Environnement Ontario dispose de plusieurs programmes de recherche sur la contamination par les dioxines et les furannes. Son laboratoire de dépistage procure le soutien technique dont ces programmes ont besoin.

Que sont les dioxines et les furannes?

Les dioxines et les furannes sont des composés chimiques sans utilité connue, dérivés de procédés industriels et de diverses méthodes de combustion.

La famille des « dioxines » compte 75 produits chimiques apparentés et celle des « furannes » en compte 135. Les deux groupes présentent une structure chimique similaire et plus ou moins les mêmes effets.

Parmi les dioxines, la tétrachlorodibenzodioxine, ou TCDD-2,3,7,8, est la plus toxique. Elle est mille fois plus nocive que la moins toxique de la famille.

D'où viennent les dioxines et les furannes?

On trouve des dioxines et des furannes dans des herbicides, des produits de préservation du bois et autres produits chimiques. Polluants créés au cours du procédé de fabrication, les dioxines et les furannes peuvent s'échapper dans l'atmosphère pendant la production, l'utilisation ou l'élimination de ces produits. Aux États-Unis, par exemple, des dioxines et des furannes sont déversés dans les Grands Lacs à partir de décharges de déchets chimiques industriels.

La combustion de déchets industriels et d'ordures ménagères en incinérateur peut également libérer ces polluants.

En quoi leur présence est-elle inquiétante?

Les dioxines et les furannes sont présents dans l'air, l'eau et le sol, chez la faune, dans les aliments et dans les tissus humains.

Ils persistent longtemps dans l'environnement et s'accumulent dans les tissus vivants. Les dioxines s'accumulent parfois dans la chair des poissons à des concentrations 5 000 fois plus élevées que dans l'eau.

Des recherches effectuées sur des animaux montrent que certaines formes de dioxines et de furannes peuvent provoquer le cancer et d'autres effets nuisibles, même à faible dose. Les effets à long terme d'une légère exposition sur la santé humaine sont toujours à l'étude.

Quel est le rôle du laboratoire de dépistage des dioxines?

Créé en 1981, le laboratoire d'Environnement Ontario fut le premier centre d'analyse des dioxines au Canada. On y analyse, à l'aide de méthodes analytiques ultra-modernes, des échantillons d'air, d'eau de lacs et de rivières, d'eau potable, d'eaux souterraines, de poissons, de sols, de sédiments, de lixiviats de décharge et d'émissions d'incinérateur.

Le laboratoire fournit les preuves légales dont le ministère a besoin pour inculper les pollueurs.

Les analyses effectuées par l'Unité de dépistage des dioxines permettent également de cerner les zones de préoccupation, de surveiller les sources de pollution connues, de distinguer les tendances et d'établir des normes.

Par ailleurs, l'information recueillie sert à l'élaboration du Guide de consommation du poisson gibier de l'Ontario publié par le ministère. Ce guide, qui s'adresse d'abord aux pêcheurs et aux consommateurs, aide aussi les scientifiques à établir l'évolution de la concentration des dioxines et à isoler les sources de contamination.

Le ministère surveille aussi les industries de pâtes et papiers qui polluent nos cours d'eau. En effet, le chlore qu'elles emploient pour blanchir le papier entre en réaction avec les composés organiques et produit des dioxines et des furannes. Environnement Ontario se sert des résultats de cette surveillance pour imposer des normes à l'ensemble de l'industrie des pâtes et papiers.

Comment le laboratoire mesure-t-il la concentration de dioxines et de furannes?

Le laboratoire peut déceler la présence de dioxines et de furannes dans l'eau potable à des concentrations aussi minimes qu'une partie par 10^{15} et une partie par billion dans d'autres échantillons.

Pour effectuer cette analyse sensible et complexe, il faut avoir recours à des appareils spécialisés et des techniciens expérimentés. L'analyse d'un seul échantillon peut coûter de 300 $ à 1 500 $.

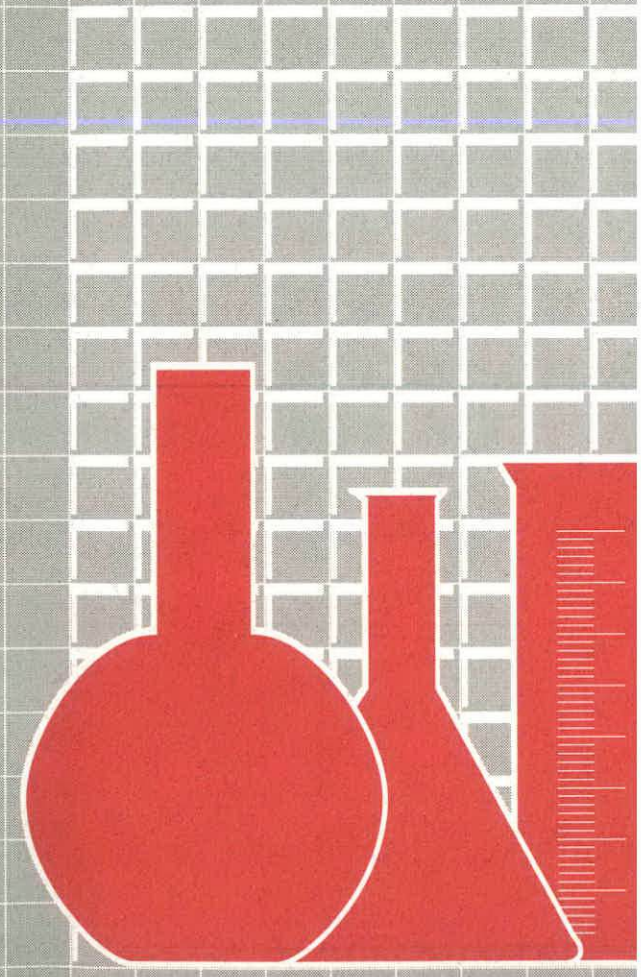
Mais il faut d'abord extraire les dioxines et les furannes de l'échantillon et les séparer des autres composés chimiques organiques, tels les BPC. L'extraction et l'analyse préliminaire peuvent s'échelonner sur plusieurs jours.

