters from EPA to the WV Environmental Quality Board (or vice versa) regarding WV's Water Quality Standards. I am particularly interested in correspondence related to fish tissue standards. I served on the EQB's "Body Burden Committee" when it took up this issue a couple years ago. In fact, the EQB acted on my suggestion when it agreed to put together the "Body Burden Committee".

As the lone citizen representative on the committee I was disappointed to find the members from EPA and state agencies tended to side with industry, who downplayed the importance and usefulness of fish tissue standards. EPA's representatives on the committee told us our simplistic, numeric fish tissue standards were "too confusing" to have on the books, in addition to our water concentration standards. (Now EPA allows for fish standards.)

EPA's representatives told us then we should switch to their math equation for calculating fish tissue values from our water concentration standards, never mind the fact none of the federal or state agency people on the committee were ever able to crank through the equation. I challenged my other committee members to do the math, at numerous meetings, but never got a taker.

EPA's latest guidance on water quality standards does provide for state's to include fish tissue standards, but still recommends the use of their overly complicated "back calculation" method. I continue to believe that simple, numeric fish tissue values are unquestionably easier to use and more likely to hold up in court, than a complicated equation. (Our existing numeric standard for dioxin in fish tissue was used in court to defeat the largest pulp mill planned for North America, at Apple Grove, WV). After all, we have simple, numeric water concentration standards on our books, for exactly the same reasons.

I proposed to the Body Burden Committee then, and have suggested to the EQB since, the use of EPA's own simple, numeric values for fish tissue.

These numbers come from EPA Reg III's own Risk Based Concentration Table, which may be found on the internet website. Their "RBC" Table lists hundreds of chemicals, along with the one-in-a-million cancer risk associated with each chemical for drinking water, fish tissue, air, residential soils, and industrial soils. I urge the EQB to reference this table in its response to the EPA's disapproval of our fish tissue standards. Our state's Brownfields legislation references the RBC, and so our legislature has already found it useful. I don't think EPA can logically disapprove of its own numbers.

Here's a short table of bioaccumulative chemicals, the fish tissue values now in the state's standards, and the RBC's numeric values which represent EPA's latest estimates for one-in-a-million cancer risk. I added some bioaccumulative chemicals not yet listed in our fish tissue standards, but should be. The expanded list would be consistent with EPA's new approach to deal with Persistent, Bioaccumulative, and Toxic chemicals. A few of the "PBTs" don't yet have a value in the EPA's RBC, but are included for future reference.

Fish Tissue (Water Quality) Standards for
Persistent, Bioaccumulative, and Toxic Contaminants

Chemical Name	Current Value levels (ug/kg, or "ppb")	Proposed Value at arbitrary risk at EPA's 10-6 risk (ug/kg, or "ppb")
Aldrin	na	0.165
Chlordane	1000	2.4
DDD	na	11.7
DDE	na	8.4
DDT	100	9
Dieldrin	300	0.21
Endrin	300	90
Hexaclorobenzene	na	1.8
Hexachlorobutadiene	na	36
HCCH; alpha-BHC	na	0.045
HCCH; beta-BHC	na	1.65
HCCH; gamma-BHC "Lindane"	na	2.1
Heptachlor	na	0.63
Heptachlor Epoxide	na	0.3
Mercury (methyl)	na	126
Methoxychlor	na	6000
Mirex		

na	Octachlorostyrene	1.65	
na	PCBs	na	
2000	Pentachlorobenzene	0.3	
na	Photomirex	990	
na	1,2,3,4 Tetrachlorobenzene	na	
na	1,2,4,5 Tetrachlorobenzene	na	
na	2,3,7,8 TCDD "Dioxin"	360	
6.4	Toxaphene	0.021	ppt
ppt			
1000		3	

This table submitted to WV EQB, 7/28/99 by Lewis Baker
for WV Citizen's Research Group and Ohio Valley Environmental Coalition

this e-mail from
Lewis Baker, Huntington, WV
12/22/99

Sources: I = IRIS H = HEAST A = HEAST Alternate W = Withdrawn from IRIS or HEAST
E = EPA-NCEA provisional value O = other

Basis: C = Carcinogenic effects N = Noncarcinogenic effects I = RBC at HI of 0.1 < RBC-c

Chemical	CAS	RfDo mg/kg/d	CSFo 1/mg/kg/d	RfDi mg/kg/d	CSFi 1/mg/kg/d	VOC	Risk-based concentrations: Tap water ug/l	Ambient air ug/m3	Fish mg/kg	Soil Industrial mg/kg	Residential mg/kg	Region III SSLs: Soil, for groundwater migration DAF 1 mg/kg	DAF 20 mg/kg
ACETALDEHYDE	75070			2.57E-003 I	7.7E-003 I	y	1.6E+000 C	8.1E-001 C				3.8E-004	7.7E-003 C
ACETOCHLOR	34256821	2E-002 I					7.3E+002 N	7.3E+001 N	2.7E+001 N	4.1E+004 N	1.6E+003 N		
ACETONE	67641	1.00E-001 I				y	6.1E+002 N	3.7E+002 N	1.4E+002 N	2.0E+005 N	7.8E+003 N	1.2E-001	2.5E+000 N
ACETONITRILE	75058			1.7E-002 I		y	1.2E+002 N	6.2E+001 N				2.9E-002	5.8E-001 N
ACETOPHENONE	98862	1.00E-001 I		5.70E-006 W		y	4.2E-002 N	2.1E-002 N	1.4E+002 N	2.0E+005 N	7.8E+003 N	1.1E-005	2.2E-004 N
ACROLEIN	107028	2.00E-002 H		5.70E-006 I		y	4.2E-002 N	2.1E-002 N	2.7E+001 N	4.1E+004 N	1.6E+003 N	1.0E-005	2.0E-004 N
ACRYLAMIDE	79061	2.00E-004 I	4.50E+000 I		4.50E+000 I		1.5E-002 C	1.4E-003 C	7.0E-004 C	1.3E+000 C	1.4E-001 C	3.7E-006	7.4E-005 C
ACRYLONITRILE	107131	1.00E-003 H	5.40E-001 I	5.70E-004 I	2.40E-001 I	y	3.7E-002 C	2.6E-002 C	5.8E-003 C	1.1E+001 C	1.2E+000 C	7.4E-006	1.5E-004 C
ALACHLOR	1597260	1.00E-002 I	8.00E-002 H				8.4E-001 C	7.8E-002 C	3.9E-002 C	7.2E+001 C	8.0E+000 C	3.5E-004	7.0E-003 C
ALAR	1596845	1.50E-001 I					5.5E+003 N	5.5E+002 N	2.0E+002 N	3.1E+005 N	1.2E+004 N		
ALDICARB	116063	1.00E-003 I					3.7E+001 N	3.7E+000 N	1.4E+000 N	2.0E+003 N	7.8E+001 N	1.0E-002	2.1E-001 N
ALDICARB SULFONE	1646884	1.00E-003 I					3.7E+001 N	3.7E+000 N	1.4E+000 N	2.0E+003 N	7.8E+001 N	7.5E-003	1.5E-001 N
ALDRIN	309002	3.00E-005 I	1.70E+001 I		1.70E+001 I		3.9E-003 C	3.7E-004 C	1.9E-004 C	3.4E-001 C	3.8E-002 C	3.8E-004	7.7E-003 C
ALUMINUM	7429905	1.00E+000 E		1.00E-003 E			3.7E+004 N	3.7E+000 N	1.4E+003 N	2.0E+006 N	7.8E+004 N		
AMINODINITROTOLUENES		6.00E-005 E					2.2E+000 N	2.2E-001 N	8.1E-002 N	1.2E+002 N	4.7E+000 N		
4-AMINOPYRIDINE	504245	2.00E-005 H					7.3E-001 N	7.3E-002 N	2.7E-002 N	4.1E+001 N	1.6E+000 N		
AMMONIA	7664417			2.86E-002 I		y	2.1E+002 N	1.0E+002 N					
ANILINE	62533	7.00E-003 E	5.70E-003 I	2.90E-004 I			1.2E+001 C	1.1E+000 N	5.5E-001 C	1.0E+003 C	1.1E+002 C I	6.8E-003	1.4E-001 C
ANTIMONY	7440360	4.00E-004 I					1.5E+001 N	1.5E+000 N	5.4E-001 N	8.2E+002 N	3.1E+001 N	6.6E-001	1.3E+001 N
ANTIMONY PENTOXIDE	1314609	5.00E-004 H					1.8E+001 N	1.8E+000 N	6.8E-001 N	1.0E+003 N	3.9E+001 N		
ANTIMONY TETROXIDE	1332816	4.00E-004 H					1.5E+001 N	1.5E+000 N	5.4E-001 N	8.2E+002 N	3.1E+001 N		
ANTIMONY TRIOXIDE	1309644	4.00E-004 H		5.70E-005 I			1.5E+001 N	2.1E-001 N	5.4E-001 N	8.2E+002 N	3.1E+001 N		
ARSENIC	7440382	3.00E-004 I	1.50E+000 I		1.51E+001 I		4.5E-002 C	4.1E-004 C	2.1E-003 C	3.8E+000 C	4.3E-001 C	1.3E-003	2.6E-002 C
ARSINE	7784421			1.40E-005 I		y	1.0E-001 N	5.1E-002 N					
ASSURE	76578148	9.00E-003 I					3.3E+002 N	3.3E+001 N	1.2E+001 N	1.8E+004 N	7.0E+002 N		
ATRAZINE	1912249	3.50E-002 I	2.20E-001 H				3.0E-001 C	2.8E-002 C	1.4E-002 C	2.6E+001 C	2.9E+000 C	4.4E-004	8.8E-003 C
AZOBENZENE	103333		1.10E-001 I		1.10E-001 I		6.1E-001 C	5.7E-002 C	2.9E-002 C	5.2E+001 C	5.8E+000 C	1.8E-003	3.5E-002 C
BARIUM	7440393	7.00E-002 I		1.40E-004 A			2.6E+003 N	5.1E-001 N	9.5E+001 N	1.4E+005 N	5.5E+003 N	1.1E+002	2.1E+003 N
BAYGON	114261	4.00E-003 I					1.5E+002 N	1.5E+001 N	5.4E+000 N	8.2E+003 N	3.1E+002 N		
BAYTHROID	68359375	2.50E-002 I					9.1E+002 N	9.1E+001 N	3.4E+001 N	5.1E+004 N	2.0E+003 N		
BENTAZON	25057890	3.00E-002 I					1.1E+003 N	1.1E+002 N	4.1E+001 N	6.1E+004 N	2.3E+003 N		
BENZALDEHYDE	100527	1.00E-001 I					3.7E+003 N	3.7E+002 N	1.4E+002 N	2.0E+005 N	7.8E+003 N		
BENZENE	71432	3.00E-003 E	2.90E-002 I	1.70E-003 E	2.90E-002 I	y	3.6E-001 C	2.2E-001 C	1.1E-001 C	2.0E+002 C	2.2E+001 C	1.0E-004	2.1E-003 C
BENZENETHIOL	108985	1.00E-005 H				y	6.1E-002 N	3.7E-002 N	1.4E-002 N	2.0E+001 N	7.8E-001 N		
BENZIDINE	92875	3.00E-003 I	2.30E+002 I		2.30E+002 I		2.9E-004 C	2.7E-005 C	1.4E-005 C	2.5E-002 C	2.8E-003 C		
BENZOIC ACID	65850	4.00E+000 I					1.5E+005 N	1.5E+004 N	5.4E+003 N	8.2E+006 N	3.1E+005 N		
BENZYL ALCOHOL	100516	3.00E+001 H					1.1E+004 N	1.1E+003 N	4.1E+002 N	6.1E+005 N	2.3E+004 N	4.4E+000	8.8E+001 N
BENZYL CHLORIDE	100447		0.17 I			y	6.2E-002 C	3.7E-002 C	1.9E-002 C	3.4E+001 C	3.8E+000 C	1.9E-005	3.7E-004 C
BERYLLIUM	7440417	2.00E-003 I		5.7E-006 I	8.40E+000 I		7.3E+001 N	7.5E-004 C	2.7E+000 N	4.1E+003 N	1.6E+002 N	5.8E+001	1.2E+003 N
BIPHENYL	92524	5.00E-002 I				y	3.0E+002 N	1.8E+002 N	6.8E+001 N	1.0E+005 N	3.9E+003 N	4.8E+000	9.6E+001 N
BIS(2-CHLOROETHYL)ETHER	111444		1.10E+000 I		1.10E+000 I	y	9.6E-003 C	5.7E-003 C	2.9E-003 C	5.2E+000 C	5.8E-001 C	2.2E-006	4.4E-005 C
BIS(2-CHLOROISOPROPYL)ETHER	108601	4.00E-002 I	7.00E-002 H		3.50E-002 H	y	2.6E-001 C	1.8E-001 C	4.5E-002 C	8.2E+001 C	9.1E+000 C	8.4E-005	1.7E-003 C
BIS(CHLOROMETHYL)ETHER	542881		2.20E+002 I		2.20E+002 I	y	4.8E-005 C	2.8E-005 C	1.4E-005 C	2.6E-002 C	2.9E-003 C	9.7E-009	1.9E-007 C
BIS(2-ETHYLHEXYL)PHTHALATE	117817	2.00E-002 I	1.40E-002 I		1.40E-002 E		4.8E+000 C	4.5E-001 C	2.3E-001 C	4.1E+002 C	4.6E+001 C	1.4E+002	2.9E+003 C
BORON	7440428	9.00E-002 I		5.70E-003 H			3.3E+003 N	2.1E+001 N	1.2E+002 N	1.8E+005 N	7.0E+003 N		

Attach to Email Brian Pew Baker

Sources: I = IRIS H = HEAST A = HEAST Alternate W = Withdrawn from IRIS or HEAST
E = EPA-NCEA provisional value O = other

Basis: C = Carcinogenic effects N = Noncarcinogenic effects I = RBC at HI of 0.1 < RBC-c

