Chapter VI

CHEMICALS IN THE NIAGARA RIVER: CATEGORIES OF CONCERN

TABLE OF CONTENTS

6.1 Introduction

One of the principal tasks of the Niagara River Toxics Committee was to assess the significance of the types and levels of chemicals found in the Niagara River and its immediate tributaries. The eastern end of Lake Erie and the western end of Lake Ontario were included as indicative of chemicals entering and leaving the river, respectively.

Chemicals were selected from ambient monitoring reports from both lakes and the Niagara River, and included those substances found both quantitatively and qualitatively in biota, sediment, and water. Only chemicals found in ambient data were used, and not chemicals found in point source or non-point source data.

267 chemicals were identified. Of these, iron, sulphur, cholesterol, vanillin, aluminum, and silicon were excluded because they were considered to be of natural origin and minimal toxicological concern. The remaining 261 chemicals formed the universal inventory for which the NRTC was to establish some sense of priority for future monitoring and control action.

The original strategy was to sort the chemicals into groups that could be ranked according to priority: (i) chemicals requiring immediate action, (ii) chemicals requiring continuing monitoring or further investigation, and (iii) chemicals of no concern. The priority for action within groups (i) and (ii) was to be established by comparing existing environmental levels with environmental and health criteria.

The paucity of data on environmental levels and of information on the characteristics of the contaminants made it difficult to establish the three individual lists identified above. Furthermore, ranking within groups was extremely difficult due to the lack of existing criteria and major gaps in information about the nature and impact of most of the contaminants. It was decided that a screening mechanism was needed to enable the division of the large number of chemicals into smaller, more workable groups before

attempting to establish a priority ranking within each of the three basic groups.

6.2 Screening Procedure

The screening mechanism that was developed to rank chemicals into groups evolved from an intensive data collection and validation procedure. All chemicals were checked to assure positive identification; all sources, both published and unpublished, were researched extensively.

Three major types of information were used in the chemical screening methodology:

1. Criteria information: These criteria were developed by several agencies and were based on the protection of aquatic life, impact on human health, etc. In each case, the most stringent criterion was used.

2. Chemical and toxicological information: Data collected on bioaccumulation and acute toxicity were used when available. Additional health parameters were introduced into the screening process through the use of the International Joint Commission (IJC) Health Effects Committee (HEC) report, and the Acute Effects Ranking (AER) system, an adaptation of the Michigan Critical Materials Register scoring methodology.

3. Environmental occurrence information: Data were submitted by the respective jurisdictions participating in the Niagara River Toxics Project.

Appendix D outlines the step-by-step procedure used in the chemical screening process, and provides a complete reference to all sources used.

6.3 Data Limitations

It should be recognized that using available information to screen a large number of chemicals has inherent problems. The Committee considered information availability in designing the screening process, and information reliability and relevance in applying information at the various decision points in the screening process. In cases where there was more than one source of information to be considered at a decision point, the information source which would classify the chemical into the group of greatest concern was applied, that is, the most stringent criterion. The policy of using the most stringent criteria may not be the most relevant on a case-by-case basis. However, it ensures that in a broad-scope screening process, the potential of a chemical to be of concern is overestimated rather than underestimated.

Because there were few data on environmental and health parameters, experimental values were sometimes used. Many of the environmental monitoring reports identified substances in terms of their compositions, either as mixtures (i.e., total PCBs), or as categories (xylene rather than the individual xylene isomers). Since the activity and chemical characteristics of most substances are dependent upon their structure as well as their composition, a range of values was sometimes available. Where this happened, the species yielding the highest AER score was chosen to represent the isomer group. The same procedure was used for mixtures such as PCBs.

As mentioned above, experimental values for toxicity and bioaccumulation were used when such information was available. Estimated Log K_{ow} (octanol/water partition coefficient data) values were used for bioaccumulation when no experimental information was available. The information was obtained from secondary sources; primary literature sources were not reviewed.

All information referenced in Appendix D is dated post-1980, although the actual environmental data may have been collected earlier. All

information was accepted as received. The material was reviewed to determine the highest and lowest documented environmental levels in the three respective media - water, sediment, and biota. Neither data quality nor the details of the monitoring surveys were considered. The highest environmental levels may represent a site specific or isolated high, and as such may not be indicative of general or widespread contamination in the Niagara study area. The relevance of the values requires case-by-case evaluation. The HEC's assessments considered exposure potential in the Great Lakes which may not necessarily reflect the exposure potential in the Niagara River.