L'analyse finale est effectuée à l'aide d'un chromatographe en phase gazeuse couplé à un spectromètre de masse (CG/SM), appareil semblable à celui qui est utilisé aux Olympiques pour déceler la présence de substances proscrites chez les athlètes. Les modèles utilisés au laboratoire du ministère coûtent entre 150 000 $ et 1 000 000 $.

Les chercheurs de laboratoire sont constamment en quête de nouvelles méthodes d'analyse plus exactes et plus fiables. Environnement Ontario se fait un devoir de consulter les chefs de file dans ce domaine pour que la province demeure à la fine pointe des progrès technologiques dans le monde.

Le laboratoire de dépistage des dioxines publie ses résultats dans des rapports qui intéressent toute la communauté scientifique. Il travaille également en collaboration étroite avec d'autres services du ministère. Ensemble, ils interprètent les résultats des analyses en vue d'élaborer des politiques de dépollution et d'assainissement de l'environnement.

Environment Ontario's Dioxin Lab



Ontario Environment Environnement
Jim Bradley, Minister/ministre

Environment Ontario has several programs that deal with dioxin and furan contamination. The ministry's Dioxin Lab provides laboratory support for these programs.

What are dioxins and furans?

Dioxins and furans are chemicals that have no known use, but occur as byproducts of many industrial and combustion processes.

The term "dioxins" refers to a group of 75 related chemicals, while "furans" refers to 135 related chemicals. The two groups have similar chemical structures and effects.

The most toxic dioxin is 2,3,7,8-tetrachlorodibenzo-p-dioxin or 2,3,7,8-TCDD. It is 1000 times more toxic than the least toxic dioxin.

Where do dioxins and furans come from?

Some herbicides, wood preservatives and other chemical products contain dioxins and furans as contaminants. These chemicals, created as unwanted byproducts during the manufacturing process, may escape to the environment during their production, use or disposal. For example, some industrial chemical dumps in the United States are leaking dioxins and furans into the Great Lakes.

Burning of municipal and industrial waste in incinerators can also produce dioxin and furan emmisions.

Why are we concerned about dioxins and furans?

Dioxins and furans have been found in air, water, soil, wildlife, food and human tissue.

Dioxins and furans stay in the environment for a long time. They also become concentrated in biological tissues. The level of dioxins in fish may be 5,000 times that found in water.

Animal studies have shown that certain types of dioxins and furans can cause cancer and other toxic effects at low doses. The effects of long-term, low-level human exposure are still under investigation.

What does the Dioxin Lab do?

The ministry's Dioxin Lab, established in 1981, was the first facility in Canada dedicated to dioxin analysis. The lab uses sophisticated analytical technology to analyse air, lake and river water, drinking water, ground water, fish, soil, sediments, landfill leachates and incinerator emissions.

The Dioxin Lab provides the legal evidence needed to charge polluters.

The anaylsis done by the Dioxin Unit also helps to identify "hotspots", monitor known sources, determine trends and set standards.

Information generated by the lab is used in the ministry's *Guide to Eating Ontario Sport Fish*. In addition to providing advice to anglers and consumers, the guide helps scientists determine trends in dioxin levels and pinpoint sources.

The ministry has also been monitoring water pollution by the pulp and paper industry. The chlorine used to bleach paper reacts with organic compounds to produce dioxins and furans. The ministry has used results of these analyses to place controls on pulp and paper mills.

How does the lab measure dioxin and furan levels?

The Dioxin Lab is able to detect dioxins and furans at concentrations as low as parts per quadrillion in drinking water, and parts per trillion in other samples.

This sensitive and complex analysis requires specialized equipment and skilled technicians. The time-consuming work can cost from $300 to $1500 for each sample.