Chemical	CAS	RfDo mg/kg/d	CSFo 1/mg/kg/d	RfDi mg/kg/d	CSFi 1/mg/kg/d	VOC	Risk-based concentrations: Tap water ug/l	Ambient air ug/m3	Fish mg/kg	Soil Industrial mg/kg	Residential mg/kg	Region III SSLs: Soil, for groundwater migration DAF 1 mg/kg	DAF 20 mg/kg
BROMODICHLOROMETHANE	75274	2.00E-002 I	6.20E-002 I			y	1.7E-001 C	1.0E-001 C	5.1E-002 C	9.2E+001 C	1.0E+001 C	5.4E-005	1.1E-003 C
BROMOETHENE	593602			8.6E-004 I	1.10E-001 H	y	1.1E-001 C	5.7E-002 C				5.4E-005	1.1E-003 C
BROMOFORM	75252	2.00E-002 I	7.90E-003 I		3.90E-003 I		8.5E+000 C	1.6E+000 C	4.0E-001 C	7.2E+002 C	8.1E+001 C	2.0E-001	4.1E+000 C
BROMOMETHANE	74839	1.40E-003 I		1.40E-003 I		y	8.5E+000 N	5.1E+000 N	1.9E+000 N	2.9E+003 N	1.1E+002 N	2.1E-003	4.1E-002 N
BROMOPHOS	2104963	5.00E-003 H					1.8E+002 N	1.8E+001 N	6.8E+000 N	1.0E+004 N	3.9E+002 N		
1,3-BUTADIENE	106990				1.80E+000 H	y	7.0E-003 C	3.5E-003 C				3.9E-006	7.8E-005 C
1-BUTANOL	71363	1.00E-001 I					3.7E+003 N	3.7E+002 N	1.4E+002 N	2.0E+005 N	7.8E+003 N	7.8E-001	1.6E+001 N
BUTYLBENZYLPHTHALATE	85687	2.00E-001 I					7.3E+003 N	7.3E+002 N	2.7E+002 N	4.1E+005 N	1.6E+004 N	8.4E+002	1.7E+004 N
BUTYLATE	2008415	5.00E-002 I					1.8E+003 N	1.8E+002 N	6.8E+001 N	1.0E+005 N	3.9E+003 N		
N-BUTYLBENZENE	104518	1.00E-002 E				y	6.1E+001 N	3.7E+001 N	1.4E+001 N	2.0E+004 N	7.8E+002 N		
SEC-BUTYLBENZENE	135988	1.00E-002 E				y	6.1E+001 N	3.7E+001 N	1.4E+001 N	2.0E+004 N	7.8E+002 N		
TERT-BUTYLBENZENE	98066	1.00E-002 E				y	6.1E+001 N	3.7E+001 N	1.4E+001 N	2.0E+004 N	7.8E+002 N		
**CADMIUM-WATER	7440439	5.00E-004 I		5.7E-005 E	6.30E+000 I		1.8E+001 N	9.9E-004 C	6.8E-001 N	1.0E+003 N	3.9E+001 N	1.4E+000	2.7E+001 N
**CADMIUM-FOOD	7440439	1.00E-003 I		5.7E-005 E	6.30E+000 I		3.7E+001 N	9.9E-004 C	1.4E+000 N	2.0E+003 N	7.8E+001 N	2.7E+000	5.5E+001 N
CAPROLACTAM	105602	5.00E-001 I					1.8E+004 N	1.8E+003 N	6.8E+002 N	1.0E+006 N	3.9E+004 N		
CARBARYL	63252	1.00E-001 I					3.7E+003 N	3.7E+002 N	1.4E+002 N	2.0E+005 N	7.8E+003 N	1.5E+000	3.0E+001 N
CARBON DISULFIDE	75150	1.00E-001 I		2.00E-001 I		y	1.0E+003 N	7.3E+002 N	1.4E+002 N	2.0E+005 N	7.8E+003 N	9.5E-001	1.9E+001 N
CARBON TETRACHLORIDE	56235	7.00E-004 I	1.30E-001 I	5.71E-004 E	5.30E-002 I	y	1.6E-001 C	1.2E-001 C	2.4E-002 C	4.4E+001 C	4.9E+000 C	1.1E-004	2.1E-003 C
CARBOSULFAN	55285148	1.00E-002 I					3.7E+002 N	3.7E+001 N	1.4E+001 N	2.0E+004 N	7.8E+002 N		
CHLORAL	75876	2.00E-003 I					7.3E+001 N	7.3E+000 N	2.7E+000 N	4.1E+003 N	1.6E+002 N		
CHLORANIL	118752		4.00E-001 H				1.7E-001 C	1.6E-002 C	7.9E-003 C	1.4E+001 C	1.6E+000 C		
CHLORDANE	57749	5.00E-004 I	3.5E-001 I	2.00E-004 I	3.5E-001 I		1.9E-001 C	1.8E-002 C	9.0E-003 C	1.6E+001 C	1.8E+000 C	4.6E-002	9.2E-001 C
**CHLORINE	7782505	1.00E-001 I		5.7E-005 E		y	4.2E-001 N	2.1E-001 N	1.4E+002 N	2.0E+005 N	7.8E+003 N		
CHLORINE DIOXIDE	10049044			5.70E-005 I		y	4.2E-001 N	2.1E-001 N					
CHLOROACETIC ACID	79118	2.00E-003 H					7.3E+001 N	7.3E+000 N	2.7E+000 N	4.1E+003 N	1.6E+002 N		
4-CHLOROANILINE	106478	4.00E-003 I					1.5E+002 N	1.5E+001 N	5.4E+000 N	8.2E+003 N	3.1E+002 N	4.8E-002	9.7E-001 N
CHLOROBENZENE	108907	2.00E-002 I		1.7E-002 E		y	1.1E+002 N	6.2E+001 N	2.7E+001 N	4.1E+004 N	1.6E+003 N	4.0E-002	8.0E-001 N
CHLOROBENZILATE	510156	2.00E-002 I	2.70E-001 H		2.70E-001 H		2.5E-001 C	2.3E-002 C	1.2E-002 C	2.1E+001 C	2.4E+000 C	1.3E-003	2.7E-002 C
P-CHLOROBENZOIC ACID	74113	2.00E-001 H					7.3E+003 N	7.3E+002 N	2.7E+002 N	4.1E+005 N	1.6E+004 N		
2-CHLORO-1,3-BUTADIENE	126998	2.00E-002 A		2.00E-003 H		y	1.4E+001 N	7.3E+000 N	2.7E+001 N	4.1E+004 N	1.6E+003 N	6.0E-003	1.2E-001 N
1-CHLOROBUTANE	109693	4.00E-001 H				y	2.4E+003 N	1.5E+003 N	5.4E+002 N	8.2E+005 N	3.1E+004 N	1.0E+000	2.0E+001 N
1-CHLORO-1,1-DIFLUOROETHANE	75683			1.40E+001 I		y	1.0E+005 N	5.1E+004 N				7.0E+001	1.4E+003 N
CHLORODIFLUOROMETHANE	75456			1.40E+001 I		y	1.0E+005 N	5.1E+004 N				7.0E+001	1.4E+003 N
CHLOROETHANE	75003	4.00E-001 E	2.90E-003 E	2.90E+000 I		y	3.6E+000 C	2.2E+000 C	1.1E+000 C	2.0E+003 C	2.2E+002 C	9.6E-004	1.9E-002 C
CHLOROFORM	67663	1.00E-002 I	6.10E-003 I	8.6E-005 E	8.10E-002 I	y	1.5E-001 C !	7.7E-002 C !	5.2E-001 C	9.4E+002 C	1.0E+002 C !	4.5E-005	8.9E-004 C
CHLOROMETHANE	74873		1.30E-002 H	8.6E-002 E	3.5E-003 E	y	2.1E+000 C	1.8E+000 C	2.4E-001 C	4.4E+002 C	4.9E+001 C	5.2E-004	1.0E-002 C
4-CHLORO-2-METHYLANILINE	95692		5.80E-001 H				1.2E-001 C	1.1E-002 C	5.4E-003 C	9.9E+000 C	1.1E+000 C		
BETA-CHLORONAPHTHALENE	91587	8.00E-002 I				y	4.9E+002 N	2.9E+002 N	1.1E+002 N	1.6E+005 N	6.3E+003 N	1.6E+000	3.2E+001 N
O-CHLORONITROBENZENE	88733		2.50E-002 H			y	4.2E-001 C	2.5E-001 C	1.3E-001 C	2.3E+002 C	2.6E+001 C		
P-CHLORONITROBENZENE	100005		1.80E-002 H			y	5.9E-001 C	3.5E-001 C	1.8E-001 C	3.2E+002 C	3.5E+001 C		
2-CHLOROPHENOL	95578	5.00E-003 I				y	3.0E+001 N	1.8E+001 N	6.8E+000 N	1.0E+004 N	3.9E+002 N		
2-CHLOROPROPANE	75296			2.90E-002 H		y	2.1E+002 N	1.1E+002 N				6.6E-002	1.3E+000 N
O-CHLOROTOLUENE	95498	2.00E-002 I				y	1.2E+002 N	7.3E+001 N	2.7E+001 N	4.1E+004 N	1.6E+003 N	6.5E-002	1.3E+000 N
CHLORPYRIFOS	2921882	3.00E-003 I					1.1E+002 N	1.1E+001 N	4.1E+000 N	6.1E+003 N	2.3E+002 N	3.2E+000	6.3E+001 N
CHLORPYRIFOS-METHYL	5598130	1.00E-002 H					3.7E+002 N	3.7E+001 N	1.4E+001 N	2.0E+004 N	7.8E+002 N		

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Chemical	CAS	RfDo mg/kg/d	CSFo 1/mg/kg/d	RfDi mg/kg/d	CSFi 1/mg/kg/d	VOC	Risk-based concentrations: Tap water ug/l	Ambient air ug/m3	Fish mg/kg	Soil Industrial mg/kg	Soil Residential mg/kg	Region III SSLs: Soil, for groundwater migration DAF 1 mg/kg	DAF 20 mg/kg
CHROMIUM III	16065831	1.50E+000 I					5.5E+004 N	5.5E+003 N	2.0E+003 N	3.1E+006 N	1.2E+005 N	9.9E+007	2.0E+009 N
CHROMIUM VI	18540299	3.00E-003 I		3.00E-005 I	4.10E+001 H		1.1E+002 N	1.5E-004 C	4.1E+000 N	6.1E+003 N	2.3E+002 N	2.1E+000	4.2E+001 N
COBALT	7440484	6.00E-002 E					2.2E+003 N	2.2E+002 N	8.1E+001 N	1.2E+005 N	4.7E+003 N		
COKE OVEN EMISSIONS (COAL TAR)	8007452				2.2 I			2.8E-003 C					
COPPER	7440508	4.00E-002 H					1.5E+003 N	1.5E+002 N	5.4E+001 N	3.2E+004 N	3.1E+003 N	5.3E+002	1.1E+004 N
CROTONALDEHYDE	123739		1.90E+000 H			y	5.6E-003 C	3.3E-003 C	1.7E-003 C	3.0E+000 C	3.4E-001 C	1.5E-005	3.1E-004 C
CUMENE	98828	1.00E-001 I		1.10E-001 I		y	6.6E+002 N	4.0E+002 N	1.4E+002 N	2.0E+005 N	7.8E+003 N	3.2E+000	6.4E+001 N
CYANIDE (FREE)	57125	2.00E-002 I					7.3E+002 N	7.3E+001 N	2.7E+001 N	4.1E+004 N	1.6E+003 N	7.4E+000	1.5E+002 N
CALCIUM CYANIDE	592018	4E-002 I					1.5E+003 N	1.5E+002 N	5.4E+001 N	8.2E+004 N	3.1E+003 N		
COPPER CYANIDE	544923	5.00E-003 I					1.8E+002 N	1.8E+001 N	6.8E+000 N	1.0E+004 N	3.9E+002 N		
CYANAZINE	21725462	2.00E-003 H	8.40E-001 H				8.0E-002 C	7.5E-003 C	3.8E-003 C	6.8E+000 C	7.6E-001 C	2.6E-005	5.3E-004 C
CYANOGEN	460195	4.00E-002 I				y	2.4E+002 N	1.5E+002 N	5.4E+001 N	8.2E+004 N	3.1E+003 N		
CYANOGEN BROMIDE	506683	9.00E-002 I					3.3E+003 N	3.3E+002 N	1.2E+002 N	1.8E+005 N	7.0E+003 N		
CYANOGEN CHLORIDE	506774	5.00E-002 I					1.8E+003 N	1.8E+002 N	6.8E+001 N	1.0E+005 N	3.9E+003 N		
HYDROGEN CYANIDE	74908	2.00E-002 I		8.60E-004 I		y	6.2E+000 N	3.1E+000 N	2.7E+001 N	4.1E+004 N	1.6E+003 N	1.1E-001	2.2E+000 N
POTASSIUM CYANIDE	151508	5.00E-002 I					1.8E+003 N	1.8E+002 N	6.8E+001 N	1.0E+005 N	3.9E+003 N		
POTASSIUM SILVER CYANIDE	506616	2.00E-001 I					7.3E+003 N	7.3E+002 N	2.7E+002 N	4.1E+005 N	1.6E+004 N		
SILVER CYANIDE	506649	1.00E-001 I					3.7E+003 N	3.7E+002 N	1.4E+002 N	2.0E+005 N	7.8E+003 N	3.1E+001	6.2E+002 N
SODIUM CYANIDE	143339	4.00E-002 I					1.5E+003 N	1.5E+002 N	5.4E+001 N	8.2E+004 N	3.1E+003 N		
**THIOCYANATE		5.00E-002 E					1.8E+003 N	1.8E+002 N	6.8E+001 N	1.0E+005 N	3.9E+003 N		
ZINC CYAN DE	557211	5.00E-002 I					1.8E+003 N	1.8E+002 N	6.8E+001 N	1.0E+005 N	3.9E+003 N	1.1E+002	2.3E+003 N
CYCLOHEXANONE	108941	5.00E+000 I					1.8E+005 N	1.8E+004 N	6.8E+003 N	1.0E+007 N	3.9E+005 N	6.1E+001	1.2E+003 N
CYHALOTHRIN/KARATE	68085858	5.00E-003 I					1.8E+002 N	1.8E+001 N	6.8E+000 N	1.0E+004 N	3.9E+002 N		
CYPERMETHRIN	52315078	1.00E-002 I					3.7E+002 N	3.7E+001 N	1.4E+001 N	2.0E+004 N	7.8E+002 N		
DACTHAL	1861321	1.00E-002 I					3.7E+002 N	3.7E+001 N	1.4E+001 N	2.0E+004 N	7.8E+002 N		
DALAPON	75990	3.00E-002 I					1.1E+003 N	1.1E+002 N	4.1E+001 N	6.1E+004 N	2.3E+003 N	3.5E-001	7.1E+000 N
DDD	72548		2.40E-001 I				2.8E-001 C	2.6E-002 C	1.3E-002 C	2.4E+001 C	2.7E+000 C	5.6E-001	1.1E+001 C
DDE	72559		3.40E-001 I				2.0E-001 C	1.8E-002 C	9.3E-003 C	1.7E+001 C	1.9E+000 C	1.8E+000	3.5E+001 C
DDT	50293	5.00E-004 I	3.40E-001 I		3.40E-001 I		2.0E-001 C	1.8E-002 C	9.3E-003 C	1.7E+001 C	1.9E+000 C	5.8E-002	1.2E+000 C
DIAZINON	333415	9.00E-004 H					3.3E+001 N	3.3E+000 N	1.2E+000 N	1.8E+003 N	7.0E+001 N	2.1E-002	4.3E-001 N
DIBENZOFURAN	132649	4.00E-003 E				y	2.4E+001 N	1.5E+001 N	5.4E+000 N	8.2E+003 N	3.1E+002 N	3.8E-001	7.7E+000 N
1,4-DIBROMOBENZENE	106376	1.00E-002 I					3.7E+002 N	3.7E+001 N	1.4E+001 N	2.0E+004 N	7.8E+002 N		
DIBROMOCHLOROMETHANE	124481	2.00E-002 I	8.40E-002 I			y	1.3E-001 C	7.5E-002 C	3.8E-002 C	6.8E+001 C	7.6E+000 C	4.1E-005	8.3E-004 C
1,2-DIBROMO-3-CHLOROPROPANE	96128		1.40E+000 H	5.70E-005 I	2.40E-003 H	y	4.7E-002 C	2.1E-001 N	2.3E-003 C	4.1E+000 C	4.6E-001 C	4.4E-005	8.7E-004 C
1,2-DIBROMOETHANE	106934		8.50E+001 I	5.70E-005 H	7.60E-001 I	y	7.5E-004 C	8.2E-003 C	3.7E-005 C	6.7E-002 C	7.5E-003 C	4.3E-007	8.5E-006 C
DIBUTYLPHTHALATE	84742	1.00E-001 I					3.7E+003 N	3.7E+002 N	1.4E+002 N	2.0E+005 N	7.8E+003 N	2.5E+002	5.0E+003 N
DICAMBA	1918009	3.00E-002 I					1.1E+003 N	1.1E+002 N	4.1E+001 N	6.1E+004 N	2.3E+003 N	2.2E-001	4.5E+000 N
**1,2-DICHLOROBENZENE	95501	9.00E-002 I				y	5.5E+002 N	3.3E+002 N	1.2E+002 N	1.8E+005 N	7.0E+003 N	4.6E-001	9.3E+000 N
1,3-DICHLOROBENZENE	541731	9.00E-004 E				y	5.5E+000 N	3.3E+000 N	1.2E+000 N	1.8E+003 N	7.0E+001 N	4.4E-003	8.7E-002 N
1,4-DICHLOROBENZENE	106467	3.00E-002 E	2.40E-002 H	2.29E-001 I	2.2E-002 E	y	4.7E-001 C	2.8E-001 C	1.3E-001 C	2.4E+002 C	2.7E+001 C	3.6E-004	7.1E-003 C
3,3'-DICHLOROBENZIDINE	91941		4.50E-001 I				1.5E-001 C	1.4E-002 C	7.0E-003 C	1.3E+001 C	1.4E+000 C	2.5E-004	4.9E-003 C
1,4-DICHLORO-2-BUTENE	764410				9.30E+000 H	y	1.3E-003 C	6.7E-004 C				4.0E-007	8.0E-006 C
DICHLORODIFLUOROMETHANE	75718	2.00E-001 I		5.00E-002 A		y	3.5E+002 N	1.8E+002 N	2.7E+002 N	4.1E+005 N	1.6E+004 N	5.5E-001	1.1E+001 N
1,1-DICHLOROETHANE	75343	1.00E-001 H		1.40E-001 A		y	8.0E+002 N	5.1E+002 N	1.4E+002 N	2.0E+005 N	7.8E+003 N	2.3E-001	4.5E+000 N
1,2-DICHLOROETHANE	107062	3.00E-002 E	9.10E-002 I	1.40E-003 E	9.10E-002 I	y	1.2E-001 C	6.9E-002 C	3.5E-002 C	6.3E+001 C	7.0E+000 C	5.2E-005	1.0E-003 C