Finally, there are several chemicals which have been detected in municipal or industrial effluents discharging (see Ch. II) into the Niagara River system that have not been reported in ambient data. These chemicals may not have been present, or may not have been looked for, or may have been present in levels too low to be detected. As a result, they were not used in this screening process. This suggests that data gaps other than those outlined in this chapter still exist.

6.4 Results

The screening process resulted in the division of the chemicals into three major groups. Group II was further subdivided into seven groups. All nine groups are listed here in order of decreasing concern.

Group I - By definition this group requires immediate attention. The chemicals are found at least once at levels equaling or exceeding criteria, or they are considered to pose risks to human health or the environment based on the HEC and AER screens. All Group I chemicals have been positively (quantitatively) identified. Each, because of its environmental levels, is recommended for source testing to determine its origin. Group I chemicals require surveillance to determine their spatial and temporal trends in each medium.

The majority of Group I chemicals lack criteria for at least one environmental medium. All but five Group I chemicals have been assessed by the Health Effects Committee. These five require an HEC or similar evaluation.

Group IIA - Group IIA chemicals fall only slightly lower in priority than those in Group I. Although their environmental levels have not violated any criteria, all Group IIA chemicals have been assessed by the Health Effects Committee and are considered to represent potential health hazards. Like Group I chemicals, the chemicals in Group IIA are suggested for surveillance to determine their spatial and temporal trends to ensure that their levels remain below criteria levels. Since most Group IIA chemicals are also Group I chemicals (because of their levels in another environmental medium), these will require source testing.

Group IIB - All Group IIB chemicals have been assessed by the Health Effects Committee and have been found to be of concern. They are therefore much like Group IIA chemicals, except that their AER's have been calculated based on only one data element. More characteristics data are needed to define the significance of these chemicals. By looking at Figure D.2 in the detailed explanation of the screening process contained in Appendix D, the similarity between Group IIA and IIB is more obvious. This similarity also exists between Groups IIC and IID, Groups IIE and IIF, and Groups III and IIG. The groups on the left side of the figure have less information available to make a categorical statement based on the AER. In other words, more characteristics data are required for groups on the left side of Figure D.2.

Group IIC - All chemicals in this group require an evaluation by the Health Effects Committee. Only a few of the Group IIC chemicals have information relating to bioaccumulation (BCF). In general, these chemicals require attention to their characteristics, criteria development, and assessment and warrant some limited monitoring.

Group IID - As discussed under Group IIB, Groups IIC and IID are very similar. Group IID does, however, require more attention to its characteristics as there were only enough data available to calculate the AER based on one data element. Like Group IIC, no Group IID chemicals have been evaluated by the Health Effects Committee. A significant number of Group IID chemicals have only been identified qualitatively. They require additional monitoring to confirm their existence.

Group IIE - Although Group IIE chemicals have been found to be of no concern by the Health Effects Committee, their AER scores indicate that a problem could exist. Since half of these chemicals are also Group I chemicals (in another medium), some attention should be paid to them during environmental monitoring. Development of criteria should also be considered.

Group IIF - As the analogue to Group IIE, Group IIF chemicals also require attention to the development of criteria and, to a limited extent, to monitoring. The bulk of the effort to address information gaps for chemicals in this group must be placed on their characteristics so that a more thorough assessment can be made of the significance of these chemicals.

Group IIG - Group IIG chemicals are considered to require little attention. They have been judged by the Health Effects Committee to be of no concern. Based on their AER scores, they are not potential threats, although their AER's were calculated

using only one data element. Some effort should be devoted to obtaining additional characteristics data for these chemicals.

Group III - Group III chemicals require very little attention. Their HEC evaluations and AER scores are such that priority need not be given to these chemicals.

6.5 Future Action

Even though general statements can be made about each group, each chemical within that group is unique, and considerable variability between chemicals can occur within a group. Some of the factors contributing to this intergroup variability are a chemical's AER ranking and HEC evaluation, whether the chemical was found qualitatively or quantitatively, the medium in which was isolated, when it was identified, how often it was identified, and in which it geographic locations. Because of these varied and uncontrollable influences, it was not possible to rank the chemicals within each group in order of priority. It was therefore decided that, for each of the nine groups, specific recommendations should be made for each chemical. Table 6.1 identifies areas where environmental monitoring and research is required to fill some of the gaps in the current data base.