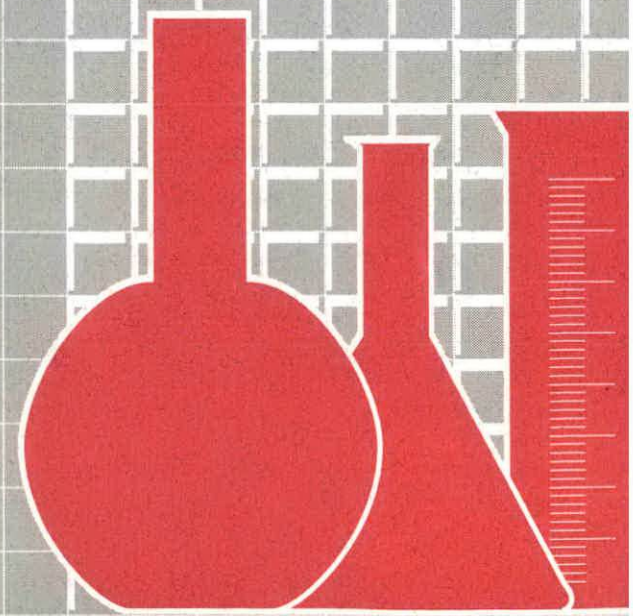
Before analysis, dioxins and furans must be extracted from the sample and separated from other organic chemicals, such as PCBs. This extraction and pre-analysis procedure can take several days.

The final analysis is performed using a gas chromatograph-mass spectrometer (GC-MS), equipment similar to that used to test for drugs at the Olympics. The cost of the GC-MS models used at the lab ranges from $150,000 to $1 million.

Lab scientists continue to research and develop even more accurate and reliable methods of analysis. Leaders in this field are consulted to ensure Ontario keeps pace with worldwide developments.

The Dioxin Lab publishes its results in reports widely used by other scientists. The lab also works with other ministry staff to interpret the significance of its findings to support abatement and cleanup.

Le Laboratoire de dépistage des dioxines d'environnement Ontario



Ontario Environment Environnement
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GREENPEACE

DIOXIN FROM AN ENVIRONMENTALIST'S POINT OF VIEW

Renate Kroesa/Greenpeace International

Greenpeace is an international environmental organization with offices in 21 countries. I myself hold the equivalent of a Masters Degree in chemistry, and have lead Greenpeace in three of our campaigns to eliminate distinct sources of dioxin. I now hold the position of Greenpeace's international pulp and paper campaign director.

I appreciate the opportunity to give this symposium an overview of how Greenpeace views the knowledge accrued to date on dioxin and give you our reasoning for mounting so much pressure to eliminate the sources.

I) THE AMOUNT OF KNOWLEDGE

The next slide gives you an indication of the number of papers published on tetra, penta, hexa, hepta and octa chloro-dibenzo-dioxins and furans combined, over the last 20 years. The data is based on a computer search of the Biological Abstracts, and you can see that the number of papers registered per year has increased exponentially.

In 1985, Al Young estimated that, by then, more than US$ 1 billion had been spent on dioxin research. It is probably fair to say that we are closer to the US$ 2 billion mark today.

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Although a striking amount of information has been generated, and an ever larger community of scientists derives a stable source of income over the years, much of this research effort must have been misdirected. How else can you explain that industry and government still claim to not have enough information on the toxicity of dioxin to justify elimination of the sources?

I wonder whether this is an indication of how limited the tools of modern science really are, or whether clear answers are possible, and the whole issue is just being clouded by interest groups who deliberately throw more and more questions into the debate, causing confusion rather than clarification.

II) WHAT DO WE KNOW?

So, what do we actually know? Dioxin is extremely toxic and extremely bio-accumulative. We should be aware that if dioxin is that extremely toxic to laboratory animals, then it will be as toxic to wildlife. It is this combination of toxicity and persistence in the environment that makes Greenpeace believe that there are no safe levels of dioxin emissions.

Dioxin acts through a protein receptor, which has been identified in laboratory animals as well as in humans. Experimental evidence from studies of human cells and tissues exposed to dioxins in vitro suggests that the responses are qualitatively similar to those produced in cells and tissues from laboratory animals.

Industry only acknowledges chloracne as a human health effect, but far more important are other health effects such as reproductive failure. It is striking that reproductive failure has been observed in all animal species tested, be it fish, bird or mammal. It is therefore highly likely that reproductive failure will also occurr in humans when exposed to dioxin.

I recall Joc Ferguson's presentation at the 1985 symposium, in which he talked about the Hooker Chemicals workers he had interviewed, all three of whom suddenly came to realize that none had fathered children. Somehow, incidences like these are always labelled anecdotal evidence and are dismissed immediately, whereas negative findings always become promoted as certainty.

Dioxin is also the most potent carcinogen tested to date, even though it is not yet clarified whether dioxin is a co-carcinogen or whether it suppresses the immune response to another carcinogen. Given the fact that we have more than enough carcinogens in our polluted environment, that question is of academic interest only.

But perhaps most frightening are the effects of dioxin on the immune system. The thymus, a gland that is of utmost importance to the immune system, is one of the main targets of dioxin. It was shown in laboratory animals that one of the first signs of dioxin poisoning is thymic atrophy.

The human thymus develops at 9 weeks of gestation and disappears at the age of 10 to 12, in other words when the child goes into puberty. It seems that the thymus is not required for the maintenance of effective immune function in adults, since human T lymphocytes have a life-span of 15-20 years, and there is little replacement for them during adult life. But, what about children, and even worse, what does thymic atrophy do to nursing babies?

A number of effects are seen at doses comparable to those that produce cancer. Very few of the studies, however, have produced clear No Observable Effect Levels. This is particularly true of long-term studies in rodents and rhesus monkeys. The available evidence suggests that No Observable Effect Levels for some of the immunologic and reproductive effects in rhesus monkeys are well below 1 ng/kg/day.