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1,1-DICHLOROETHENE	75354	9.00E-003 I	6.00E-001 I		1.75E-001 I	y	4.4E-002 C	3.6E-002 C	5.3E-003 C	9.5E+000 C	1.1E+000 C	1.8E-005	3.6E-004 C
CIS-1,2-DICHLOROETHENE	156592	1.00E-002 H				y	6.1E+001 N	3.7E+001 N	1.4E+001 N	2.0E+004 N	7.8E+002 N	1.7E-002	3.5E-001 N
TRANS-1,2-DICHLOROETHENE	156605	2.00E-002 I				y	1.2E+002 N	7.3E+001 N	2.7E+001 N	4.1E+004 N	1.6E+003 N	4.1E-002	8.2E-001 N
TOTAL 1,2-DICHLOROETHENE	540590	9.00E-003 H				y	5.5E+001 N	3.3E+001 N	1.2E+001 N	1.8E+004 N	7.0E+002 N	1.9E-002	3.7E-001 N
2,4-DICHLOROPHENOL	120832	3.00E-003 I					1.1E+002 N	1.1E+001 N	4.1E+000 N	6.1E+003 N	2.3E+002 N	6.0E-002	1.2E+000 N
2,4-D	94757	1.00E-002 I					3.7E+002 N	3.7E+001 N	1.4E+001 N	2.0E+004 N	7.8E+002 N	4.5E-001	9.0E+000 N
4-(2,4-DICHLOROPHENOXY)BUTYRIC ACID	94826	8E-003 I					2.9E+002 N	2.9E+001 N	1.1E+001 N	1.6E+004 N	6.3E+002 N		
1,2-DICHLOROPROPANE	78875		6.80E-002 H	1.14E-003 I		y	1.6E-001 C	9.2E-002 C	4.6E-002 C	8.4E+001 C	9.4E+000 C	1.0E-004	2.1E-003 C
2,3-DICHLOROPROPANOL	616239	3.00E-003 I					1.1E+002 N	1.1E+001 N	4.1E+000 N	6.1E+003 N	2.3E+002 N		
1,3-DICHLOROPROPENE	542756	3.00E-004 I	1.80E-001 H	5.71E-003 I	1.30E-001 H	y	7.7E-002 C	4.8E-002 C	1.8E-002 C	3.2E+001 C	3.5E+000 C I	2.7E-005	5.5E-004 C
DICHLORVOS	62737	5E-004 I	0.29 I	1.43E-004 I			2.3E-001 C	2.2E-002 C	1.1E-002 C	2.0E+001 C	2.2E+000 C	5.5E-005	1.1E-003 C
DICOFOL	115322		4.4E-001 W				1.5E-001 C	1.4E-002 C	7.2E-003 C	1.3E+001 C	1.5E+000 C	9.3E-004	1.9E-002 C
DICYCLOPENTADIENE	77736	3E-002 H		6.00E-005 A		y	4.4E-001 N	2.2E-001 N	4.1E+001 N	6.1E+004 N	2.3E+003 N		
DIELDRIN	60571	5.00E-005 I	1.60E+001 I		1.60E+001 I		4.2E-003 C	3.9E-004 C	2.0E-004 C	3.6E-001 C	4.0E-002 C	1.1E-004	2.2E-003 C
DIESEL EMISSIONS				1.40E-003 I				5.1E+000 N					
DIETHYLPHTHALATE	84662	8.00E-001 I					2.9E+004 N	2.9E+003 N	1.1E+003 N	1.6E+006 N	6.3E+004 N	2.3E+001	4.5E+002 N
DIETHYLENE GLYCOL, MONOBUTYL ETHER	112345			5.70E-003 H				2.1E+001 N					
DIETHYLENE GLYCOL, MONOETHYL ETHER	111900	2.00E+000 H					7.3E+004 N	7.3E+003 N	2.7E+003 N	4.1E+006 N	1.6E+005 N		
DI(2-ETHYLHEXYL)ADIPATE	103231	6.00E-001 I	1.20E-003 I				5.6E+001 C	5.2E+000 C	2.6E+000 C	4.8E+003 C	5.3E+002 C		
DIETHYLSTILBESTROL	56531		4.70E+003 H				1.4E-005 C	1.3E-006 C	6.7E-007 C	1.2E-003 C	1.4E-004 C		
DIFENZOQUAT (AVENGE)	43222486	8.00E-002 I					2.9E+003 N	2.9E+002 N	1.1E+002 N	1.6E+005 N	6.3E+003 N		
1,1-DIFLUOROETHANE	75376			1.10E+001 I		y	8.0E+004 N	4.0E+004 N					
DIISOPROPYL METHYLPHOSPHONATE (DIMP)	1445756	8.00E-002 I					2.9E+003 N	2.9E+002 N	1.1E+002 N	1.6E+005 N	6.3E+003 N		
3,3'-DIMETHOXYBENZIDINE	119904		1.40E-002 H				4.8E+000 C	4.5E-001 C	2.3E-001 C	4.1E+002 C	4.6E+001 C		
DIMETHYLAMINE	124403			5.70E-006 W		y	4.2E-002 N	2.1E-002 N				8.5E-006	1.7E-004 N
2,4-DIMETHYLANILINE HYDROCHLORIDE	21436964		5.80E-001 H				1.2E-001 C	1.1E-002 C	5.4E-003 C	9.9E+000 C	1.1E+000 C		
2,4-DIMETHYLANILINE	95681		7.50E-001 H				8.9E-002 C	8.3E-003 C	4.2E-003 C	7.6E+000 C	8.5E-001 C		
N,N-DIMETHYLANILINE	121697	2.00E-003 I					7.3E+001 N	7.3E+000 N	2.7E+000 N	4.1E+003 N	1.6E+002 N		
3,3'-DIMETHYLBENZIDINE	119937		9.20E+000 H				7.3E-003 C	6.8E-004 C	3.4E-004 C	6.2E-001 C	6.9E-002 C		
1,1-DIMETHYLHYDRAZINE	57147		2.60E+000 W		3.50E+000 W		2.6E-002 C	1.8E-003 C	1.2E-003 C	2.2E+000 C	2.5E-001 C		
1,2-DIMETHYLHYDRAZINE	540738		3.70E+001 W		3.70E+001 W		1.8E-003 C	1.7E-004 C	8.5E-005 C	1.5E-001 C	1.7E-002 C		
2,4-DIMETHYLPHENOL	105679	2.00E-002 I					7.3E+002 N	7.3E+001 N	2.7E+001 N	4.1E+004 N	1.6E+003 N	3.4E-001	6.7E+000 N
2,6-DIMETHYLPHENOL	576261	6.00E-004 I					2.2E+001 N	2.2E+000 N	8.1E-001 N	1.2E+003 N	4.7E+001 N		
3,4-DIMETHYLPHENOL	95658	1.00E-003 I					3.7E+001 N	3.7E+000 N	1.4E+000 N	2.0E+003 N	7.8E+001 N		
DIMETHYLPHTHALATE	131113	1.00E+001 W					3.7E+005 N	3.7E+004 N	1.4E+004 N	2.0E+007 N	7.8E+005 N		
1,2-DINITROBENZENE	528290	4.00E-004 H					1.5E+001 N	1.5E+000 N	5.4E-001 N	8.2E+002 N	3.1E+001 N		
1,3-DINITROBENZENE	99650	1.00E-004 I					3.7E+000 N	3.7E-001 N	1.4E-001 N	2.0E+002 N	7.8E+000 N	1.8E-003	3.7E-002 N
1,4-DINITROBENZENE	100254	4.00E-004 H					1.5E+001 N	1.5E+000 N	5.4E-001 N	8.2E+002 N	3.1E+001 N		
4,6-DINITRO-O-CYCLOHEXYL PHENOL	131895	2.00E-003 I					7.3E+001 N	7.3E+000 N	2.7E+000 N	4.1E+003 N	1.6E+002 N		
4,6-DINITRO-2-METHYLPHENOL	534521	1.00E-004 E					3.7E+000 N	3.7E-001 N	1.4E-001 N	2.0E+002 N	7.8E+000 N		
2,4-DINITROPHENOL	51285	2.00E-003 I					7.3E+001 N	7.3E+000 N	2.7E+000 N	4.1E+003 N	1.6E+002 N		
DINITROTOLUENE MIX			6.80E-001 I				9.8E-002 C	9.2E-003 C	4.6E-003 C	8.4E+000 C	9.4E-001 C		
2,4-DINITROTOLUENE	121142	2.00E-003 I					7.3E+001 N	7.3E+000 N	2.7E+000 N	4.1E+003 N	1.6E+002 N	2.9E-002	5.7E-001 N
2,6-DINITROTOLUENE	606202	1.00E-003 H					3.7E+001 N	3.7E+000 N	1.4E+000 N	2.0E+003 N	7.8E+001 N	1.2E-002	2.5E-001 N
DINOSEB	88857	1.00E-003 I					3.7E+001 N	3.7E+000 N	1.4E+000 N	2.0E+003 N	7.8E+001 N	8.7E-003	1.7E-001 N

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Chemical	CAS	RfDo mg/kg/d	CSFo 1/mg/kg/d	RfDi mg/kg/d	CSFi 1/mg/kg/d	VOC	Risk-based concentrations: Tap water ug/l	Ambient air ug/m3	Fish mg/kg	Soil Industrial mg/kg	Residential mg/kg	Region III SSLs: Soil, for groundwater migration DAF 1 mg/kg	DAF 20 mg/kg
DIOCTYLPHTHALATE	117840	2.00E-002 H					7.3E+002 N	7.3E+001 N	2.7E+001 N	4.1E+004 N	1.6E+003 N	1.2E+005	2.4E+006 N
1,4-DIOXANE	123911		1.10E-002 I				6.1E+000 C	5.7E-001 C	2.9E-001 C	5.2E+002 C	5.8E+001 C	1.3E-003	2.6E-002 C
DIPHENYLAMINE	122394	2.50E-002 I					9.1E+002 N	9.1E+001 N	3.4E+001 N	5.1E+004 N	2.0E+003 N	1.3E+000	2.5E+001 N
1,2-DIPHENYLHYDRAZINE	122667		8.00E-001 I		8.00E-001 I		8.4E-002 C	7.8E-003 C	3.9E-003 C	7.2E+000 C	8.0E-001 C	1.3E-004	2.5E-003 C
DIQUAT	85007	2.20E-003 I					8.0E+001 N	8.0E+000 N	3.0E+000 N	4.5E+003 N	1.7E+002 N	1.7E-002	3.3E-001 N
DISULFOTON	298044	4.00E-005 I					1.5E+000 N	1.5E-001 N	5.4E-002 N	8.2E+001 N	3.1E+000 N	3.2E-003	6.4E-002 N
1,4-DITHIANE	505293	1.00E-002 I					3.7E+002 N	3.7E+001 N	1.4E+001 N	2.0E+004 N	7.8E+002 N		
DIURON	330541	2.00E-003 I					7.3E+001 N	7.3E+000 N	2.7E+000 N	4.1E+003 N	1.6E+002 N	5.8E-002	1.2E+000 N
ENDOSULFAN	115297	6.00E-003 I					2.2E+002 N	2.2E+001 N	8.1E+000 N	1.2E+004 N	4.7E+002 N	9.8E-001	2.0E+001 N
ENDRIN	72208	3.00E-004 I					1.1E+001 N	1.1E+000 N	4.1E-001 N	6.1E+002 N	2.3E+001 N	2.7E-001	5.4E+000 N
EPICHLOROHYDRIN	106898	2.00E-003 H	9.90E-003 I	2.86E-004 I	4.20E-003 I	y	2.0E+000 N	1.0E+000 N	3.2E-001 C	5.8E+002 C !	6.5E+001 C !	4.2E-004	8.4E-003 N
ETHION	563122	5.00E-004 I					1.8E+001 N	1.8E+000 N	6.8E-001 N	1.0E+003 N	3.9E+001 N	3.2E-001	6.4E+000 N
2-ETHOXYETHANOL	110805	4.00E-001 H		5.70E-002 I			1.5E+004 N	2.1E+002 N	5.4E+002 N	8.2E+005 N	3.1E+004 N	3.3E+000	6.5E+001 N
ETHYL ACETATE	141786	9.00E-001 I				y	5.5E+003 N	3.3E+003 N	1.2E+003 N	1.8E+006 N	7.0E+004 N	1.7E+000	3.5E+001 N
ETHYLBENZENE	100414	1.00E-001 I		2.90E-001 I		y	1.3E+003 N	1.1E+003 N	1.4E+002 N	2.0E+005 N	7.8E+003 N	7.5E-001	1.5E+001 N
ETHYLENE DIAMINE	107153	2.00E-002 H					7.3E+002 N	7.3E+001 N	2.7E+001 N	4.1E+004 N	1.6E+003 N		
ETHYLENE GLYCOL	107211	2.00E+000 I					7.3E+004 N	7.3E+003 N	2.7E+003 N	4.1E+006 N	1.6E+005 N	1.5E+001	3.0E+002 N
ETHYLENE GLYCOL MONOBUTYL ETHER	111762			5.70E-003 H				2.1E+001 N					
ETHYLENE OXIDE	75218		1.00E+000 H		3.50E-001 H	y	2.3E-002 C	1.8E-002 C	3.2E-003 C	5.7E+000 C	6.4E-001 C	4.8E-006	9.5E-005 C
ETHYLENE THIOUREA	96457	8.00E-005 I	1.1E-001 H				6.1E-001 C !	5.7E-002 C !	2.9E-002 C !	5.2E+001 C !	5.8E+000 C !		
ETHYL ETHER	60297	2.00E-001 I				y	1.2E+003 N	7.3E+002 N	2.7E+002 N	4.1E+005 N	1.6E+004 N	4.2E-001	8.5E+000 N
ETHYL METHACRYLATE	97632	9.00E-002 H				y	5.5E+002 N	3.3E+002 N	1.2E+002 N	1.8E+005 N	7.0E+003 N	1.0E+000	2.1E+001 N
FENAMIPHOS	22224926	2.50E-004 I					9.1E+000 N	9.1E-001 N	3.4E-001 N	5.1E+002 N	2.0E+001 N	7.8E-003	1.6E-001 N
FLUOMETURON	2164172	1.30E-002 I					4.7E+002 N	4.7E+001 N	1.6E+001 N	2.7E+004 N	1.0E+003 N		
FLUORINE	7782414	6.00E-002 I					2.2E+003 N	2.2E+002 N	8.1E+001 N	1.2E+005 N	4.7E+003 N		
FOMESAFEN	72178020		1.90E-001 I				3.5E-001 C	3.3E-002 C	1.7E-002 C	3.0E+001 C	3.4E+000 C		
FONOFOS	944229	2.00E-003 I					7.3E+001 N	7.3E+000 N	2.7E+000 N	4.1E+003 N	1.6E+002 N	1.8E-001	3.5E+000 N
FORMALDEHYDE	50000	2.00E-001 I			4.50E-002 I		7.3E+003 N	1.4E-001 C	2.7E+002 N	4.1E+005 N	1.6E+004 N	1.5E+000	3.0E+001 N
FORMIC ACID	64186	2.00E+000 H					7.3E+004 N	7.3E+003 N	2.7E+003 N	4.1E+006 N	1.6E+005 N		
FURAN	110009	1.00E-003 I				y	6.1E+000 N	3.7E+000 N	1.4E+000 N	2.0E+003 N	7.8E+001 N	1.5E-003	3.0E-002 N
FURAZOLIDONE	67458		3.80E+000 H				1.8E-002 C	1.6E-003 C	8.3E-004 C	1.5E+000 C	1.7E-001 C		
FURFURAL	98011	3.00E-003 I		1.00E-002 A			1.1E+002 N	3.7E+001 N	4.1E+000 N	6.1E+003 N	2.3E+002 N	2.3E-002	4.6E-001 N
GLYCIDALDEHYDE	765344	4.00E-004 I		2.90E-004 H			1.5E+001 N	1.1E+000 N	5.4E-001 N	8.2E+002 N	3.1E+001 N		
GLYPHOSATE	1071836	1.00E-001 I					3.7E+003 N	3.7E+002 N	1.4E+002 N	2.0E+005 N	7.8E+003 N	2.6E+001	5.3E+002 N
HEPTACHLOR	76448	5.00E-004 I	4.50E+000 I		4.50E+000 I		1.5E-002 C	1.4E-003 C	7.0E-004 C	1.3E+000 C	1.4E-001 C	4.2E-002	8.4E-001 C
HEPTACHLOR EPOXIDE	1024573	1.30E-005 I	9.10E+000 I		9.10E+000 I		7.4E-003 C	6.9E-004 C	3.5E-004 C	6.3E-001 C	7.0E-002 C	1.2E-003	2.5E-002 C
HEXABROMOBENZENE	87821	2.00E-003 I					7.3E+001 N	7.3E+000 N	2.7E+000 N	4.1E+003 N	1.6E+002 N		
HEXACHLOROBENZENE	118741	8.00E-004 I	1.60E+000 I		1.60E+000 I		4.2E-002 C	3.9E-003 C	2.0E-003 C	3.6E+000 C	4.0E-001 C	2.6E-003	5.2E-002 C
HEXACHLOROBUTADIENE	87683	2.00E-004 H	7.80E-002 I		7.80E-002 I		8.6E-001 C !	8.0E-002 C !	4.0E-002 C !	7.3E+001 C !	8.2E+000 C !	9.2E-002	1.8E+000 C
ALPHA-HCH	319846		6.30E+000 I		6.30E+000 I		1.1E-002 C	9.9E-004 C	5.0E-004 C	9.1E-001 C	1.0E-001 C	4.5E-005	8.9E-004 C
BETA-HCH	319857		1.80E+000 I		1.80E+000 I		3.7E-002 C	3.5E-003 C	1.8E-003 C	3.2E+000 C	3.5E-001 C	1.6E-004	3.1E-003 C
GAMMA-HCH (LINDANE)	58899	3.00E-004 I	1.30E+000 H				5.2E-002 C	4.8E-003 C	2.4E-003 C	4.4E+000 C	4.9E-001 C	2.2E-004	4.3E-003 C
TECHNICAL HCH	608731		1.80E+000 I		1.80E+000 I		3.7E-002 C	3.5E-003 C	1.8E-003 C	3.2E+000 C	3.5E-001 C		
HEXACHLOROCYCLOPENTADIENE	77474	7.00E-003 I		2.00E-005 H			2.6E+002 N	7.3E-002 N	9.5E+000 N	1.4E+004 N	5.5E+002 N	1.0E+002	2.0E+003 N
HEXACHLORODIBENZODIOXIN MIX	19408743		6.20E+003 I		4.55E+003 I		1.1E-005 C	1.4E-006 C	5.1E-007 C	9.2E-004 C	1.0E-004 C		