It is possible for any one chemical to be found at varying concentrations in each of the three environmental media (water, biota, sediment). This preference is influenced by a number of factors, for example the chemical's characteristics and method of entry into the environment. The sampling and analytical methods may also influence the relative proportion of the chemcials detailed in each of the three media. Therefore, it is possible for a chemical to be of major concern in one medium but represent no risk at all in another. For that reason some chemicals appear in more than one group in Table 6.1. By making this type of distinction between media, it becomes easier to determine what specific action is needed for each chemical. The amount of attention, and therefore the time and cost necessary to address each chemical, can be more readily determined.

Each chemical in Table 6.1 is followed by a letter (either S, W, or B) to indicate to which medium that particular group assignment applies. For example, in Group III benzene is listed followed by an S. This means that the benzene contamination of sediment is considered to be minimal and therefore it was assigned to Group III. Benzene, however, was also isolated in water. Its level in water was such that it is considered to be a major priority; therefore, benzene also appears as a Group I chemical. Many chemicals appear in only one group. To reflect the fact that dual group assignments can occur, Table 6.1 contains notes which cross reference one group with another. As an example, benzene in Group I is referenced to Group III and vice versa.

The remaining columns in Table 6.1 contain the recommended actions for monitoring, characteristics, and assessment activities. The monitoring column contains four sub-headings; source, confirmation, trend, and media. An X in the source column indicates point and non-point source testing is warranted to determine the chemical's origin. All Group I chemicals require source testing.

Chemicals found qualitatively only in a particular medium are indicated in the confirmation column with the letter symbolizing the medium in which they were identified. These chemicals require further monitoring to confirm their presence in that particular medium.

Chemicals considered to be of such importance that their environmental trends should be determined through a regular surveillance program are marked in the trend column. All Group I and Group IIA chemicals fall into this category. Group IIA chemicals were included because, although their environmental levels are currently below criteria, they are considered by the HEC to represent potential health hazards. As such, it is important to determine whether their levels are increasing, and thereby raise them to Group I status.

TABLE 6.1

CHEMICAL GROUP
ASSIGNMENTS AND REQUIREMENTS FOR ACTION

CHEMICAL GROUP	MONITORING				CHARACTERISTICS				ASSESSMENT		
	Source	Conf	Trend	Media	LC50	LD50	Log Kow	BCF	Crit	HEC	
GROUP I											
Aldrin (S)	X		S	W,B,S					S		
Antimony (W)	X		W	W,B,S		X	X	X	S	X	See Group IID
Arsenic (S)	X		W,B,S	W,B,S				X		X	See Group IIA
Benzene (W)	X		W	W,B,S					S		See Group III
Benzo(B)fluoranthene (W)	X		W	W,B,S	X	X		X	S		See Group IIB
Benzo(K)fluoranthene (W)	X		W	W,B,S	X	X		X	S		See Group IIF
Benz(A)anthracene (W)	X		W	W,B,S	X	X			S		See Group IIF
Benz(A)pyrene (S,W)	X		W,S	W,B,S	X						
Berylium (W)	X		W	W,B,S		X	X	X	S	X	See Group IID
BHC-(α) (W)	X		W,B,S	W,B,S				X	B,S		See Group IIA
Bis(2-ethylhexyl) phthalate (S,W)	X		W,S	W,B,S		X			S		
Cadmium (B,S,W)	X		W,B,S	W,B,S					B		
Carbon tetrachloride (W)	X		W	W,B,S							
Chlordane (S,W)	X		W,B,S	W,B,S					S		See Group IIA
Chloroform (W)	X		W,S	W,B,S				X	S		See Group IIA
Chromium (S,W,)	X		W,B,S	W,B,S			X		B		See Group IIA
Chrysene (W)	X		W	W,B,S					S		See Group IIB
Copper (S,W)	X		W,S	W,B,S		X	X	X			See Group IIF
Cyanide (S,W)	X		W,S	W,B,S		X	X	X		X	
DDD (p,p) (S,W)	X		W,B,S	W,B,S					S		See Group IIA
DDE (S,W)	X		W,B,S	W,B,S	X				S		See Group IIA
DDT (p,p) (S,W)	X		W,B,S	W,B,S					S		See Group IIA
1,2-Dichloroethane (W)	X		W	W,B,S				X			
Dieldrin (S,W)	X		W,B,S	W,B,S					S		See Group IIA
Dioctyl phthalate (W)	X		W	W,B,S	X				S	X	See Group IIC
Endosulphan (S,W)	X		W,B,S	W,B,S					S		See Group IIA
Endrin (S,W)	X		W,B,S	W,B,S					S		See Group IIA
Fluoranthene (W)	X		W	W,B,S				X	S		See Group IIE
Heptachlor (S)	X		B,S	W,B,S					S		See Group IIA
Heptachlor epoxide (S,W)	X		W,B,S	W,B,S	X				S		See Group IIA
Hexachlorobenzene (B,S)	X		W,B,S	W,B,S	X				B,S		See Group IIA
Hexachlorobutadiene (B,S,W)	X		W,B,S	W,B,S					B,S		
Lead (S,W)	X		W,B,S	W,B,S		X	X				See Group IIA
Lindane (S,W)	X		W,B,S	W,B,S					S		See Group IIA
Mercury (S,W)	X		W,S	W,B,S		X	X				