An average breast-fed baby in the Western industrialized world will ingest up to 100 times the amount of dioxin that the WHO deems safe for a healthy adult. The margin of safety, that is the difference between the levels of dioxin we expose our babies to and those that we know will cause adverse effects in laboratory animals, is on the order of ten to even non-existent.

We must be clear that mother's milk also contains other toxic chlorinated chemicals, such as PCB's, hexachlorobenzene or polychloro-naphthalenes to name a few. Yet, no research has been done on the likely synergistic effects.

We must also be clear that it will be impossible for scientists to ever prove a link between health effects at a later stage in life to any toxic chemicals present in mother's milk, simply because the baby will not grow up in a controlled environment such as a laboratory.

This is the dilemma with any epidemiological study: the humans investigated are exposed to many more toxic influences than just dioxin, and it will always be possible to point the finger to other factors possibly causing the disease.

Further, epidemiological studies never have verified the actual exposure of the presumed exposed versus control group. That fact is probably the single most important reason, why epidemiological studies contradict each other so much.

III) WHO IS AT RISK?

Obviously, the human baby is of most concern when it comes to human health effects. But what about the entire environment?

Despite all the money spent and all the papers published, we know very little about dioxin's effect on an entire ecosystem. But it seems likely that animals with a fish-based diet, like fish-eating birds or marine mammals, will suffer most.

The Baltic gray seal is a case in point: in the mid-seventies it was found that only 20 percent of the mature female gray seals were fertile! This is commonly thought to be caused by PCB's in the Baltic food chain; and PCB's, as we know, react through the same Ah-receptor as dioxins.

Infertility is not the only effect linked to PCB's in the seals' diet: over 75% of the seals found dead in recent years have been found to have intestinal ulcers and kidney damage. Roughly half the female gray seals also had uterine tumors. Often, even the living display these same diseases. Interestingly, when seals are raised with a diet of less contaminated fish caught outside the Baltic, the seals are able to reproduce. Somehow, this fact is never featured in information brochures on dioxin.

IV) THE SOURCES AND ELIMINATION STRATEGIES

Dioxins seem to come from many different sources, but there is an obvious common denominator: society's use of chlorine gas and the production and combustion of organochlorines.

Despite industry's claims that dioxin is a naturally occurring toxin, we find that human milk is dangerously contaminated in heavily industrialized nations only. The Czuczwa study, which investigated contamination of Great Lakes sediments, found that dioxin levels were rising since the Second World War, which coincides with the beginning of large-scale production and combustion of organochlorines.

Interestingly, elemental chlorine does not exist in Nature, and Nature does not produce organochlorines on a large scale either, with exception of some very simple molecules, such as methylchloride or dichloromethane.

Eliminating dioxin would actually mean eliminating a much larger portion of toxic chemicals from our environment. Which makes a lot of sense from an environmental point of view, because dioxin never ever comes alone, but is always accompanied by other toxic organochlorines.

Dioxin indeed is the tip of the iceberg, it is the tip of an iceberg of environmentally dangerous organohalogens, halotoxins as Greenpeace calls them. To successfully eliminate modern society's dioxin sources will inevitably mean eliminating this iceberg, and that is why we environmentalists are becoming more and more vocal in this matter. To Greenpeace, dioxin is a symbol of whether we want to deal with our pollution and clean-up or whether we want to continue our self-destructive life style.

V) THE POLITICS - WHOSE INTEREST'S ARE AT STAKE?

Obviously, when the entire organohalogen production is being questioned, some very powerful interest groups will want to have a say. Much is at stake, both in terms of liability law suits and lost profits.

It would be naive to think that these players have had no influence on the colour of dioxin science. The result: instead of eliminating the sources, we are now deluged with attempts to linguistically detoxify dioxin: pseudo-scientific exercises known as risk assessments.

IV) LINGUISTICALLY DETOXIFYING DIOXIN: RISK ASSESSMENTS

Citizen's groups and environmentalists view risk assessments or risk-benefit analysis with much suspicion. Why? Well, three simple questions can answer that: Who takes the risk? Who determines the risk? And who gets the benefit?

Too often, we find risk assessments are based on phony science. One case in point is the risk assessment presented last year in this forum by Envirologic Data, about health risks associated with the use of dioxin-contaminated paper products.

That entire assessment is based on this graph, which illustrates the migration rate of soil-bound dioxin into rat skin. The graph itself is based on only two measure points. Experimental data support a first order rate law, yet the risk assessment is based on a linear decline from measure point A on. It is easy to see that this linearisation greatly distorts the estimation of how much dioxin will migrate during short term exposures.

The same risk assessment uses a wet model for diapers and hygiene products, postulating that the dioxin will migrate through a barrier of urine or blood, rather than directly into the skin. But, as any mother can confirm, a diaper is dry when put on, and is changed when wet. Coincidentally, the wet model results in a so-called safe level of contamination around 1000 times higher than the model postulating direct migration from the diaper into the skin.

Further, this same risk assessment completely neglects the influence of baby oil, or the fact that skin in the human genital area is far more penetrable than at other parts of the body. It also neglects the fact that these paper products are contaminated with many more toxic organochlorines than just dioxin.

Quite frankly, if I at university would have based my thesis on such poor assumptions, I would not have been allowed to graduate. Yet, because this risk assessment was paid for and published by the industry organization NCASI, its conclusions are now being referred to in many credible papers and by regulatory bodies throughout the world.