Sources: I = IRIS H = HEAST A = HEAST Alternate W = Withdrawn from IRIS or HEAST
E = EPA-NCEA provisional value O = other

Basis: C = Carcinogenic effects N = Noncarcinogenic effects I = RBC at HI of 0.1 < RBC-c

Chemical	CAS	RfDo mg/kg/d	CSFo 1/mg/kg/d	RfDi mg/kg/d	CSFi 1/mg/kg/d	VOC	Risk-based concentrations: Tap water ug/l	Ambient air ug/m3	Fish mg/kg	Soil Industrial mg/kg	Residential mg/kg	Region III SSLs: Soil, for groundwater migration DAF 1 mg/kg	DAF 20 mg/kg
HEXACHLOROETHANE	67721	1.00E-003 I	1.40E-002 I		1.40E-002 I		4.8E+000 C I	4.5E-001 C I	2.3E-001 C I	4.1E+002 C I	4.6E+001 C I	1.0E-002	3.6E-001 C
HEXACHLOROPHENE	70304	3.00E-004 I					1.1E+001 N	1.1E+000 N	4.1E-001 N	6.1E+002 N	2.3E+001 N	1.0E+002	2.0E+003 N
1,6-HEXAMETHYLENE DIISOCYANATE	822060			2.90E-006 I				1.1E-002 N					
HEXANE	110543	6.00E-002 H		5.71E-002 I		y	3.5E+002 N	2.1E+002 N	8.1E+001 N	1.2E+005 N	4.7E+003 N	6.9E-001	1.4E+001 N
2-HEXANONE	591786	4.00E-002 E		1.4E-003 E			1.5E+003 N	5.1E+000 N	5.4E+001 N	8.2E+004 N	3.1E+003 N		
HEXAZINONE	51235042	3.30E-002 I					1.2E+003 N	1.2E+002 N	4.5E+001 N	6.7E+004 N	2.6E+003 N		
HMX	2691410	5.00E-002 I					1.8E+003 N	1.8E+002 N	6.8E+001 N	1.0E+005 N	3.9E+003 N		
HYDRAZINE	302012		3.00E+000 I		1.70E+001 I		2.2E-002 C	3.7E-004 C	1.1E-003 C	1.9E+000 C	2.1E-001 C		
HYDROGEN CHLORIDE	7647010			5.70E-003 I				2.1E+001 N					
HYDROGEN SULFIDE	7783064	3.00E-003 I		2.85E-004 I			1.1E+002 N	1.0E+000 N	4.1E+000 N	6.1E+003 N	2.3E+002 N		
HYDROQUINONE	123319	4.00E-002 H					1.5E+003 N	1.5E+002 N	5.4E+001 N	8.2E+004 N	3.1E+003 N		
IRON	7439896	3.00E-001 E					1.1E+004 N	1.1E+003 N	4.1E+002 N	6.1E+005 N	2.3E+004 N		
ISOBUTANOL	78831	3.00E-001 I				y	1.8E+003 N	1.1E+003 N	4.1E+002 N	6.1E+005 N	2.3E+004 N	5.9E-001	1.2E+001 N
ISOPHORONE	78591	2.00E-001 I	9.50E-004 I				7.0E+001 C	6.6E+000 C	3.3E+000 C	6.0E+003 C	6.7E+002 C	2.1E-002	4.1E-001 C
ISOPROPALIN	3382053	1.50E-002 I					5.5E+002 N	5.5E+001 N	2.0E+001 N	3.1E+004 N	1.2E+003 N		
ISOPROPYL METHYL PHOSPHONIC ACID	1832548	1.00E-001 I					3.7E+003 N	3.7E+002 N	1.4E+002 N	2.0E+005 N	7.8E+003 N		
TETRAETHYLLEAD	78002	1.00E-007 I					3.7E-003 N	3.7E-004 N	1.4E-004 N	2.0E-001 N	7.8E-003 N	4.6E-005	9.2E-004 N
LITHIUM	7439932	2.00E-002 E					7.3E+002 N	7.3E+001 N	2.7E+001 N	4.1E+004 N	1.6E+003 N		
MALATHION	121755	2.00E-002 I					7.3E+002 N	7.3E+001 N	2.7E+001 N	4.1E+004 N	1.6E+003 N	4.0E-001	8.1E+000 N
MALEIC ANHYDRIDE	108316	1.00E-001 I					3.7E+003 N	3.7E+002 N	1.4E+002 N	2.0E+005 N	7.8E+003 N		
MANGANESE-NONFOOD	7439965	2.00E-002 I		1.43E-005 I			7.3E+002 N	5.2E-002 N	2.7E+001 N	4.1E+004 N	1.6E+003 N	4.8E+001	9.5E+002 N
MANGANESE-FOOD	7439965	1.40E-001 I		1.43E-005 I			5.1E+003 N	5.2E-002 N	1.9E+002 N	2.9E+005 N	1.1E+004 N	3.3E+002	6.7E+003 N
MEPHOSFOLAN	950107	9.00E-005 H					3.3E+000 N	3.3E-001 N	1.2E-001 N	1.8E+002 N	7.0E+000 N		
MEPIQUAT CHLORIDE	24307264	3.00E-002 I					1.1E+003 N	1.1E+002 N	4.1E+001 N	6.1E+004 N	2.3E+003 N		
MERCURIC CHLORIDE	7487947	3.00E-004 I					1.1E+001 N	1.1E+000 N	4.1E-001 N	6.1E+002 N	2.3E+001 N		
MERCURY (INORGANIC)	7439976			8.60E-005 I				3.1E-001 N					
METHYLMERCURY	22967926	1.00E-004 I					3.7E+000 N	3.7E-001 N	1.4E-001 N	2.0E+002 N	7.8E+000 N		
METHACRYLONITRILE	126987	1.00E-004 I		2.00E-004 A		y	1.0E+000 N	7.3E-001 N	1.4E-001 N	2.0E+002 N	7.8E+000 N	2.1E-004	4.2E-003 N
METHANOL	67561	5.00E-001 I					1.8E+004 N	1.8E+003 N	6.8E+002 N	1.0E+006 N	3.9E+004 N	3.8E+000	7.5E+001 N
METHIDATHION	950378	1.00E-003 I					3.7E+001 N	3.7E+000 N	1.4E+000 N	2.0E+003 N	7.8E+001 N		
METHOXYCHLOR	72435	5.00E-003 I					1.8E+002 N	1.8E+001 N	6.8E+000 N	1.0E+004 N	3.9E+002 N	1.5E+001	3.1E+002 N
METHYL ACETATE	79209	1.00E+000 H				y	6.1E+003 N	3.7E+003 N	1.4E+003 N	2.0E+006 N	7.8E+004 N	1.2E+000	2.5E+001 N
METHYL ACRYLATE	96333	3.00E-002 A				y	1.8E+002 N	1.1E+002 N	4.1E+001 N	6.1E+004 N	2.3E+003 N	5.0E-001	1.0E+001 N
2-METHYLANILINE	95534		2.40E-001 H				2.8E-001 C	2.6E-002 C	1.3E-002 C	2.4E+001 C	2.7E+000 C	2.8E-004	5.7E-003 C
4-(2-METHYL-4-CHLOROPHENOXY) BUTYRIC ACID	94815	1.00E-002 I					3.7E+002 N	3.7E+001 N	1.4E+001 N	2.0E+004 N	7.8E+002 N		
2-METHYL-4-CHLOROPHENOXYACETIC ACID (MCPA)	94746	5.00E-004 I					1.8E+001 N	1.8E+000 N	6.8E-001 N	1.0E+003 N	3.9E+001 N		
2-(2-METHYL-4-CHLOROPHENOXY)PROPIONIC ACID (MCPP)	93652	1.00E-003 I					3.7E+001 N	3.7E+000 N	1.4E+000 N	2.0E+003 N	7.8E+001 N		
METHYLCYCLOHEXANE	108872			8.60E-001 H		y	6.3E+003 N	3.1E+003 N					
METHYLENE BROMIDE	74953	1.00E-002 A				y	6.1E+001 N	3.7E+001 N	1.4E+001 N	2.0E+004 N	7.8E+002 N	1.5E-002	3.0E-001 N
METHYLENE CHLORIDE	75092	6.00E-002 I	7.50E-003 I	8.60E-001 H	1.65E-003 I	y	4.1E+000 C	3.8E+000 C	4.2E-001 C	7.6E+002 C	8.5E+001 C	9.5E-004	1.9E-002 C
4,4'-METHYLENE BIS(2-CHLOROANILINE)	101144	7.00E-004 H	1.30E-001 H		1.30E-001 H		5.2E-001 C	4.8E-002 C	2.4E-002 C	4.4E+001 C	4.9E+000 C		
4,4'-METHYLENE BIS(N,N'-DIMETHYL)ANILINE	101611		4.60E-002 I				1.5E+000 C	1.4E-001 C	6.9E-002 C	1.2E+002 C	1.4E+001 C		
4,4'-METHYLENEDIPHENYL ISOCYANATE	101688			1.7E-004 I				6.2E-001 N					
METHYL ETHYL KETONE (2-BUTANONE)	78933	6.00E-001 I		2.86E-001 I		y	1.9E+003 N	1.0E+003 N	8.1E+002 N	1.2E+006 N	4.7E+004 N	4.0E-001	7.9E+000 N
METHYL HYDRAZINE	60344		1.10E+000 W				6.1E-002 C	5.7E-003 C	2.9E-003 C	5.2E+000 C	5.8E-001 C		

✓ Brownfield process // appro...

RBC = risk based conc.

www.epa.gov RBC table

(10⁻⁶)

Sources: I = IRIS H = HEAST A = HEAST Alternate W = Withdrawn from IRIS or HEAST
E = EPA-NCEA provisional value O = other

Basis: C = Carcinogenic effects N = Noncarcinogenic effects I = RfD et HI of 0.1 < RBC-c