TABLE 6.1 (Continued)

CHEMICAL GROUP	MONITORING				CHARACTERISTICS				ASSESSMENT		
	Source	Conf	Trend	Media	LC50	LD50	Log Kow	BCF	Crit	HEC	
GROUP I (Cont'd)											
Methoxychlor (B,S)	X		B,S	W,B,S		X			B,S		
Methylene chloride (W)	X		W	W,B,S				X	S		See Group IIE
Mirex (W)	X		W,B,S	W,B,S					S		See Group IIA
Nickel (S,W)	X		W,B,S	W,B,S		X	X		B		See Group IIA
Pentachlorobiphenyl (S)	X		S	W,B,S		X					
Pentachlorophenol (B,W)	X		W,B	W,B,S					B		
Phenol (W)	X		W,B	W,B,S				X	S		See Group IIA
Polychlorinated Biphenyl-Arochlor 1242 (B,S)	X		B,S	W,B,S							
Polychlorinated Biphenyl-Arochlor 1254 (S)	X		S	W,B,S							
Polychlorinated Biphenyl-Arochlor 1260 (W)	X		W	W,B,S							
Pyrene (W)	X		W	W,B,S	X			X	S		See Group IIE
Selenium (W)	X		W,S	W,B,S		X	X		S		See Group IIA
Silver (S,W)	X		W,S	W,B,S		X	X				
TCDD (B,W)	X		W,B	W,B,S		X					
Tetrachlorobiphenyl (S)	X		S	W,B,S		X					
Tetrachloroethene (W)	X		W,S	W,B,S					S		See Group IIA
Trichlorobiphenyl (S)	X		S	W,B,S		X					
2,4,5-Trichlorophenol (B)	X		W,B	W,B,S					B		See Group IIA
2,4,6-Trichlorophenol (B,S)	X		B,S	W,B,S		X		X	B,S		
Zinc (S,W)	X		W,S	W,B,S		X	X		B		See Group IIE
GROUP IIA											
Aniline (S)			S	W,B,S		X		X	S		
Arsenic (B,W)	X		W,B,S	W,B,S				X			See Group I
BHC (S)			S	W,B,S				X	S		
BHC-(α) (B)	X		W,B,S	W,B,S				X	B,S		See Group I
Bromoform (W)			W	W,B,S							
Chlordane (B)	X		W,B,S	W,B,S					S		See Group I
Chlorodibromomethane (S,W)			W,S	W,B,S	X			X	S		
Chloroform (S)	X		W,S	W,B,S				X	S		See Group I
Chloronaphthalene (S,W)	W		W,S	W,B,S	X			X	S		
Chromium (B)	X		W,B,S	W,B,S			X		B		See Group I
2,4-D (W)			W	W,B,S							
DDD-(p,p) (B)	X		W,B,S	W,B,S					S		See Group I

TABLE 6.1 (Continued)