The scientific community is doing itself a great disservice by letting such pseudo-scientific papers become published in credible magazines, and the reputation of science itself is suffering as a consequence.

Generally speaking, risk assessments mostly fall short on the following points: They don't take into account total exposure from all possible sources; synergistic effects; effects on the next generation, for example through contaminated human milk, and they only look at one possible health effect, such as cancer.

VII) CONCLUSIONS

To Greenpeace, it seems that the scientific community has been used and scientific journals have been abused by parties with a vested interest, in order to delay the elimination of man-made dioxin sources, which would go hand-in-hand with the elimination of a much larger group of environmentally dangerous organochlorines.

We do not need more research to determine whether dioxin is toxic or not. Instead, we must eliminate the sources, immediately. Research we do need is to finding clean production technologies and safe methods of destroying the existing piles of dioxin and other chlorinated waste.

Thirdly, the scientific community must regain its credibility, that is objectivity. It is a must that publications be screened more thoroughly, to prevent any more pseudo-scientific papers based on assumptions and vested interests from being published in scientific journals.

Last, this annual symposium must broaden its narrow focus and become a symposium on the environmental impact of halotoxins, rather than continue the increasingly futile debate of whether dioxin kills humans or not.

MINIMUM EFFECT LEVELS

COMPARED TO AVERAGE DAILY INTAKE

BY NURSING BABY

	MEL in ng/kg bw/day		INTAKE BY BABY in ng/kg bw/day
immunotoxic effects	6	(guinea pig)	
reproductive effects	0.12	(primates)	around 0.1
carcinogenic effects	10	(rats)	

TOLERABLE DAILY INTAKES COMPARED TO AVERAGE DAILY INTAKE BY NURSING BABY

	TDI in pg/kg bw/day	BABY in pg/kg bw/day
WHO	1	
Sweden	1-5	around 100
Canada	10	

SOURCES AND ELIMINATION STRATEGIES

A. Production Of CHC's

* chlorophenols	immediate ban on production & use

B. Combustion Of CHC's

* car exhaust, leaded gas	don't add lead / CHC scavengers
* municipal incinerators	comprehensive recycling systems
* hazzardous waste incinerators	other destruction methods e.g. strip off chlorine chemically
* copper reclamation	don't use PVC for coating
* steel recycling	don't mix with CHC's

C. Use of Chlorine Gas

* pulp and paper industry	bleach with oxygen / less bleaching
* metallurgical processes	use alternative production methods
* disinfection	ozone

ENVIROLOGIC DATA

NOVEMBER, 1987

FIGURE 4.