Risk-based concentrations

Chemical	CAS	RfDo mg/kg/d	CSFo 1/mg/kg/d	RfDi mg/kg/d	CSFi 1/mg/kg/d	VOC	Tap water ug/l	Ambient air ug/m3	Fish mg/kg	Soil Industrial mg/kg	Soil Residential mg/kg	Region III SSLs Soil, for groundwater migration DAF 1 mg/kg	DAF 20 mg/kg
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	108101	8.00E-002 H		2.00E-002 A		y	1.4E+002 N	7.3E+001 N	1.1E+002 N	1.6E+005 N	6.3E+003 N	6.5E-002	1.3E+000 N
METHYL METHACRYLATE	80626	1.40E+000 I		2.00E-001 I		y	1.4E+003 N	7.3E+002 N	1.9E+003 N	2.9E+006 N	1.1E+005 N	3.2E-001	6.5E+000 N
2-METHYL-5-NITROANILINE	99558		3.30E-002 H				2.0E+000 C	1.9E-001 C	9.6E-002 C	1.7E+002 C	1.9E+001 C		
METHYL PARATHION	298000	2.50E-004 I					9.1E+000 N	9.1E-001 N	3.4E-001 N	5.1E+002 N	2.0E+001 N	4.3E-003	8.5E-002 N
2-METHYLPHENOL	95487	5.00E-002 I					1.8E+003 N	1.8E+002 N	6.8E+001 N	1.0E+005 N	3.9E+003 N		
3-METHYLPHENOL	108394	5.00E-002 I					1.8E+003 N	1.8E+002 N	6.8E+001 N	1.0E+005 N	3.9E+003 N		
4-METHYLPHENOL	106445	5.00E-003 H					1.8E+002 N	1.8E+001 N	6.8E+000 N	1.0E+004 N	3.9E+002 N		
METHYLSTYRENE MIX	25013154	6.00E-003 A		1.00E-002 A		y	5.5E+001 N	3.7E+001 N	8.1E+000 N	1.2E+004 N	4.7E+002 N	5.1E-002	1.0E+000 N
ALPHA-METHYLSTYRENE	98839	7.00E-002 A				y	4.3E+002 N	2.6E+002 N	9.5E+001 N	1.4E+005 N	5.5E+003 N	4.0E-001	7.9E+000 N
METHYL TERT-BUTYL ETHER	163404			8.57E-001 I		y	6.3E+003 N	3.1E+003 N				1.4E+000	2.8E+001 N
METOLACHLOR (DUAL)	51218452	1.50E-001 I					5.5E+003 N	5.5E+002 N	2.0E+002 N	3.1E+005 N	1.2E+004 N		
MIREX	2385855	2.00E-004 I					7.3E+000 N	7.3E-001 N	2.7E-001 N	4.1E+002 N	1.6E+001 N		
MOLYBDENUM	7439987	5E-003 I					1.8E+002 N	1.8E+001 N	6.8E+000 N	1.0E+004 N	3.9E+002 N		
MONOCHLORAMINE	10599903	1E-001 I		1.00E-001 H			3.7E+003 N	3.7E+002 N	1.4E+002 N	2.0E+005 N	7.8E+003 N		
NALED	300765	2E-003 I					7.3E+001 N	7.3E+000 N	2.7E+000 N	4.1E+003 N	1.6E+002 N		
NICKEL REFINERY DUST					8.4E-001 I			7.5E-003 C					
NICKEL	7440020	2.00E-002 I					7.3E+002 N	7.3E+001 N	2.7E+001 N	4.1E+004 N	1.6E+003 N		
NITRATE	14797558	1.60E+000 I					5.8E+004 N	5.8E+003 N	2.2E+003 N	3.3E+006 N	1.3E+005 N		
NITRIC OXIDE	10102439	1.00E-001 W				y	6.1E+002 N	3.7E+002 N	1.4E+002 N	2.0E+005 N	7.8E+003 N		
NITRITE	14797650	1.00E-001 I					3.7E+003 N	3.7E+002 N	1.4E+002 N	2.0E+005 N	7.8E+003 N		
2-NITROANILINE	88744			5.70E-005 H				2.1E-001 N					
NITROBENZENE	98953	5.00E-004 I		6.00E-004 A		y	3.5E+000 N	2.2E+000 N	6.8E-001 N	1.0E+003 N	3.9E+001 N	1.2E-003	2.3E-002 N
NITROFURANTOIN	67209	7.00E-002 H					2.6E+003 N	2.6E+002 N	9.5E+001 N	1.4E+005 N	5.5E+003 N		
NITROFURAZONE	59870		1.50E+000 H				4.5E-002 C	4.2E-003 C	2.1E-003 C	3.8E+000 C	4.3E-001 C		
NITROGEN DIOXIDE	10102440	1.00E+000 W				y	6.1E+003 N	3.7E+003 N	1.4E+003 N	2.0E+006 N	7.8E+004 N		
NITROGLYCERIN	55630		1.4E-002 E				4.8E+000 C	4.5E-001 C	2.3E-001 C	4.1E+002 C	4.6E+001 C		
4-NITROPHENOL	100027	8.00E-003 E					2.9E+002 N	2.9E+001 N	1.1E+001 N	1.6E+004 N	6.3E+002 N	8.7E-002	1.7E+000 N
2-NITROPROPANE	79469			5.70E-003 I	9.40E+000 H	y	1.3E-003 C	6.7E-004 C				3.2E-007	6.4E-006 C
N-NITROSO-DI-N-BUTYLAMINE	924163		5.40E+000 I		5.60E+000 I	y	1.9E-003 C	1.1E-003 C	5.8E-004 C	1.1E+000 C	1.2E-001 C	1.4E-006	2.7E-005 C
N-NITROSODIETHANOLAMINE	1116547		2.80E+000 I				2.4E-002 C	2.2E-003 C	1.1E-003 C	2.0E+000 C	2.3E-001 C		
N-NITROSODIETHYLAMINE	55185		1.50E+002 I		1.50E+002 I		4.5E-004 C	4.2E-005 C	2.1E-005 C	3.8E-002 C	4.3E-003 C	1.1E-007	2.3E-006 C
N-NITROSODIMETHYLAMINE	62759		5.10E+001 I		5.10E+001 I		1.3E-003 C	1.2E-004 C	6.2E-005 C	1.1E-001 C	1.3E-002 C	2.8E-007	5.7E-006 C
N-NITROSODIPHENYLAMINE	86306		4.90E-003 I				1.4E+001 C	1.3E+000 C	6.4E-001 C	1.2E+003 C	1.3E+002 C	3.8E-002	7.6E-001 C
N-NITROSODIPROPYLAMINE	621647		7.00E+000 I				9.6E-003 C	8.9E-004 C	4.5E-004 C	8.2E-001 C	9.1E-002 C	2.4E-006	4.7E-005 C
N-NITROSO-N-ETHYLUREA	759739		1.40E+002 H				4.8E-004 C	4.5E-005 C	2.3E-005 C	4.1E-002 C	4.6E-003 C		
N-NITROSO-N-METHYLETHYLAMINE	10595956		2.20E+001 I				3.0E-003 C	2.8E-004 C	1.4E-004 C	2.6E-001 C	2.9E-002 C		
N-NITROSOPYRROLIDINE	930552		2.10E+000 I		2.10E+000 I		3.2E-002 C	3.0E-003 C	1.5E-003 C	2.7E+000 C	3.0E-001 C		
M-NITROTOLUENE	99081	2.00E-002 E				y	1.2E+002 N	7.3E+001 N	2.7E+001 N	4.1E+004 N	1.6E+003 N		
O-NITROTOLUENE	88722	1.00E-002 H				y	6.1E+001 N	3.7E+001 N	1.4E+001 N	2.0E+004 N	7.8E+002 N		
P-NITROTOLUENE	99990	1.00E-002 H				y	6.1E+001 N	3.7E+001 N	1.4E+001 N	2.0E+004 N	7.8E+002 N		
NUSTAR	85509199	7.00E-004 I					2.6E+001 N	2.6E+000 N	9.5E-001 N	1.4E+003 N	5.5E+001 N		
ORYZALIN	19044883	5.00E-002 I					1.8E+003 N	1.8E+002 N	6.8E+001 N	1.0E+005 N	3.9E+003 N		
OXADIAZON	19666309	5.00E-003 I					1.8E+002 N	1.8E+001 N	6.8E+000 N	1.0E+004 N	3.9E+002 N		
OXAMYL	23135220	2.50E-002 I					9.1E+002 N	9.1E+001 N	3.4E+001 N	5.1E+004 N	2.0E+003 N	1.9E-001	3.8E+000 N
OXYFLUORFEN	42874033	3.00E-003 I					1.1E+002 N	1.1E+001 N	4.1E+000 N	6.1E+003 N	2.3E+002 N		

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Basis: C = Carcinogenic effects N = Noncarcinogenic effects I = RBC at Hi of 0.1 < RBC-c

Chemical	CAS	RfDo mg/kg/d	CSFo 1/mg/kg/d	RfDi mg/kg/d	CSFi 1/mg/kg/d	VOC	Risk-based concentrations: Tap water ug/l	Ambient air ug/m3	Fish mg/kg	Soil Industrial mg/kg	Residential mg/kg	Region III SSLs: Soil, for groundwater migration DAF 1 mg/kg	DAF 20 mg/kg
PARAQUAT DICHLORIDE	1910425	4.50E-003 I					1.6E+002 N	1.6E+001 N	6.1E+000 N	9.2E+003 N	3.5E+002 N		
PARATHION	56382	6.00E-003 H					2.2E+002 N	2.2E+001 N	8.1E+000 N	1.2E+004 N	4.7E+002 N	5.0E-001	1.0E+001 N
PENTACHLOROBENZENE	608935	8.00E-004 I					2.9E+001 N	2.9E+000 N	1.1E+000 N	1.6E+003 N	6.3E+001 N	1.0E+000	2.0E+001 N
PENTACHLORONITROBENZENE	82688	3.00E-003 I	2.60E-001 H				2.6E-001 C	2.4E-002 C	1.2E-002 C	2.2E+001 C	2.5E+000 C	4.1E-003	8.2E-002 C
PENTACHLOROPHENOL	87865	3.00E-002 I	1.20E-001 I				5.6E-001 C	5.2E-002 C	2.6E-002 C	4.8E+001 C	5.3E+000 C		
PERMETHRIN	52645531	5.00E-002 I					1.8E+003 N	1.8E+002 N	6.8E+001 N	1.0E+005 N	3.9E+003 N	1.2E+002	2.4E+003 N
PHENOL	108952	6.00E-001 I					2.2E+004 N	2.2E+003 N	8.1E+002 N	1.2E+006 N	4.7E+004 N	6.7E+000	1.3E+002 N
M-PHENYLENEDIAMINE	108452	6.00E-003 I					2.2E+002 N	2.2E+001 N	8.1E+000 N	1.2E+004 N	4.7E+002 N	4.9E-002	9.8E-001 N
O-PHENYLENEDIAMINE	95545		4.70E-002 H				1.4E+000 C	1.3E-001 C	6.7E-002 C	1.2E+002 C	1.4E+001 C		
P-PHENYLENEDIAMINE	106503	1.90E-001 H					6.9E+003 N	6.9E+002 N	2.6E+002 N	3.9E+005 N	1.5E+004 N		
2-PHENYLPHENOL	90437		1.90E-003 H				3.5E+001 C	3.3E+000 C	1.7E+000 C	3.0E+003 C	3.4E+002 C		
PHOSPHINE	7803512	3.00E-004 I		8.60E-005 I			1.1E+001 N	3.1E-001 N	4.1E-001 N	6.1E+002 N	2.3E+001 N		
PHOSPHORIC ACID	7664382			2.90E-003 I				1.1E+001 N					
PHOSPHORUS (WHITE)	7723140	2.00E-005 I					7.3E-001 N	7.3E-002 N	2.7E-002 N	4.1E+001 N	1.6E+000 N		
P-PHTHALIC ACID	100210	1.00E+000 H					3.7E+004 N	3.7E+003 N	1.4E+003 N	2.0E+006 N	7.8E+004 N		
PHTHALIC ANHYDRIDE	85449	2.00E+000 I		3.43E-002 H			7.3E+004 N	1.3E+002 N	2.7E+003 N	4.1E+006 N	1.6E+005 N	2.6E+001	5.2E+002 N
POLYBROMINATED BIPHENYLS		7.00E-006 H	8.90E+000 H				7.5E-003 C	7.0E-004 C	3.5E-004 C	6.4E-001 C	7.2E-002 C I		
POLYCHLORINATED BIPHENYLS	1336363		2.00E+000 I		2.00E+000 I		3.3E-002 C	3.1E-003 C	1.6E-003 C	2.9E+000 C	3.2E-001 C	2.1E-002	4.1E-001 C
AROCLOR-1016	12674112	7.00E-005 I	7.00E-002 I		7.00E-002 I		9.6E-001 C I	8.9E-002 C I	4.5E-002 C I	8.2E+001 C I	5.5E+000 N	2.1E-001	4.2E+000 C
AROCLOR-1221	11104282		2.00E+000 I		2.00E+000 I		3.3E-002 C	3.1E-003 C	1.6E-003 C	2.9E+000 C	3.2E-001 C		
AROCLOR-1232	11141165		2.00E+000 I		2.00E+000 I		3.3E-002 C	3.1E-003 C	1.6E-003 C	2.9E+000 C	3.2E-001 C		
AROCLOR-1242	53469219		2.00E+000 I		2.00E+000 I		3.3E-002 C	3.1E-003 C	1.6E-003 C	2.9E+000 C	3.2E-001 C		
AROCLOR-1248	12672296		2.00E+000 I		2.00E+000 I		3.3E-002 C	3.1E-003 C	1.6E-003 C	2.9E+000 C	3.2E-001 C		
AROCLOR-1254	11097691	2.00E-005 I	2.00E+000 I		2.00E+000 I		3.3E-002 C	3.1E-003 C	1.6E-003 C	2.9E+000 C	3.2E-001 C I	5.4E-002	1.1E+000 C
AROCLOR-1260	11096825		2.00E+000 I		2.00E+000 I		3.3E-002 C	3.1E-003 C	1.6E-003 C	2.9E+000 C	3.2E-001 C		
POLYCHLORINATED TERPHENYLS	61788338		4.50E+000 E				1.5E-002 C	1.4E-003 C	7.0E-004 C	1.3E+000 C	1.4E-001 C		
POLYNUCLEAR AROMATIC HYDROCARBONS:													
ACENAPHTHENE	83329	6.00E-002 I				y	3.7E+002 N	2.2E+002 N	8.1E+001 N	1.2E+005 N	4.7E+003 N	5.2E+000	1.0E+002 N
ANTHRACENE	120127	3.00E-001 I				y	1.8E+003 N	1.1E+003 N	4.1E+002 N	6.1E+005 N	2.3E+004 N	2.3E+001	4.7E+002 N
BENZ[A]ANTHRACENE	56553		7.30E-001 E				9.2E-002 C	8.6E-003 C	4.3E-003 C	7.8E+000 C	8.7E-001 C	7.3E-002	1.5E+000 C
BENZO[B]FLUORANTHENE	205992		7.30E-001 E				9.2E-002 C	8.6E-003 C	4.3E-003 C	7.8E+000 C	8.7E-001 C	2.3E-001	4.5E+000 C
BENZO[K]FLUORANTHENE	207089		7.30E-002 E				9.2E-001 C	8.6E-002 C	4.3E-002 C	7.8E+001 C	8.7E+000 C	2.3E+000	4.5E+001 C
BENZO[A]PYRENE	50328		7.30E+000 I		3.10E+000 E		9.2E-003 C	2.0E-003 C	4.3E-004 C	7.8E-001 C	8.7E-002 C	1.9E-002	3.7E-001 C
CARBAZOLE	86748		2.00E-002 H				3.3E+000 C	3.1E-001 C	1.6E-001 C	2.9E+002 C	3.2E+001 C	2.3E-002	4.7E-001 C
CHRYSENE	218019		7.30E-003 E				9.2E+000 C	8.6E-001 C	4.3E-001 C	7.8E+002 C	8.7E+001 C	7.3E+000	1.5E+002 C
DIBENZ[A,H]ANTHRACENE	53703		7.30E+000 E				9.2E-003 C	8.6E-004 C	4.3E-004 C	7.8E-001 C	8.7E-002 C	7.0E-002	1.4E+000 C
DIBENZOFURAN	132649	4.00E-003 E				y	2.4E+001 N	1.5E+001 N	5.4E+000 N	8.2E+003 N	3.1E+002 N	3.8E-001	7.7E+000 N
FLUORANTHENE	206440	4.00E-002 I					1.5E+003 N	1.5E+002 N	5.4E+001 N	8.2E+004 N	3.1E+003 N	3.1E+002	6.3E+003 N
FLUORENE	86737	4.00E-002 I				y	2.4E+002 N	1.5E+002 N	5.4E+001 N	8.2E+004 N	3.1E+003 N	6.8E+000	1.4E+002 N
INDENO[1,2,3-C,D]PYRENE	193395		7.30E-001 E				9.2E-002 C	8.6E-003 C	4.3E-003 C	7.8E+000 C	8.7E-001 C	6.4E-001	1.3E+001 C
2-METHYLNAPHTHALENE	91576	2.00E-002 E				y	1.2E+002 N	7.3E+001 N	2.7E+001 N	4.1E+004 N	1.6E+003 N	1.1E+000	2.2E+001 N
NAPHTHALENE	91203	2.00E-002 I		9.00E-004 I		y	6.5E+000 N	3.3E+000 N	2.7E+001 N	4.1E+004 N	1.6E+003 N	7.7E-003	1.5E-001 N
PYRENE	129000	3.00E-002 I				y	1.8E+002 N	1.1E+002 N	4.1E+001 N	6.1E+004 N	2.3E+003 N	3.4E+001	6.8E+002 N
PROMETON	1610180	1.50E-002 I					5.5E+002 N	5.5E+001 N	2.0E+001 N	3.1E+004 N	1.2E+003 N		
PROMETRYN	7287196	4.00E-003 I					1.5E+002 N	1.5E+001 N	5.4E+000 N	8.2E+003 N	3.1E+002 N		

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Basis: C = Carcinogenic effects N = Noncarcinogenic effects I = RBC at HI of 0.1 < RBC-c