CHEMICAL GROUP	MONITORING				CHARACTERISTICS				ASSESSMENT		
	Source	Conf	Trend	Media	LC50	LD50	Log Kow	BCF	Crit	HEC	
GROUP IIA (Cont'd)											
DDE (B)	X		W,B,S	W,B,S	X				S		See Group I
DDT (B)	X		W,B,S	W,B,S					S		See Group I
1,2-Dichlorobenzene (S,W)			W,S	W,B,S		X			S		
1,3-Dichlorobenzene (S,W)			W,S	W,B,S		X		S			
1,4-Dichlorobenzene (B,S,W)			W,B,S	W,B,S		X			B,S		
1,2-Dichloroethylene (S)			S	W,B,S		X		X	S		
Dieldrin (B)	X		W,B,S	W,B,S					S		See Group I
Diphenylamine (S)			S	W,B,S	X				S		
Endosulphan (B)	X		W,B,S	W,B,S					S		See Group I
Endrin (B)	X		W,B,S	W,B,S					S		See Group I
Ethylbenzene (S,W)			W,S	W,B,S				X	S		
Heptachlor (B)	X		B,S	W,B,S					S		See Group I
Heptachlor epoxide (B)	X		W,B,S	W,B,S	X				S		See Group I
Hexachlorobenzene (W)	X		W,B,S	W,B,S	X				B,S		See Group I
Lead (B)	X		W,B,S	W,B,S		X	X				See Group I
Lindane (B)	X		W,B,S	W,B,S					S		See Group I
Mirex (B,S)	X		W,B,S	W,B,S					S		See Group I
Nickel (B)	X		W,B,S	W,B,S		X	X		B		See Group I
Phenol (S)	X		W,S	W,B,S				X	S		See Group I
Selenium (S)	X		W,S	W,B,S					S		See Group I
Silvex (W)			W	W,B,S				X			
Styrene (W)			W	W,B,S				X	W		
2,4,5-T (W)			W	W,B,S				X	W		
Tetrachloroethene (S)	X		W,S	W,B,S					S		See Group I
Tribromomethane (S)			S	W,B,S		X		X	S		
Trichloroethene (W)			W	W,B,S		X		X			
Trichlorophenol (W)	X		W,B	W,B,S					B		See Group I
GROUP IIB											
Benzo(B)fluoranthene (S)	X		W	W,B,S	X	X		X	S		See Group I
Chrysene (S)	X		W	W,B,S	X	X		X	S		See Group I
Dibenz(A,H)anthracene (S,W)				B	X	X		X	W,S		
Dichlorobromomethane (W)				B,S	X	X		X			
Dichloronaphthalene (S,W)		W		W,B	X	X			S		
Trichloronaphthalene (S)					X	X			S		

TABLE 6.1 (Continued)

CHEMICAL GROUP	MONITORING				CHARACTERISTICS				ASSESSMENT		
	Source	Conf	Trend	Media	LC50	LD50	Log Kow	BCF	Crit	HEC	
GROUP IIC											
Benzaldehyde (B,S,W)								X	W,B,S	X	
BHC-(β) (B,W)				S		X		X	B	X	
Benzene sulphonamide (W)				B,S	X			X	W	X	
Butanal (W)				B,S				X	W	X	
Butanol (W)				B,S				X	W	X	
Butylphenol-(T) (W)		W		W,B,S	X				W	X	
Chlorobenzene (S,W)				B					S	X	
Chlorotoluene (S,W)				B				X	W,S	X	
DCPA (B,S)						X		X	B,S	X	
DDT-(o,p) (S)					X			X	S	X	
1,1-Dichloroethane (S)								X	S	X	
Dichlorophenol (W)				B,S				X	W	X	
2,4-Dichloro-4-phenoxybutyric acid (S)		S		S	X			X	S	X	
Dichloropropane (W)		W		W,B,S				X		X	
1,2-Dichloropropane (S)								X	S	X	
Dichloropropene (W)		W		W,B,S	X			X		X	
2,6-Dichlorotoluene (B,S,W)		B		B	X				W,B,S	X	
Diethyl disulphide (W)		W		W,B,S	X			X	W	X	
Diethyl phthalate (S)								X	S	X	
Dimethylheptadienone (S)					X				S	X	
Dimethyl phthalate (S)								X	S	X	
Dinitroanisole (S)					X			X	S	X	
Dioctyl phthalate (S)	X		W	W,B,S	X				S	X	See Group I
1,2-Diphenylhydrazine (S)						X		X	S	X	
Hexanal (W)				B,S	X			X	W	X	
Hexenone (W)				B,S	X			X	W	X	
Isobutanal (W)		W		W,B,S	X			X	W	X	
Isobutanol (W)		W		W,B,S				X	W	X	
Isophorone (B)				S		X		X	B	X	
Manganese (S)						X	X		S	X	
Methylcoumarin (S)					X			X	S	X	
Methylfuran (W)		W		W,B,S	X			X	W	X	
Methylnaphthalene (B,S,W)						X			W,B,S	X	
Methylpentene (W)		W		W,B,S		X		X	W	X	
Methyl pivalate (S)					X				S	X	
N-Nitrosodiphenylamine (S)						X		X	S	X	
Octachlorostyrene (B,S)					X				B,S	X	
Pentachloroanisole (W)				B,S	X			X	W	X	