EFFECT OF EXPOSURE DURATION ON DERMAL PENETRATION OF SOIL-BOUND ^{3}H-TCDD IN THE RAT

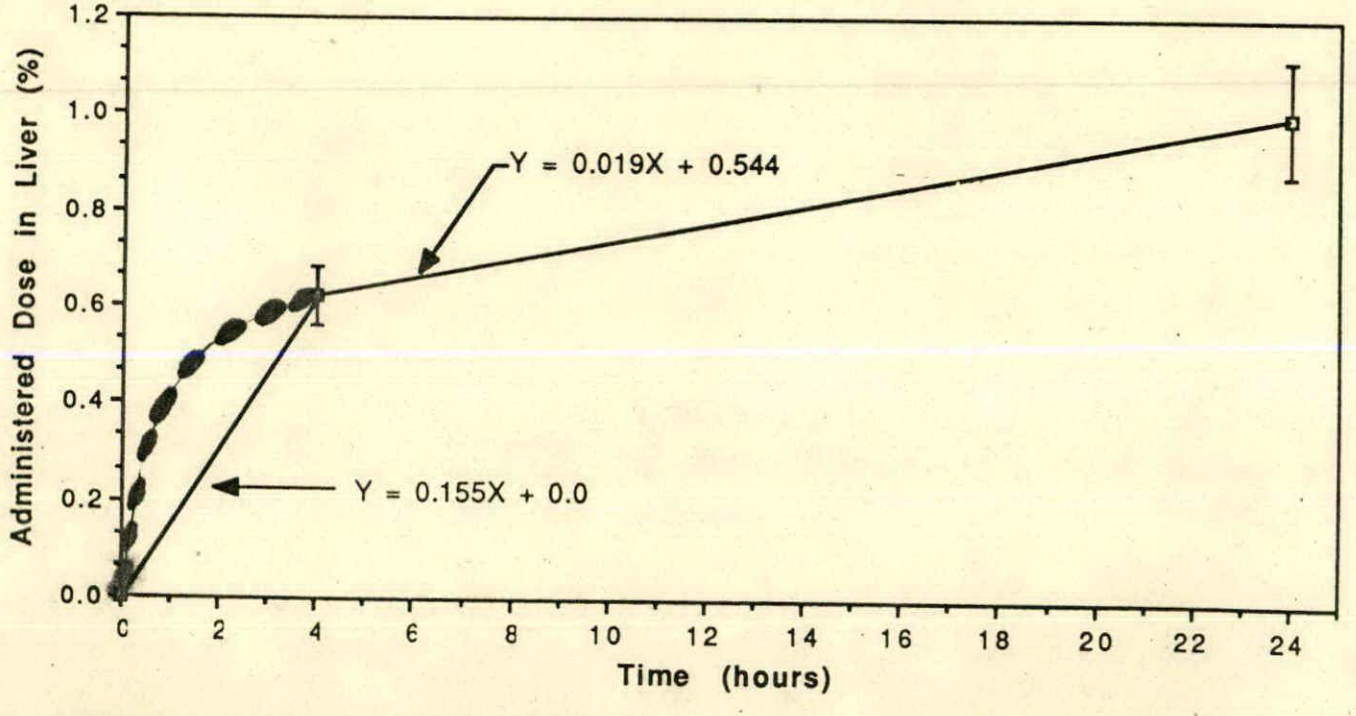
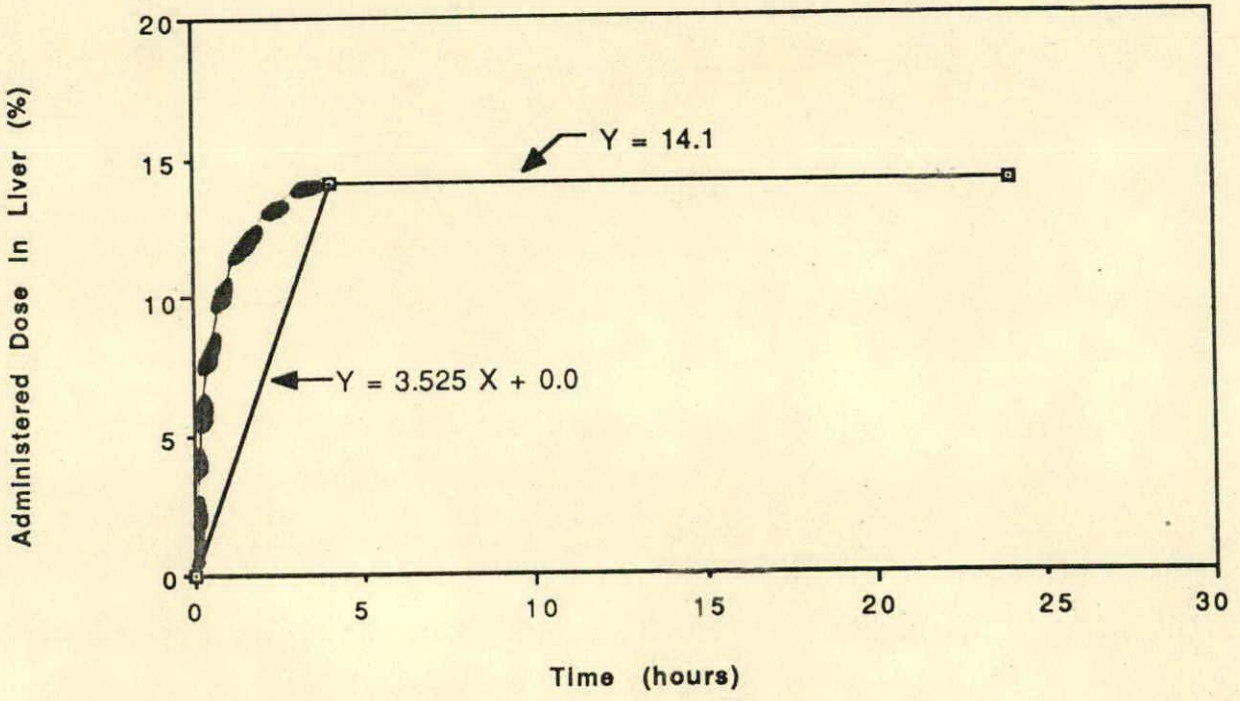


FIGURE 5.

MODELED RELATIONSHIP BETWEEN EXPOSURE DURATION AND DERMAL ABSORPTION OF TCDD IN THE PEG + WATER VEHICLE IN THE RAT



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including the impact of environmental issues — dioxins, water pollution — on chlorine usage

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A comprehensive review of current and future prospects in the 500 million dollar pulp bleaching chemicals market in Western Europe

To be Published September 1989

PPCM CONSULTING (Mr. Clive Capps)

Price & Pierce are major suppliers of pulp, secondary fibres, chemicals and minerals to the pulp and paper industry worldwide. PPCM Consulting, located within the chemicals and minerals division, is a market research company which specialises in providing reports and information on trends and key issues relating to the current and future usage of chemicals by the pulp, paper and coating sectors.

8. METHODOLOGY

Information and data will be developed from the authors' database and will be supplemented by interviews with key personnel in the industry. The demand for bleaching chemicals will be aggregated from the individual requirements of the 300 West European pulp mills.