Chemical	CAS	RfDo mg/kg/d	CSFo 1/mg/kg/d	RfDi mg/kg/d	CSFi 1/mg/kg/d	VOC	Risk-based concentrations: Tap water ug/l	Ambient air ug/m3	Fish mg/kg	Soil Industrial mg/kg	Residential mg/kg	Region III SSLs: Soil, for groundwater migration DAF 1 mg/kg	DAF 20 mg/kg
PROPACHLOR	1918167	1.30E-002 I					4.7E+002 N	4.7E+001 N	1.8E+001 N	2.7E+004 N	1.0E+003 N		
PROPANIL	709988	5.00E-003 I					1.8E+002 N	1.8E+001 N	6.8E+000 N	1.0E+004 N	3.9E+002 N		
PROPARGITE	2312358	2.00E-002 I					7.3E+002 N	7.3E+001 N	2.7E+001 N	4.1E+004 N	1.6E+003 N		
N-PROPYLBENZENE		1.00E-002 E				y	6.1E+001 N	3.7E+001 N	1.4E+001 N	2.0E+004 N	7.8E+002 N	3.6E-001	7.1E+000 N
PROPYLENE GLYCOL	57556	2.00E+001 H					7.3E+005 N	7.3E+004 N	2.7E+004 N	4.1E+007 N	1.6E+006 N		
PROPYLENE GLYCOL, MONOETHYL ETHER	5212553B	7.00E-001 H					2.6E+004 N	2.6E+003 N	9.5E+002 N	1.4E+006 N	5.5E+004 N		
PROPYLENE GLYCOL, MONOMETHYL ETHER	107982	7.00E-001 H		5.70E-001 I			2.6E+004 N	2.1E+003 N	9.5E+002 N	1.4E+006 N	5.5E+004 N		
PURSUIT	81335775	2.50E-001 I					9.1E+003 N	9.1E+002 N	3.4E+002 N	5.1E+005 N	2.0E+004 N		
PYRIDINE	110861	1.00E-003 I					3.7E+001 N	3.7E+000 N	1.4E+000 N	2.0E+003 N	7.8E+001 N		
QUINOLINE	91225		1.20E+001 H				5.6E-003 C	5.2E-004 C	2.6E-004 C	4.8E-001 C	5.3E-002 C		
RDX	121824	3.00E-003 I	1.10E-001 I				6.1E-001 C	5.7E-002 C	2.9E-002 C	5.2E+001 C	5.8E+000 C		
RESMETHRIN	1045386B	3.00E-002 I					1.1E+003 N	1.1E+002 N	4.1E+001 N	6.1E+004 N	2.3E+003 N		
RONNEL	299843	5.00E-002 H					1.8E+003 N	1.8E+002 N	6.8E+001 N	1.0E+005 N	3.9E+003 N		
ROTENONE	83794	4.00E-003 I					1.5E+002 N	1.5E+001 N	5.4E+000 N	8.2E+003 N	3.1E+002 N		
SELENIOUS ACID	778300B	5.00E-003 I					1.8E+002 N	1.8E+001 N	6.8E+000 N	1.0E+004 N	3.9E+002 N		
SELENIUM	7782492	5.00E-003 I					1.8E+002 N	1.8E+001 N	6.8E+000 N	1.0E+004 N	3.9E+002 N	9.5E-001	1.9E+001 N
SILVER	7440224	5.00E-003 I					1.8E+002 N	1.8E+001 N	6.8E+000 N	1.0E+004 N	3.9E+002 N	1.6E+000	3.1E+001 N
SIMAZINE	122349	5.00E-003 I	1.20E-001 H				5.6E-001 C	5.2E-002 C	2.6E-002 C	4.8E+001 C	5.3E+000 C	1.7E-004	3.3E-003 C
SODIUM AZIDE	26628228	4.00E-003 I					1.5E+002 N	1.5E+001 N	5.4E+000 N	8.2E+003 N	3.1E+002 N		
SODIUM DIETHYLDITHIOCARBAMATE	148185	3.00E-002 I	2.70E-001 H				2.5E-001 C	2.3E-002 C	1.2E-002 C	2.1E+001 C	2.4E+000 C		
STRONTIUM, STABLE	7440246	6.00E-001 I					2.2E+004 N	2.2E+003 N	8.1E+002 N	1.2E+006 N	4.7E+004 N	7.7E+002	1.5E+004 N
STRYCHNINE	57249	3.00E-004 I					1.1E+001 N	1.1E+000 N	4.1E-001 N	6.1E+002 N	2.3E+001 N	8.3E-003	1.7E-001 N
STYRENE	100425	2.00E-001 I		2.86E-001 I		y	1.6E+003 N	1.0E+003 N	2.7E+002 N	4.1E+005 N	1.6E+004 N	2.9E+000	5.7E+001 N
2,3,7,8-TETRACHLORODIBENZODIOXIN	1746016		1.50E+005 H		1.50E+005 H		4.5E-007 C	4.2E-008 C	2.1E-008 C	3.8E-005 C	4.3E-006 C	4.3E-007	8.6E-006 C
1,2,4,5-TETRACHLOROBENZENE	95943	3.00E-004 I					1.1E+001 N	1.1E+000 N	4.1E-001 N	6.1E+002 N	2.3E+001 N	3.3E-002	6.6E-001 N
1,1,1,2-TETRACHLOROETHANE	630206	3.00E-002 I	2.60E-002 I		2.60E-002 I	y	4.1E-001 C	2.4E-001 C	1.2E-001 C	2.2E+002 C	2.5E+001 C	2.0E-004	4.0E-003 C
1,1,2,2-TETRACHLOROETHANE	79345	6.00E-002 E	2.00E-001 I		2.00E-001 I	y	5.3E-002 C	3.1E-002 C	1.6E-002 C	2.9E+001 C	3.2E+000 C	3.4E-005	6.8E-004 C
TETRACHLOROETHENE	127184	1.00E-002 I	5.20E-002 E	1.4E-001 E	2.00E-003 E	y	1.1E+000 C	3.1E+000 C	6.1E-002 C	1.1E+002 C	1.2E+001 C	2.4E-003	4.8E-002 C
2,3,4,6-TETRACHLOROPHENOL	58902	3.00E-002 I					1.1E+003 N	1.1E+002 N	4.1E+001 N	6.1E+004 N	2.3E+003 N		
P,A,A,A-TETRACHLOROTOLUENE	5216251		2.00E+001 H				3.3E-003 C	3.1E-004 C	1.6E-004 C	2.9E-001 C	3.2E-002 C		
1,1,1,2-TETRAFLUOROETHANE	811972			2.29E+001 I		y	1.7E+005 N	8.4E+004 N					
**TETRAHYDROFURAN	109999	2.00E-001 E	7.6E-003 E	8.6E-002 E	6.8E-003 E		8.8E+000 C	9.2E-001 C	4.2E-001 C	7.5E+002 C	8.4E+001 C		
TETRYL	479458	1.00E-002 H					3.7E+002 N	3.7E+001 N	1.4E+001 N	2.0E+004 N	7.8E+002 N		
THALLIC OXIDE	1314325	7.00E-005 W					2.6E+000 N	2.6E-001 N	9.5E-002 N	1.4E+002 N	5.5E+000 N		
THALLIUM	7440280	7.00E-005 O					2.6E+000 N	2.6E-001 N	9.5E-002 N	1.4E+002 N	5.5E+000 N	1.8E-001	3.6E+000 N
THALLIUM ACETATE	563688	9.00E-005 I					3.3E+000 N	3.3E-001 N	1.2E-001 N	1.8E+002 N	7.0E+000 N		
THALLIUM CARBONATE	6533739	8.00E-005 I					2.9E+000 N	2.9E-001 N	1.1E-001 N	1.6E+002 N	6.3E+000 N		
THALLIUM CHLORIDE	7791120	8.00E-005 I					2.9E+000 N	2.9E-001 N	1.1E-001 N	1.6E+002 N	6.3E+000 N		
THALLIUM NITRATE	10102451	9.00E-005 I					3.3E+000 N	3.3E-001 N	1.2E-001 N	1.8E+002 N	7.0E+000 N		
THALLIUM SULFATE (2:1)	7446186	8.00E-005 I					2.9E+000 N	2.9E-001 N	1.1E-001 N	1.6E+002 N	6.3E+000 N		
THIOBENCARB	28249776	1.00E-002 I					3.7E+002 N	3.7E+001 N	1.4E+001 N	2.0E+004 N	7.8E+002 N		
TIN	7440315	6.00E-001 H					2.2E+004 N	2.2E+003 N	8.1E+002 N	1.2E+006 N	4.7E+004 N		

Sources: I = IRIS H = HEAST A = HEAST Alternate W = Withdrawn from IRIS or HEAST
E = EPA-NCEA provisional value O = other

Basis: C = Carcinogenic effects N = Noncarcinogenic effects I = RBC at HI of 0.1 < RBC-c

Chemical	CAS	RfDo mg/kg/d	CSFo 1/mg/kg/d	RfDi mg/kg/d	CSFi 1/mg/kg/d	VOC	Risk-based concentrations: Tap water ug/l	Ambient air ug/m3	Fish mg/kg	Soil Industrial mg/kg	Residential mg/kg	Region III SSLs: Soil, for groundwater migration DAF 1 mg/kg	DAF 20 mg/kg
TITANIUM	7440326	4.00E+000 E		8.60E-003 E			1.5E+005 N	3.1E+001 N	5.4E+003 N	8.2E+006 N	3.1E+005 N		
TITANIUM DIOXIDE	13463677	4.00E+000 E		8.60E-003 E			1.5E+005 N	3.1E+001 N	5.4E+003 N	8.2E+006 N	3.1E+005 N		
TOLUENE	108883	2.00E-001 I		1.14E-001 I		y	7.5E+002 N	4.2E+002 N	2.7E+002 N	4.1E+005 N	1.6E+004 N	4.4E-001	8.8E+000 N
TOLUENE-2,4-DIAMINE	95807		3.20E+000 H				2.1E-002 C	2.0E-003 C	9.9E-004 C	1.8E+000 C	2.0E-001 C		
TOLUENE-2,5-DIAMINE	95705	6.00E-001 H					2.2E+004 N	2.2E+003 N	8.1E+002 N	1.2E+006 N	4.7E+004 N		
TOLUENE-2,6-DIAMINE	823405	2.00E-001 H					7.3E+003 N	7.3E+002 N	2.7E+002 N	4.1E+005 N	1.6E+004 N		
P-TOLUIDINE	106490		1.90E-001 H				3.5E-001 C	3.3E-002 C	1.7E-002 C	3.0E+001 C	3.4E+000 C	3.0E-004	5.9E-003 C
TOXAPHENE	8001352		1.10E+000 I		1.10E+000 I		6.1E-002 C	5.7E-003 C	2.9E-003 C	5.2E+000 C	5.8E-001 C	3.1E-002	6.3E-001 C
1,2,4-TRIBROMOBENZENE	615543	5.00E-003 I					1.8E+002 N	1.8E+001 N	6.8E+000 N	1.0E+004 N	3.9E+002 N		
TRIBUTYLTIN OXIDE	56359	3.00E-004 I					1.1E+001 N	1.1E+000 N	4.1E-001 N	6.1E+002 N	2.3E+001 N		
2,4,6-TRICHLOROANILINE	634935		3.40E-002 H				2.0E+000 C	1.8E-001 C	9.3E-002 C	1.7E+002 C	1.9E+001 C		
1,2,4-TRICHLOROBENZENE	120821	1.00E-002 I		5.70E-002 H		y	1.9E+002 N	2.1E+002 N	1.4E+001 N	2.0E+004 N	7.8E+002 N	3.8E-001	7.5E+000 N
1,1,1-TRICHLOROETHANE	71556	2.00E-002 E		2.86E-001 E		y	5.4E+002 N	1.0E+003 N	2.7E+001 N	4.1E+004 N	1.6E+003 N	5.1E-001	1.0E+001 N
1,1,2-TRICHLOROETHANE	79005	4.00E-003 I	5.70E-002 I		5.60E-002 I	y	1.9E-001 C	1.1E-001 C	5.5E-002 C	1.0E+002 C	1.1E+001 C	3.9E-005	7.8E-004 C
TRICHLOROETHENE	79016	6.00E-003 E	1.10E-002 E		6.00E-003 E	y	1.6E+000 C	1.0E+000 C	2.9E-001 C	5.2E+002 C	5.8E+001 C I	7.7E-004	1.5E-002 C
TRICHLOROFLUOROMETHANE	75694	3.00E-001 I		2.00E-001 A		y	1.3E+003 N	7.3E+002 N	4.1E+002 N	6.1E+005 N	2.3E+004 N	1.1E+000	2.3E+001 N
2,4,5-TRICHLOROPHENOL	95954	1.00E-001 I					3.7E+003 N	3.7E+002 N	1.4E+002 N	2.0E+005 N	7.8E+003 N		
2,4,6-TRICHLOROPHENOL	88062		1.10E-002 I		1.00E-002 I		6.1E+000 C	6.3E-001 C	2.9E-001 C	5.2E+002 C	5.8E+001 C		
2,4,5-T	93765	1.00E-002 I					3.7E+002 N	3.7E+001 N	1.4E+001 N	2.0E+004 N	7.8E+002 N	9.8E-002	2.0E+000 N
2-(2,4,5-TRICHLOROPHENOXY)PROPIONIC ACID	93721	8.00E-003 I					2.9E+002 N	2.9E+001 N	1.1E+001 N	1.6E+004 N	6.3E+002 N	1.1E+000	2.1E+001 N
1,1,2-TRICHLOROPROPANE	598776	5.00E-003 I				y	3.0E+001 N	1.8E+001 N	6.8E+000 N	1.0E+004 N	3.9E+002 N	1.2E-002	2.5E-001 N
1,2,3-TRICHLOROPROPANE	96184	6.00E-003 I	7.00E+000 H			y	1.5E-003 C	8.9E-004 C	4.5E-004 C	8.2E-001 C	9.1E-002 C	5.2E-007	1.0E-005 C
1,2,3-TRICHLOROPROPENE	96195	5.00E-003 H				y	3.0E+001 N	1.8E+001 N	6.8E+000 N	1.0E+004 N	3.9E+002 N	1.2E-002	2.5E-001 N
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	76131	3.00E+001 I		8.60E+000 H		y	5.9E+004 N	3.1E+004 N	4.1E+004 N	6.1E+007 N	2.3E+006 N	1.2E+002	2.3E+003 N
1,2,4-TRIMETHYLBENZENE	95636	5.00E-002 E		1.70E-003 E		y	1.2E+001 N	6.2E+000 N	6.8E+001 N	1.0E+005 N	3.9E+003 N		
1,3,5-TRIMETHYLBENZENE	108678	5.00E-002 E		1.70E-003 E		y	1.2E+001 N	6.2E+000 N	6.8E+001 N	1.0E+005 N	3.9E+003 N		
TRIMETHYL PHOSPHATE	512561		3.70E-002 H				1.8E+000 C	1.7E-001 C	8.5E-002 C	1.5E+002 C	1.7E+001 C		
1,3,5-TRINITROBENZENE	99354	3.00E-002 I					1.1E+003 N	1.1E+002 N	4.1E+001 N	6.1E+004 N	2.3E+003 N		
2,4,6-TRINITROTOLUENE	118967	5.00E-004 I	3.00E-002 I				2.2E+000 C I	2.1E-001 C I	1.1E-001 C I	1.9E+002 C I	2.1E+001 C I		
URANIUM (SOLUBLE SALTS)		3.00E-003 I					1.1E+002 N	1.1E+001 N	4.1E+000 N	6.1E+003 N	2.3E+002 N		
VANADIUM	7440622	7.00E-003 H					2.6E+002 N	2.6E+001 N	9.5E+000 N	1.4E+004 N	5.5E+002 N	2.6E+002	5.1E+003 N
VANADIUM PENTOXIDE	1314621	9.00E-003 I					3.3E+002 N	3.3E+001 N	1.2E+001 N	1.8E+004 N	7.0E+002 N		
VANADIUM SULFATE	16785812	2.00E-002 H					7.3E+002 N	7.3E+001 N	2.7E+001 N	4.1E+004 N	1.6E+003 N		
VINCLOZOLIN	50471448	2.50E-002 I					9.1E+002 N	9.1E+001 N	3.4E+001 N	5.1E+004 N	2.0E+003 N		
VINYL ACETATE	108054	1.00E+000 H		5.71E-002 I		y	4.1E+002 N	2.1E+002 N	1.4E+003 N	2.0E+006 N	7.8E+004 N	8.7E-002	1.7E+000 N
VINYL CHLORIDE	75014		1.90E+000 H		3.00E-001 H	y	1.9E-002 C	2.1E-002 C	1.7E-003 C	3.0E+000 C	3.4E-001 C	7.9E-006	1.6E-004 C
WARFARIN	81812	3.00E-004 I					1.1E+001 N	1.1E+000 N	4.1E-001 N	6.1E+002 N	2.3E+001 N	2.2E-002	4.4E-001 N
M-XYLENE	108383	2.00E+000 H				y	1.2E+004 N	7.3E+003 N	2.7E+003 N	4.1E+006 N	1.6E+005 N	1.3E+001	2.5E+002 N
O-XYLENE	95476	2.00E+000 H				y	1.2E+004 N	7.3E+003 N	2.7E+003 N	4.1E+006 N	1.6E+005 N	1.1E+001	2.3E+002 N
P-XYLENE	106423					y							
XYLENES	1330207	2.00E+000 I				y	1.2E+004 N	7.3E+003 N	2.7E+003 N	4.1E+006 N	1.6E+005 N	8.5E+000	1.7E+002 N
ZINC	7440666	3.00E-001 I					1.1E+004 N	1.1E+003 N	4.1E+002 N	6.1E+005 N	2.3E+004 N	6.8E+002	1.4E+004 N
ZINC PHOSPHIDE	1314847	3E-004 I					1.1E+001 N	1.1E+000 N	4.1E-001 N	6.1E+002 N	2.3E+001 N		
ZINEB	12122677	5E-002 I					1.8E+003 N	1.8E+002 N	6.8E+001 N	1.0E+005 N	3.9E+003 N		