TABLE 6.1 (Continued)

CHEMICAL GROUP	MONITORING				CHARACTERISTICS				ASSESSMENT		
	Source	Conf	Trend	Media	LC50	LD50	Log Kow	BCF	Crit	HEC	
GROUP IIC (Cont'd)											
Pentachlorobenzene (B,S,W)						X			B,S	X	
Phenothiazine (S,W)				B	X			X	W,S	X	
Tetrachlorobenzene (B)				S				X	B	X	
1,2,3,4-Tetrachlorobenzene (S,W)				B				X	S	X	
1,2,4,5-Tetrachlorobenzene (S,W)				B				X	S	X	
1,1,2,2-Tetrachloroethane (S,W)				B		X		X	S	X	
2,3,4,6-Tetrachlorophenol (B)				S		X		X	B	X	
Tetrahydrofuran (W)				B,S		X		X		X	
(Tetramethylbutyl)phenol (W)				B,S	X			X	W	X	
Trichlorobenzene (B)				S					B	X	
1,2,3-Trichlorobenzene (S,W)				B		X		X	S	X	
1,2,4-Trichlorobenzene (S,W)				B					S	X	
1,3,5-Trichlorobenzene (S,W)				B		X		X	S	X	
2,4,5-Trichlorotoluene (S,W)				B	X			X	W,S	X	
Trimethylbenzene (W)		W		W,B,S	X			X		X	
2,4-Xylenol (S)						X		X		X	
GROUP IID											
Acenaphthylene (S)					X	X		X	S	X	
1-Aminonaphthalene (S)					X	X		X	S	X	
Antimony (S)	X		W	W,B,S		X	X	X	S	X	See Group I
Barium (S,W)				B		X	X	X	S	X	
Benzo(G,H,I)perylene (S,W)				B	X	X		X	W,S	X	
Benzo(E)pyrene (S)					X	X		X	S	X	
Benzyl benzoate (S)					X	X		X	S	X	
Benzylidene-4,4'-bis(N,N-dimethylaniline (S)					X	X		X	S	X	
N-Benzyl-N-ethylaniline (S)					X	X		X	S	X	
Berylium (S)	X		W	W,B,S		X	X	X	S	X	See Group I
Chloroanthracene (W)		W		W,B,S	X	X			W	X	
Chlorodibromoethane (W)				B,S	X	X			W	X	
Chloro(difluorochloromethyl) benzene (W)		W		W,B,S	X	X			W	X	
Chlorohydroxybenzophenone (S,W)		W		W,B	X	X			W,S	X	
Chlorohydroxyphenothiazine (W)		W		W,B,S	X	X			W	X	
Chloromethoxybenzophenone (W)		W		W,B,S	X	X			W	X	
Chloromethylbis(phenylmethyl) benzene (S,W)		W		W,B	X	X			W,S	X	

TABLE 6.1 (Continued)

CHEMICAL GROUP	MONITORING				CHARACTERISTICS				ASSESSMENT	
	Source	Conf	Trend	Media	LC50	LD50	Log Kow	BCF	Crit	HEC
GROUP IID (Cont'd)										
Chloromethyldiphenylmethane (S,W)		W		W,B	X	X			W,S	X
Chloronitrobenzene (S)					X	X	X		S	X
(Chlorophenyl)cyclohexene (S)					X	X	X		S	X
2-Chloro(trifluoromethyl) benzene (B)				S	X	X	X		B	X
3-Chloro(trifluoromethyl) benzene (W)				B,S	X	X	X		W	X
4-Chloro(trifluoromethyl) benzene (B)				S	X	X	X		B	X
2,4-Decadienal (B)				S	X	X	X		B	X
Dibenzofuran (S)					X	X	X		S	X
Dibromomethane (W)				B,S	X	X	X			X
Dichloroanthracene (W)		W		W,B,S	X	X	X		W	X
Dichlorobromoethane (W)				B,S	X	X			W	X
Dichloromethylbis(phenylmethyl) benzene (S,W)		W		W,B	X	X			W,S	X
Dichloromethyldiphenyl-methane (S,W)		W		W,B	X	X			W,S	X
Dichlorophenanthrene (S)					X	X		X	S	X
2,4-Dichloro-2-phenoxyethanol (W)		W		W,B,S	X	X			W	X
Dichloroquinone (S)					X	X		X	S	X
Dichloro(trifluoromethyl) benzene (W)		W		W,B,S	X	X			W	X
2,3-Dichloro(trifluoromethyl) benzene (B)				S	X	X			B	X
2,4-Dichloro(trifluoromethyl) benzene (B)				S	X	X		X	B	X
3,4-Dichloro(trifluoromethyl) benzene (B)				S	X	X		X	B	X
Dichloro(trifluoromethyl) benzophenone (S,W)		W		W,B	X	X		X	W,S	X
Dicyclohexyl phthalate (S)					X	X		X	S	X
Diethylcyclohexanone (S)					X	X		X	S	X
4-(Dimethylamino)benzophenone (S)					X	X		X	S	X
Dimethyl disulphide (W)				B,S	X	X		X	W	X
Dimethylphenanthrene (S)					X	X			S	X
N,N-Dimethyl-2-propenoamide (W)				B,S	X	X		X	W	X
Diphenylcyclohexane (S)					X	X			S	X