9. COST AND TIMING

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NINTH INTERNATIONAL SYMPOSIUM ON
CHLORINATED DIOXINS AND
RELATED COMPOUNDS

SEPTEMBER 17 - 22, 1989
TORONTO, CANADA

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SEPTEMBER 17 - 22, 1989

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Ahlborg	Ulf	P.O. Box 60208		S-10401 Stockholm		Sweden	
Ahokas	Jorma	Australian Key Centre for Tox.	P.O. Box 2476V, RMIT	Melbourne	Vic	Australia	3001
Allan	Ron	Domtar Packaging	6789 Airport Road	Malton	ON	Canada	L4V 1N2
Allen	Kathleen	MO. Dept. of Health	P.O. Box 570	Jefferson City	MO	USA	65102
Allen	Elizabeth	Michigan Agent Orange Comm.	2774 Seminole	Ann Arbor	MI	USA	48109
Allender	Bruce	Amcor Research & Tech. Centre	17 Rex Avenue	Alphington	Victoria	Australia	3078
Altwicher	Elmar	Dept. of Chemical Engineering	Rensselaer Poly. Inst.	Troy	NY	USA	12180
Amendola	Gary	NCASI, Anderson Hall	Tufts University	Medford	MA	USA	02155
Anderson	Dennis	Proctor & Redfern Group	45 Green Belt Drive	Toronto	ON	Canada	M3C 3K3
Andersson	Osten	National Food Administration	Box 622	S-75126 Uppsala		Sweden	
Andrews	J.S.	Agency for Toxic Substances	1600 Clifton Road N.E.	Atlanta	GA	USA	30333
Armstrong	A. Douglas	Georgia-Pacific Corporation	P.O. Box 105605	Atlanta	GA	USA	30348-5605
Asari	Kenji	Japan Analytical Chemistry	Consultants, 1-7-3 Funado	Itabashi-ku	Tokyo	Japan	174
Axegard	Peter	STFI	Box 5604	S-114 86 Stockholm		Sweden	
Babich	Michael	Consumer Product Safety Comm.	5401 Westbard Ave. Rm 700	Bethesda	MD	USA	20207
Baker	David John	2009 Davenport Road		Toronto	ON	Canada	M6N 1C5
Barney	Jonathan	USEPA (SW)	230 S. Dearborn St.	Chicago	IL	USA	60604
Barro	Claudio	IVR Italy	Via V. Monti 57/4	Milano		Italy	20145
Barton	Douglas	Stone & Webster Engineering	245 Summer Street	Boston	MA	USA	02107
Barton	Robert	EER Corp.	18 Mason	Irvine	CA	USA	92718

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Baughman	Robert	Harvard Medical School	220 Longwood Ave.	Boston	MA	USA	02115
Beauregard	Yvon	Domtar Pulp & Paper Products	P.O. Box 7211	Montreal	Quebec	Canada	H3C 3M2
Bedbury	Hadley	717 North Harwood Street		Dallas	TX	USA	75201
Beekwilder	A.H.M.	Ak20 Engineering GV	P.O. Box 9200	6800 SB Arnhem		The Netherlands	
Behrens	Carl Arthur	Norsk Hydro, Research Centre	P.O. Box 2560	3901 Porsgrunn		Norway	
Beliles	Robert	National Academy of Sci.	2101 Const. Ave, Rm HA354	Washington	DC	USA	20418
Belli	Giuseppe	University of Pavia	Via A. Basse n.6	Pavia		Italy	
Bellward	Gail	2146 East Mall		Vancouver	BC	Canada	V6T 1W5
Bendixen	Eva Lise	National Agengy, Env. Prot.	29 Strandgade	DK 1401 Copenhagen		Denmark	
Benfenati	Emilio	Istituto ''M. Negri''	Via Eritrea, 62	Milano		Italy	20157
Bergqvist	Per-Anders	Inst. of Env. Chemistry	University of Umea	Umea	S-90187	Sweden	
Berry	Richard	Paprican	570 Boul. St. Jean	Pointe Claire	Quebec	Canada	H9R 3J9
Birmingham	Brendan	135 St.Clair Avenue West		Toronto	ON	Canada	M4V 1P5
Bjorklund Jansson	Marianne	STFI	Box 5604	Stockholm	S-11486	Sweden	
Bjotveit	Ingrid	P.O. Box 8100 Dep		Oslo 1		Norway	N0032
Blake	Natalie	Nalco Chemical Company	One Nalco Center	Naperville	IL	USA	60566
Blinksbjerg	Peter	DK-Teknik	Gladsaxe Mollevej 15	DK-2860 Soborg		Denmark	
Bobet	Esther	Environment Canada	25 St. Clair Ave. E., 7th Flr.	Toronto	Ontario	Canada	M4T 1M2
Boggess	Kathy	425 Volker Blvd.		Kansas City	MO	USA	64110
Bolgar	Michael	898 Long Hill Road		Guildford	CT	USA	06437
Bonamin	Vladimiro	Via Campodoro 25		Villafranca Padovana	PD	Italy	35010
Bonfanti	Loretta	Via Andrea	Pisano 120	Pisa		Italy	56100
Boraston	Geoff	Superburn Systems Ltd.	2034 W 12th Avenue, Ste. 201	Vancouver	BC	Canada	V6J 2G2