Subject: **Re: EQB Fish Standards, again**
Date: Tue, 14 Dec 1999 11:31:38 -0500
From: James Kotcon <jkotcon@wvu.edu>
To: Lew Baker <lab1@ezwv.com>, clerk@mail.wvnet.edu,
"'Garvin, Don'" <troutguy@msys.net>, "'Gibbins, Helen'" <gibbins@MARSHALL.EDU>,
"'Kotcon, Jim'" <JKotcon@wvu.edu>, "'Sconyers, Jim'" <Jim_Sconyers@wvwise.org>,
"'Zuckett, Gary'" <gary_zuckett@wvwise.org>, Dianne Bady <dbady@MARSHALL.EDU>,
"info@riverkeeper.org" <info@riverkeeper.org>, Janet fout <JFout@ezwv.com>,
"Hugh E Bevans, District Chief, Charleston, WV" <hbevans@usgs.gov>,
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renae bonnett <bonnett1@newwave.net>, Viv Stockman <vivian@wvadventures.net>,
William Sanjour <Sanjour.William@epamail.epa.gov>

TO: Lew Baker, Libby Chatfield, et al.
FROM: James Kotcon
RE: EQB Fish Tissue Standards

I am in support of Mr. Baker's proposal to update the WV Water Quality standards for fish tissue levels of persistent, bioaccumulative toxins such as dioxin, PCBs, organo-mercury compounds, etc. by using the values from the EPA Region III Risk-Based Concentrations table. Be advised that the WV Legislature has already approved these levels as part of the WV Brownfields rule for voluntary remediation (60-CSR-3), although the values used were from a 1996 version of the EPA Region III RBC Table (differences are mostly a matter of completeness and rounding of values, and I would certainly support use of the more up-to-date values). Under this rule, the RBC levels are, in essence, used as a default clean up level to allow the state to issue a "Certificate of Completion" that identifies a site as meeting safe levels for that contaminant. This rule provides a further level of flexibility by alowing a less restrictive value to be used if site-specific risk assessment indicates that the less stringent level will still provide an adequate level of risk protection. Under this approach, the burden is on the applicant to demonstrate that a less-protective value will still provide adequate protection of human health and the environment.

The implicit assumption of an EQB action to simply drop the standards is that these contaminants are "safe", regardless of the fish tissue burden. No one can make a credible argument for such an assumption. Water quality analyses, by themselves, are an inadequate measure of health risks for persistent bioaccumulative toxins because water-borne levels fluctuate dramatically and because most of the health risk is associated with consumption of fish and other foods where food-chain magnification over a long time period occurs. But with no enforceable fish tissue standard, the public is left vulnerable to health and environmental risks without legal recourse for self-protection.

It is worth noting that the levels for the compounds on EPA's Region III RBC Table are intended to be conservative benchmarks and may be more stringent than is always warranted. However, such caution seems appropriate for the limited number of compounds which are persistent, toxic, and bioaccumulate in the environment. The presence in state rules of fish tissue standards for these compounds is an acknowledgement that the behavior of these compounds warrants an additional level of standards to assure protection of public health and the environment. Use of these standards for persistent bioaccumulative toxins is also consistent with recent EPA efforts to establish new initiatives to focus on these kinds of compounds for special attention in pollution prevention and risk reduction programs.

West Virginia law clearly intends that water quality standards be

protective of public health and the environment. The law already provides a mechanism for site-specific variances from these standards if site-specific factors justify a less stringent standard, provided it is still adequate to protect public health and the environment.

Based on these arguments, I urge the Board to adopt the RBC Table values for fish tissue standards in state water quality standards for persistent bioaccumulative toxins.

James Kotcon
304-293-3911 (office)
304-594-3322 (home)
412 Tyrone-Avery Road
Morgantown, WV 26508

WEST VIRGINIA RIVERS COALITION

December 16, 1999

Dr. Edward Snyder and Dr. Donald Tarter
Co-Chairs
WV Environmental Quality Board
1615 Washington Street East, Suite 301
Charleston, WV 25311-2126

RE: EQB Body Burden Standards

Dear Dr. Snyder and Dr. Tarter:

On behalf of the West Virginia Rivers Coalition and the West Virginians for Clean Water Campaign, I am submitting the following comments regarding the November 29, 1999 decision of the Board to remove the body burden standards from the regulations governing water quality standards.

We would like to go on record in support of the recommendation made by Mr. Lewis Baker in his December 14, 1999 communiqué which is to update the West Virginia Water Quality Standards by incorporating EPA's numeric values as expressed in the EPA Region III Risk-Based Concentrations table.

As Dr. James Kotcon (who also endorses this strategy) points out in his December 14, 1999 communication, the West Virginia Legislature has earlier approved these levels as part of the West Virginia Brownfields Rule for Voluntary Remediation (60-CSR-3). Additionally, we too would recommend the use of the most recent values versus the 1996 version of this table used for the Brownfields Rule.

It is clearly the intention of the law and the responsibility of the Board to assure that the health of the citizens of West Virginia and the environment are sufficiently protected.

With those intentions and responsibilities in mind, we urge the Board to rescind the November 29th decision to remove body burden standards from the rule and instead, adopt the EPA Region III Risk-Based Concentrations table in order provide the assurances that West Virginia's citizens, waters and the environment deserve.

Sincerely,

Pamela C. Moe-Merritt
Conservation Director

801 N. Randolph Avenue • Elkins, West Virginia 26241 • (304) 637-7201 • www.wvrivers.org
"Seeking the conservation and restoration of West Virginia's exceptional rivers and streams"

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

DEC 16 1999

Dr. Edward Snyder, Chairman
Environmental Quality Board
1615 Washington Street East
Charleston, WV 25311

Dear Mr. Snyder:

The Environmental Protection Agency is aware that the Environmental Quality Board is considering the removal of the fish body burden provisions set forth in Appendix E, 8.22.1 and 8.22.2 of the West Virginia water quality standards. EPA is concerned with how West Virginia, in the absence of such provisions, will assure adequate protection for the citizens of West Virginia who may be exposed to increased health risk through consumption of contaminated fish.

While some human health protection is achieved through the existing water quality criteria for bioaccumulative pollutants, there are difficulties in the application of these criteria. That is, once the concentration falls below quantification levels, it is very difficult to measure the concentration and, consequently, the human health protection being attained. Furthermore, water sampling may be useful for determining the instream water quality of a stream, but the resulting data can only present a snapshot of water quality at the time the sample was taken. Fish tissue data, on the other hand, address both of these uncertainties. First, it is often easier to quantify contaminant levels in fish tissue because these contaminants concentrate in fish tissue to quantifiable levels. Second, because fish tissue accumulates these pollutants over time, in a way, they serve as a continuous monitoring device, providing a more representative picture of water quality over time.

For these reasons, fish body burden criteria are a powerful supplement to water quality criteria in water resource assessment and management. EPA wholly supports the application of a body burden methodology as a means to assure that we do not expose the citizens of West Virginia to unacceptable human health risk from the consumption of contaminated fish. Our letter of November 9, 1995 letter, did not disapprove the concept of utilizing a fish body burden methodology, but, rather the uncertain scientific basis of the adopted body burden levels.

To address EPA's disapproval of this item, the EQB assembled an inter-agency committee, as suggested in our August 6, 1996 letter. The study group succeeded in the development of a scientifically-sound protocol that EPA and other committee members found acceptable, and the Board made a good faith effort in proposing these revisions to the Legislature. However, some complications arose during the process, and the proposal was removed, leaving the original body burden numbers in place.

Over three years later, we have come full circle in terms of how fish body burden provisions should be addressed in the West Virginia water quality standards. A considerable amount of time and resources were spent in developing a more scientifically defensible approach, and EPA hopes that this effort is not overlooked. Others may suggest alternatives such as solely relying on high-volume sampling to directly measure instream concentrations. But this option is excessively costly and does not address the difficulties raised above, and, so, we do not see this as a viable option at the moment.

For the reasons cited above, EPA urges the Board to replace the original body burden criteria with a scientifically-defensible approach. Other interests wish to defeat this type of action, or, at the very least, put off a decision for as long as possible. If there remains uncertainty on how this issue should be addressed, charged with a responsibility to protect public health, I would suggest that it would be prudent for the Board to adopt the most defensible fish body burden requirements now, and refine these requirements, if necessary, at a later date. To abandon all fish tissue requirements in the water quality standards would, in effect, roll back human health protection for the citizens of West Virginia.

Should you have any questions, please feel free to contact me at (215) 814-5730 or Mary Kuo of my staff at (215) 814-2390.

Sincerely,

Robert A. Koroncai, Chief
VA/WV Branch

INTER-AGENCY COMMITTEE ESTABLISHED TO REVIEW BODY BURDEN CRITERIA IN THE WEST VIRGINIA WATER QUALITY STANDARDS RULE (46 CSR 1)

FINAL REPORT

JUNE 12, 1997

Background

On November 5, 1995, the United States Environmental Protection Agency, Region III Office, ("USEPA") disapproved sections 8.22.1 and 8.22.2 of the Water Quality Standards rule (46 CSR 1.) Those provisions include fish tissue concentration values for 8 parameters and will be referred to herein as the "body burden criteria." The reasons provided by USEPA in their disapproval letter included the fact that the values were inconsistent with the current numeric criteria for the protection of human health in the standards, and further that the language of 8.22.1 appeared to allow "alternative" criteria to respond to detection capabilities which is not consistent with the requirements of the federal Clean Water Act. In response to USEPAs disapproval action, on July 9, 1996 the Environmental Quality Board ("Board") provided notice of proposed emergency changes to the rule to remove the body burden provisions.

Numerous public comments were received in opposition to the Board's proposal and which supported retention of body burden criteria in the rule. After review and consideration of those comments USEPA amended their original recommendation and by letter dated August 6, 1996, suggested that the Board establish an inter-agency committee to review the body burden criteria in the Water Quality Standards legislative rule. The Board announced at the public hearing on the rule held on August 8, 1997 that they intended to establish such a committee.

The Board established the committee with representatives from the following agencies and organizations: USEPA, US Fish and Wildlife Service (USFWS), WV Division of Natural Resources (DNR), Office of Water Resources of the WV Division of Environmental Protection (OWR), Office of Environmental Health Services of the WV Bureau of Public Health (OEHS), Ohio Valley Environmental Coalition (OVEC) and the West Virginia Manufacturers Association (WVMA). Don Tarter, a member of the Environmental Quality Board, served as the Board's representative on the committee.

The committee held 7 meetings from November 1996 through June 4, 1997. The deliberations of the committee resulted in a document referred to as the "protocol approach" which identifies three options for establishing background concentrations for the parameters of concern.

Committee's recommendations

- Removal of the existing numeric body burden criteria from section 8.22.1 and 8.22.2 of the rule. The decision to remove the criteria was not unanimous. After discussion of the issue at several meetings a vote was taken regarding whether to remove the body burden criteria. The representatives from USEPA, OWR, DNR, and WVMA voted to remove the body burden criteria; OVEC voted to retain numeric body burden criteria in the rule. After that vote, the committee received comments from The Affiliated Construction Trades Foundation (ACT) in support of retaining numeric body burden criteria in the rule and a request from that organization as well as from OVEC to reconsider the decision. A vote was taken at the May 23 meeting regarding whether to revisit the issue of retention or removal of the body burden criteria. OVEC and USFWS voted to revisit the issue; USEPA, DNR, OWR, WVMA and OEHS voted not to revisit the issue.

- In lieu of numeric body burden criteria, the committee recommended adoption of a protocol approach which provides three options for determining background concentrations for the parameters of concern. Those options are a procedure to back-calculate a water concentration from known fish tissue concentrations, high volume sampling method or semi-permeable membrane sampling method. The protocol approach also establishes that the options may be used for two purposes: for establishing background concentrations for developing effluent limits in NPDES permits and for establishing background concentrations to determine whether a stream is meeting its uses (ie: for implementation of the 303d list and the 305B report required by the federal Clean Water Act). The adoption of the protocol approach was not supported by the WVMA. Their position is articulated in a letter from Paul Anderson to Libby Chatfield dated May 22, 1997.

- The list of parameters of concern include the original eight parameters in section 8.22.2 - chlordane, DDT, aldrin, dieldrin, endrin, toxaphene, PCB and dioxin - with the addition of hexachlorobenzene. The committee also expressed interest in adding two other parameters to the list - heptachlor and methoxychlor - but was unable in the time allowed to find the appropriate data needed to use the back-calculation procedure for them.

Protocol Approach

The protocol approach as recommended provides language to be included in section 8.3 of the Water Quality Standards Rule. The approach proposes three sampling methods for use in developing background concentrations for the parameters of concern. The two indirect sampling methods recommended by the committee are the back-calculation procedure and the semi-permeable membrane sampling method. The direct measurement method recommended by the committee is the high volume sampling method.

The back-calculation procedure provides a set of calculations which uses known fish tissue concentrations and bioaccumulation factors to estimate the water concentration for a given parameter. The procedure was recommended by USEPA in their August 1996 letter to the Board. A subcommittee consisting of members of USEPA, WVDNR, and the WVMA wrote the back-calculation procedure. The procedure is proposed as an appendix to the rule.

The other indirect sampling method recommended by the committee is the use of a sampler called a semi-permeable membrane or "fat bag". This method uses an instream apparatus which is intended to mimic a fish in the water. Because there are several types of semi-permeable membrane devices available and because EPA has no guidance regarding their use for the purposes outlined by the committee, they have recommended that the Chief and the applicant consult with USEPA prior to approval of the use of this sampling method.

The high volume sampler technique employs an in-stream filtration system through which a large volume of water can pass. The method is effective for parameters with low detection limits because of the large volume of water it can filter. The committee reviewed literature from the AXYS Corporation in British Columbia, Canada, which manufactures a high volume sampler which is being used by ORSANCO in the Ohio River. It is with the AXYS system in mind that the committee made the recommendation to use the high volume sampling technique.

The protocol approach provides that the Chief may approve the use of any of the three methods identified. Extensive discussion regarding prioritization of the three methods occurred over the span of the five meetings. The final decision by the committee not to prioritize the methods was supported by OEHS, OWR, DNR, USFWS and USEPA. WVMA was in support of prioritizing the methods; their preference was for the use of the high volume sampling technique.