TABLE 6.1 (Continued)

CHEMICAL GROUP	MONITORING				CHARACTERISTICS				ASSESSMENT	
	Source	Conf	Trend	Media	LC50	LD50	Log Kow	BCF	Crit	HEC
GROUP IID (Cont'd)										
Diphenyldifluoromethane (W)		W		W,B,S	X	X		X	W	X
Di-t-butylquinone (S)					X	X		X	S	X
3-Ethyl-4-methylmaleic anhydride (S)					X	X		X	S	X
Ethyltoluene (W)		W		W,B,S	X	X		X	W	X
(2-Fluoroethyl)-pentachlorobenzene (S)					X	X		X	S	X
Furan (W)		W		W,B,S	X	X		X	W	X
Heptachlorodibenzofuran (S)					X	X	X		S	X
Heptachlorotoluene (S)					X	X	X		S	X
Hexachlorodibenzofuran (S)					X	X	X		S	X
Hexachlorotoluene (S,W)		W		W,B	X	X			W,S	X
4-Hydroxybenzaldehyde (B)				S	X	X	X		B	X
Indeno(1,2,3-CD)pyrene (S)					X	X	X		S	X
2-Methylbutanoic acid (B)				S	X	X	X		B	X
Methyldibenzofuran (S)					X	X	X		S	X
Methylene-4,4'-bis (N,N-dimethylaniline) (S)					X	X	X		S	X
Methylfluorene (S)		S		S	X	X		X	S	X
5-Methyl-3-hexen-2-one (B)				S	X	X		X	B	X
o-Methyloxime-3-pentanone (S)					X	X		X	S	X
Methylpyrene (S)					X	X		X	S	X
3-Nonen-2-one (B)				S	X	X		X	B	X
Octachlorodibenzofuran (S)					X	X		X	S	X
Pentachlorobiphenylene (S)					X	X		X	S	X
Pentachlorocarbazole (S)					X	X		X	S	X
Pentachlorodibenzofuran (S)					X	X		X	S	X
Pentachlorodifluoronaphthalene (S)					X	X		X	S	X
Pentachlorofluorene (S)					X	X		X	S	X
Pentachloromethylbis (phenylmethyl)benzene (S,W)				B	X	X			W,S	X
Pentachlorophenylfluoromethyl ether (S)					X	X		X	S	X
Pentachlorotoluene (S,W)				B	X	X		X	W,S	X
Phenylacetaldehyde (B)				S	X	X		X	B	X
Phenylacetic acid (B)				S	X	X		X	B	X
Phenylnaphthalene (S)					X	X		X	S	X
Piperidinone (B)				S	X	X		X	B	X

TABLE 6.1 (Continued)

CHEMICAL GROUP	MONITORING				CHARACTERISTICS				ASSESSMENT		
	Source	Conf	Trend	Media	LC50	LD50	Log Kow	BCF	Crit	HEC	
GROUP IID (Cont'd)											
Tetrachlorocarbazole (S)					X	X		X	S	X	
Tetrachlorodibenzofuran (S)					X	X		X	S	X	
Tetrachloromethylbis(phenylmethyl) benzene (S,W)				B	X	X			W,S	X	
Tetrachlorophenanthrene (S)					X	X		X	S	X	
Tetrachlorotoluene (S,W)				B	X	X		X	W,S	X	
N,N,N',N'-Tetramethylbenzidene (S)					X	X		X	S	X	
Thallium (S)						X	X	X	S	X	
Trichloroanthracene (W)				B,S	X	X			W	X	
Trichlorodiphenylmethane (W)				B,S	X	X		X	W	X	
Trichloromethylbis(phenylmethyl) benzene (S,W)				B	X	X			W,S	X	
Trichlorophenanthrene (S)					X	X		X	S	X	
(Trifluoromethyl)benzene (W)				B,S	X	X		X	W	X	
Trimethylbiphenyl (B)				S	X	X		X	B	X	
Trimethylphenanthrene (S)					X	X		X	S	X	
3A,6,6-Trimethyl-3A,4,5,6-tetrahydro-2-coumaranone (S)					X	X		X	S	X	
Zytron (B,S)					X	X		X	B,S	X	
GROUP IIE											
Di-n-butyl phthalate (S,W)				B		X			S		
Diethylbenzene (W)				B,S					W		
Fluoranthene (S)	X		W	W,B,S				X			See Group I
Methylene chloride (S)	X		W	W,B,S				X			See Group I
Methyl phenanthrene (S)						X		X	S		
Pyrene (S)	X		W	W,B,S	X			X			See Group I
1,1,1-Trichloroethane (S,W)				B		X		X	S		
Zinc (B)	X		W,S	W,B,S		X	X		B		See Group I
GROUP IIF											
Benz(A)anthracene (S)	X		W	W,B,S	X	X			S		See Group I
Benzo(K)fluoranthene (S)	X		W	W,B,S	X	X		X			See Group I
Benzofluorene (S)					X	X		X	S		
Copper (B)	X		W,S	W,B,S		X	X	X			See Group I
Coronene (S)					X	X		X	S		

TABLE 6.1 (Continued)

CHEMICAL GROUP	MONITORING				CHARACTERISTICS				ASSESSMENT		
	Source	Conf	Trend	Media	LC50	LD50	Log Kow	BCF	Crit	HEC	
GROUP IIF (Cont'd)											
Methylanthracene (S)					X		X		X	S	
Methyl palmitate (S)					X		X		X	S	
Perylene (S)					X		X		X	S	
Phenanthrene (S,W)				B	X	X			W,S		
GROUP IIG											
Anthracene (S,W)		W		W,B	X	X		X	W,S		
Dimethyl adipate (S)						X	X		X	S	
Fluorene (S,W)				B	X	X		X	W,S		
Fluorotrichloromethane (S)						X	X		X	S	
Hexane (W)				B,S	X	X		X	W		
GROUP III											
Acenaphthene (S)						X		X	S		
Acetone (W)				B,S		X		X	W		
Benzene (S)	X		W	W,B,S					S		See Group I
Benzothiazole (S,W)				B	X			X	W,S		
Benzyl alcohol (S)								X	S		
Benzylbutyl phthalate (S)									S		
Biphenyl (S,W)		W		W,B					W,S		
Butanol-(T) (W)				B,S		X		X	W		
2-Butanone (W)				B,S		X		X	W		
Carbon disulphide (W)				B,S		X		X	W		
Cumene (W)				B,S				X	W		
Diethylether (W)				B,S				X	W		
Dimethylaniline (W)				B,S	X			X	W		
Naphthalene (S,W)				B					S		
Pentane (W)				B,S				X	W		
Propanol (W)				B,S		X		X	W		
Toluene (S,W)				B					S		
Trichlorotrifluoroethane (W)		W		W,B,S	X			X	W		
m-Xylene (S)								X	S		
o-Xylene (W)								X			

The media column indicates the specific medium in which each chemical should be sampled. All chemicals referenced to a particular medium (sediment, water, biota) in the confirmation and trend columns are also referenced in the media column. In addition to this, chemicals found in a lower concentrating medium, but for which no data exist for a higher concentrating medium, are also referenced in the media column. For example, biphenyl is a Group III chemical found in sediment and water. No data are available for biota. Since biota and sediment contaminant levels are generally higher than water levels, it would seem prudent to check biota for biphenyl to determine whether it would be of concern in this medium.

The four sub-headings (LC50, LD50, Log K_{ow}, BCF) under the characteristics column are self explanatory. Xs are used to indicate where data are missing.

The assessment column contains two sub-headings; criteria and HEC. The criteria column indicates the media, for those in which the chemical was identified, for which no criteria are available. An X in the HEC column indicates that either the chemical has not been considered by the HEC, or there was insufficient data for the HEC to conduct an assessment.

Other recommendations which arose from classifying these chemicals into groups are incorporated into the previous section (6.4).