Summary

The committee established to review the body burden criteria in the water Quality Standards rule has recommended that the existing body burden criteria be replaced with a protocol approach which allows for the use of three methods for determining background concentrations of the parameters of concern. The three methods are a back-calculation procedure, use of semi-permeable membrane sampling devices and the use of a high volume sampling device. The Chief of the Office of Water Resources must approve the use of any of the methods before implementation.

may be granted to a discharger if it can be demonstrated that the conditions outlined in subsections 6.1.b.A - F limit the attainment of one or more specific water quality criteria. Variances shall apply only to the discharger to whom they are granted and shall be reviewed by the Board at least every three years. In granting a variance, the requirements for revision of water quality standards in 46 CSR Series 6 shall be followed.

8.4. Site-specific numeric criteria. The Board may establish numeric criteria different from those set forth in Appendix E for a stream or stream segment upon a demonstration that existing numeric criteria are either over-protective or under-protective of the aquatic life residing in the stream or stream segment. A site-specific numeric criterion will be established only where the numeric criterion will be fully protective of the aquatic life and the existing and designated uses in the stream or stream segment. The site-specific numeric criterion may be established by conducting a Water Effect Ratio study pursuant to the procedures outlined in EPAs "Interim Guidance on the Determination and Use of Water-Effect Ratios for Metals" (February 1994); other methods may be used with prior approval by the Board. In adopting site-specific numeric criteria, the requirements for revision of water quality standards set forth in 46 CSR 6 shall be followed.

8.5. Implementation procedures for parameters with water quality criteria which are lower than the detection limit.

8.5.a. The implementation procedures outlined in this section and corresponding appendices apply to the following parameters of concern: chlordane, DDT, aldrin, dieldrin, endrin, toxaphene, PCB, dioxin and hexachlorobenzene.

8.5.b. The methods outlined in this section and corresponding appendices may be used for the following purposes:

8.5.b.1. For measuring background concentrations of the parameters of concern for the purpose of calculating effluent limits in National Pollutant Discharge Elimination System (NPDES) permits; and

8.5.b.2. For measuring background concentrations of the parameters of concern to determine whether a stream is meeting water quality for those parameters (ie: for compiling the 303(d) list)

8.5.c. For making the determinations outlined in section b for the parameters of concern outlined in section a above, the Chief may use or approve the use of any of the following methods:

8.5.c.1. Direct measurement of water concentrations.

8.5.c.1.1. High volume sampling method.

8.5.c.2. Indirect measurement of water concentrations

8.5.c.2.1. Back-calculation of water concentration from known fish tissue concentrations. The acceptable methods for back-calculation are outlined in Appendix F.

8.5.c.2.2. Semi-permeable membrane method. Prior to using or approving the use of this method for the purposes and parameters outlined above, the Chief shall consult with USEPA, Region III.

8.5.d. Prior to implementation of any of the procedures outlined herein, a sampling protocol shall be submitted to the Chief for review and approval after consultation with the West Virginia Division of Natural Resources. In developing sampling protocols for any of the methods outlined herein the guidelines in the USEPA document entitled "Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories, Volume 1, Fish Sampling and Analysis, Second Edition (EPA Document No. EPA 823-R-95-007, September 1997) shall be used.

§46-1-9. Establishment Of Safe Concentration Values.

When a specific water quality standard has not been established by these rules and there is a discharge or proposed discharge into waters of the State, the use of which has been designated a Category B1, B2, B3 or B4, such discharge may be regulated by the chief where necessary to protect State water through establishment of a safe concentration value as follows:

9.1. Establishment of a safe concentration value shall be based upon data obtained from relevant aquatic field studies, standard bioassay test data which exists in substantial available scientific literature, or data obtained from specific tests utilizing one (1) or more representative important species of aquatic life designated on a case-by-case basis by the chief and conducted in a water environment which is equal to or closely approximates that of the natural quality of the receiving waters.

9.2. In those cases where it has been determined that there is insufficient available data to establish a safe concentration value for a pollutant, the safe concentration value shall be determined by applying the appropriate application factor as set forth below to the 96-hour LC 50 value. Except where the chief determines, based upon substantial available scientific data that an alternate application factor exists for a pollutant, the following appropriate application factors shall be used in the determination of safe concentration values:

9.2.a. Concentrations of pollutants or combinations of pollutants that are not persistent and not cumulative shall not exceed 0.10 (1/10) of the 96-hour LC 50.

APPENDIX F: Procedure for Calculating Instream Concentrations of Bioaccumulative Chemicals of Concern (BCCs) From Fish Tissue Concentrations[1]

DATA REQUIRED

*Average concentration of BCC from composite fish tissue samples.[2]

*Average percent lipids concentration of composite fish tissue samples.

*Average concentration of dissolved organic carbon (DOC)[3] .

*Average concentration of particulate organic carbon (POC)[3].

REFERENCE DATA REQUIRED:

*Log K_{ow} (See Table F-2)

*Default baseline bioaccumulation factor (BAF) for trophic level 3 or 4 (See Table F-1) or a site-specific BAF derived using methods approved by the Chief

CALCULATIONS [4]:

Calculate lipid normalized BCC concentration in fish tissue:

$$C_l = \frac{C_t}{f_l}$$

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[1]This procedure is taken from the Great Lakes Water Quality Initiative Technical Support Document for the Procedure to Determine Bioaccumulation Factors (EPA-820-B-95-005) March 1995.

[2]In developing sampling protocols for the collection of fish tissues, "Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories, Volume 1, Fish Sampling and Analysis" Second Edition (#EPA 823-R-95-007, September 1997) shall be used.

[3]The Chief shall establish the average concentration of DOC and POC from one of the following sources in descending order of priority 1) the fish sampling location, 2) a representative waterbody, or 3) a default value of statewide average. The DOC and POC values used in these calculations must be collected at the same time. (Note convert mg/l to kg/l for use in the calculation below)

[4]Proposed Water Quality Criteria Methodology Revision; Human Health, Draft Environmental Protection Agency, September 20, 1996.

Calculate freely dissolved fraction of BCC in water column:

$$f_{fd} = \frac{1}{(1 + POC \cdot K_{ow}) + (DOC \cdot \frac{K_{ow}}{10})}$$

Express baseline BAF on the basis of total BCC:

$$BAF^{t_l} = BAF^{fd_l}(f_{fd})$$

Calculate instream concentration of BCC:

$$C^{t_w} = \frac{C_l}{BAF^{t_l}}$$

DEFINITION OF TERMS:

POC = concentration of particulate organic carbon (kg/l)
DOC = concentration of dissolved organic carbon (kg/l)
K_{ow} = n-octanol water partition coefficient for the chemical
C_t = concentration of the chemical in the wet tissue either whole organism or specified tissue (ug/g).
C_l = lipid-normalized concentration of the chemical in tissues of the biota (ug/g lipid).
C^t_w = total concentration of chemical in the water (kg/l).
f_l = fraction lipid content in the organism.
f_{fd} = fraction of the total chemical that is freely dissolved in the water.
Baseline BAF = generalized BAF for a specific trophic level, based on the total chemical concentration in the water column, and normalized to 100% lipid.
BAF^{fd}_l = BAF (L/kg lipid) reported on the basis of the lipid-normalized concentration of chemical in the biota (kg/kg lipid) divided by the freely dissolve concentration of the chemical in the water (kg/L).
BAF^t_l = BAF (L/kg lipid) reported on the basis of the lipid-normalized concentration of chemical in the biota (kg/kg lipid) divided by the total concentration of the chemical in the water (kg/L).

TABLE F- 1: Human Health BAFs

Chemical	Trophic Level 3	Trophic Level 4	Method[a]
	Baseline BAF (BAF_l^{fd})	Baseline BAF (BAF_l^{fd})	
aldrin	3,035,905	4,600,499	3
chlordane	7,943,000[b]	6,166,000	1
DDT	34,670,000[b]	60,260,000	1
dieldrin	4,180,000[c,d]	19,300,000	2
endrin	325,440	247,809	4
PCBs	55,280,000	116,600,000	1
2,3,7,8-TCDD	9,360,000[c]	9,000,000	2
toxaphene	27,510,000[e]	21,580,000	1
hexachlor-obenzene	2,630,000	2,512,000	

[a] The methods used to calculate the recommended baseline BAFs for trophic level 4 were:
1 = A measured baseline BAF was based on field-measured BAF.
2 = A predicted baseline BAF was based on field-measured BSAF methodology.
3 = A predicted baseline BAF was based on a laboratory-measured BCF and a Food-Chain Multiplier (FCM)
4 = A predicted baseline BAF was based on a predicted BCF and a FCM.

[b] This is the geometric mean of measured baseline BAFs for sculpin and alewives, both of which are trophic level 3.

[c] Cook, P.M.. 1995 Memorandum to C.E. Stephan. March 7.

[d] This is based on the concentrations of dieldrin in sediment and fish. However, the concentration in fish is probably partially due to exposure of the fish to aldrin, which is converted to dieldrin. This BAF is probably not appropriate where there is more or less aldrin.

[e] This baseline BAF for trophic level 3 was calculated by using the following equation:

$$BAF_{TL3} = (BAF_{TL4})^{FCM_{TL3}} / (FCM_{TL4})$$

where:

BAF_{TL3} = Baseline BAF for trophic level 3

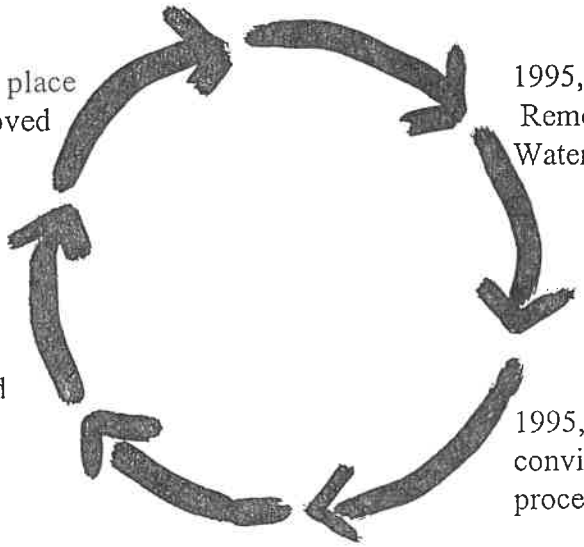
BAF_{TL4} = Baseline BAF for trophic level 4

FCM_{TL3}= Food-Chain Multiplier for trophic level 3

FCM_{TL4}= Food-Chain Multiplier for trophic level 4

These values needed for this calculation are given in Appendix G of the Great Lakes Water Quality Initiative Technical Support Document for the Procedure to Determine BAFs, EPA-820-B-95-005, March 1995.

November 29th, 1999, Board again Decides to Remove Body Burden From Water Quality Standards



1995, Bd. Held Public Hearing on Removal of Body Burden from Water Quality Standards

1995, Comments received by Board convinced Board to use stakeholder process to revise Body Burden

1996, Board went to Legislature with Revised Body Burden Provision

Legislature Rejected Revised Rule

Old Rule was left in place EPA again Disapproved

EXHIBIT "D"

Summary
Written Comments on Public A emergency rule
December 14, 1999

The following is a synopsis of the written comments received on the emergency rule filed with the Secretary of State's office in October 1999. This is intended to be used only as an outline of the issues raised, please see the individual comments for complete explanations of commenter's positions. In some cases I have summarized a general position which may have been expressed by more than one commenter.

Written comments were received from the following:

USEPA - Mary Kuo
WV Manufacturers Association
American Electric Power - Alan R. Wood
WV Highlands Conservancy - Cindy Rank
Allegheny Power - Gary Jack
Century Aluminum - Jeffrey S. VanMatre
WV Bureau for Public Health - Office of Environmental Health Services - Chris Gordon
WV Coal Association and WV Mining and Reclamation Association
WV Rivers Coalition - Pamela Moe-Merritt
WV Chamber of Commerce - Kathy Beckett
Weirton Steel Corporation - Mark Vignovic

Comments in favor of the statewide application of category A.

Several commenters indicated support of the clarification of the current interpretation of the application of the use category to all waters.

Commenter commends Board for retention of assumption that Cateory A applies to all waters based on awareness of and need to protect individual families across the state who are users of surface water for private domestic water systems. Expressed need for the Board to remain strong in its efforts to offer the highest degree of protection to the most precious water resources of the state.

Commenter also urges Board to maintain the human health criteria for manganese based on EPA Goldbook recommendations and due to sue of manganese as an indicator of other metals in the effluent limit standards set for coal mining in the 1977 SMCRA. Commenter further indicates that treatment options are available for addressing problems with precipitating manganese such as reverse osmosis and use of two stage treatment systems.

Commenter supports retention of application of Public A use category to all waters, and believes the CWA requirement to protect existing uses requires continues protection of all users of drinking water. Also believes that those profiting from use of states streams should be held accountable, and burden of treatment should not be shifted from them to the public. Shifting to

use of ZCCs in future may not be supportive of people who use surface waters and are not served by public service providers.

Commenters supports approach of adopting ZCCs, but suggests that the transition be a 5-mile protection zone above intakes rather than the Board's proposed application to all waters of the state.

Comments against proposal

Commenter indicated that statement from environmental activists that "some people are drinking untreated stream waters therefore it is necessary to apply more stringent standards to all state waters" is spurious. Believe that if such use is being made, this is a leagal or "social welfare issue" which should be resolved by health agencies.

Effect of this designation will be to require that some waters be erroneously listed as "impaired" on 303(d) list, requiring TMDL and unnecessary remediation actions.

Result of designation will be that human health manganese limits will result in treatment to remove manganese which will result in significant degradation of water quality downstream and impact aquatic life.

State must conduct a use attainability analysis prior to designation uses other than "fishable/swimmable". None has been conducted.

Board has not addressed appropriateness of a numeric limit such as a "5 mile rule", as mandated by the legislature.

Summary of apparent misconceptions identified by American Electric Power (see AEP's comments pages 2-4 for elaboration)

1. Only approximately 2% (possibly only 1% if consider multiple intakes on large rivers like the Ohio) of state's streams actually qualify for public drinking water use according to Bureau for Public Health statistics.
2. Raw surface waters should be safe for human consumption, and Public A designation will protect them.
3. Designating all waters of the state with Public A sue will protect human health from manganese exposure.

Summary of problems arising from statewide application identified by AEP (see pages 4 - 6 for elaboration)

1,DEP resources will be wasted to assess thousands of streams for compliance with category A numeric criteria.

2. DEP will be forced to place streams on 303(d) list of impaired waters to protect a use that does not exist.

3. Only relief mechanism to help discharger is a use removal which must go through a long and cumbersome regulatory and legislative process.

Board's authority to assign Public A use to all streams could provide reasonable grounds for a legal challenge because of a failure to conduct a Use Attainability Analysis confirming existence of drinking water use.

There is no presumption that category A should apply to all waters similar to the presumption that Category B and C do.

Board did not analyze the need for distance prohibitors pursuant to the directive in HB2533.

Board did not promulgate as legislative rule.

Several commenters urged the Board to adopt a 5-mile zone of protection instead of applying Category A to all streams.

One-half mile rule in section 7.2.a.2 should be deleted.

Comments regarding Board's plan to review the ZCCs developed by the Bureau for Public Health as potential areas for application of the use category.

Bureau for Public Health outlined some questions regarding implementation of the public A use category. How will situations be handled where contaminants are allowed to be discharged in exceedance of WQ criteria above ZCCs (to ensure criteria are met at edge of ZCC?) How would the placement of new treatment facilities be accommodated into the scheme? Would use apply only to discharges located within the defined ZCC? How would DEP issue permits within and outside of the zones? Would BPH be involved in permitting?

WV BPH commented on several concerns regarding manganese treatment. Presence of manganese can result in complications with chlorine treatment, causing that treatment to be less effective. Further, increased chlorine used to oxidize manganese may promote halogenation of naturally occurring organic compounds resulting in byproducts such as trihalomethanes and haloacetic acids, which are potential or known carcinogens. A federal disinfectand/Disinfection Byproducts rule has been promulgated by EPA to address this concern,. Also, consideration should be given the issue of allowing a NPDES permit holder to discharge high levels of manganese and cause public water supply system consumers to pay for additional treatment required to eliminate it.

Commenters supported plan to review the ZCCs when completed but suggested use of 5-mile

zone, rather than broad application

See additional comments about manganese throughout comments.