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Bottimore	David	6850 Versar Center		Springfield	VA	USA	22151
Bradley	Joel	Cambridge Isotope Labs. Inc.	20 Commerce Way	Woburn	MA	USA	01801
Bradley	Jim						
Braune	Birgit	Canadian Wildlife Service	100 Gamelin Boulevard	Ottawa	ON	Canada	K1A 0H3
Brecher	Ronald	Eco Logic	143 Dennis St.	Rockwood	ON	Canada	N0B 2K0
Breen	Joseph	USEPA, Field Studies Br. TS798	401 M St. S.W.	Washington	DC	USA	20460
Brener	David	Domtar	P.O. Box 300	Senneville	Quebec	Canada	H9X 3L7
Brenner	Karl	BASF Aktiengesellschaft	Abt. Dus-M 940	D-6700 Ludwigshafen/Rhein		West Germany	
Broman	Dag	University of Stockholm	Department of Zoology	Stockholm		Sweden	106 91
Brouwer	Abraham	Department of Toxicology	Bomenweg 2	Wageningen		The Netherlands	6703 AD
Brown	Roger	Rechem Environmental Research	Charleston Rd., Hardley, Hythe	Southampton		England	S04 6ZA
Brown	Gordon	P.O. Box 3030		Sarnia	Ontario	Canada	N7T 7M1
Brown	John	GE R&D Center	Box 8, Bldg. Kl. Rm 3B29	Schenectady,	NY	USA	12301-0008
Bruce	Kevin	P.O. Box 13109		Research Triangle Park	NC	USA	27709
Bruckman	Leonard	165 Capitol Avenue	Room 144	Harford	CT	USA	06106
Brun	Alain	Cerchar BP n2		Verneuil-en-Halatte	60550	France	
Brunk	Robert	2014 N.W. Estaview Dr.		Corvallis	OR	USA	97330
Brunstrom	Bjorn	Department of Zoophysiology		Uppsala	S-75122	Sweden	
Bryant	Debbie	Weyerhaeuser	WTC-2F25	Tacoma	WA	USA	98477
Buchert	Arne	National Food Agency	Morkhoj Bygade 19	Soborg		Denmark	DK2860
Buckland	Simon	Chemistry Division	Private Bag	Petone		New Zealand	

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Bushby	Bernard	Warren Spring Lab		Stevenage		England	SG12BX
Butler	Patrick	The Wiggins Teape Group Ltd.		Beaconsfield	Bucks	England	HP9 1RT
Calvert	Geoffrey	N.I.O.S.H.	4676 Columbia Pkwy., R-15	Cincinnati	OH	USA	45226
Campbell	Monica	12 Shuter Street	3rd Floor	Toronto	ON	Canada	M5B 1A1
Carle	Jorgen	National Env. Research Inst.	Morkhoj Bygade 26, H	Copenhagen	DK-2860 Soborg	Denmark	
Carlo	Rossi	via Andrea Pisano, 120		Pisa		Italy	56100
Carnovale	Frank	546 Collins Street		Melbourne	Victoria	Australia	3000
Catalano	Dennis	Weyerhaeuser	WTC-2F25	Tacoma	WA	USA	98477
Cavalier	Heather	Cambridge Isotope Labs. Inc.	20 Commerce Way	Woburn	MA	USA	01801
Chamberland	Alain	Environment Canada	Industrial Programs Branch	Ottawa	ON	Canada	K1A 0H3
Chandrasekaran	Sekar	E.B. Eddy Forest Products Ltd.	Box 1755	Espanola	ON	Canada	P0P 1C0
Charles	M. Judith	CB#7400, Bosenow Hall,	Uni at Chapel Hill	Chapel Hill	NC	USA	27514
Charlet	Philippe	Centre Technique Papier	Domaine Universitaire	Grenoble		France	38020
			BP7110				
Chiesa	Giancarlo					Italy	
Chittim	Brock	Wellington Laboratories	398 Laird Rd.	Guelph	ON	Canada	N1G 3X7
Chiu	Chung	Environment Canada	3439 River Rd, Env. Tech.	Gloucester	ON	Canada	K1A 0H3
			Ctr.				
Christmann	Wilfred	Paul Ehrlich Str. 29		6070 Langen D		West Germany	
Chung	Alain	Environment Canada	Industrial Programs Branch	Ottawa	ON	Canada	K1A 0H3
Cleghorn	Harry	2 Tippett Road		Toronto	Ontario	Canada	M3H 2V2
Clement	Ray	95 High Park Avenue	Apt. 1012	Toronto	ON	Canada	M6P 2R8
Coburn	John	845 Harrington Court		Burlington	ON	Canada	L7N 3P3

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Collins	Robert	Kamyr Canada Inc.		Ridge Center Glens Falls	NY	USA	12804
Congreve	Richard	Potlatch Corp.	P.O. Box 3591	San Francisco	CA	USA	94111
Connally	Barbara	Nat'l Inst. for Occ. Safety...	1328 Broadway	Cincinnati	OH	USA	45210
Cooper	Michael	14 Ravine Drive		Newton	New Jersey	USA	07860
Cosby	Owen	845 Harrington Court		Burlington	ON	Canada	L7N 3P3
Cox	Ernest	HM Inspectorate of Pollution	43 Marsham Street	London		England	SW1 P3PY
Cramer	Paul	425 Volker Blvd.		Kansas City	MO	USA	64110
Crawford	George	P.O. Box 213		Rexdale	ON	Canada	M9W 5L1
Creaser	Colin	CHE, University of East Anglia		Norwich	Norfolk	England	NR4 7TJ
Crummett	Warren	The Dow Chemical Company	P.O. Box 2560	Midland	MI	USA	48641-2560
Cuss	Doug	330 Winston Road		Oakville	ON	Canada	L6L 4W5
Czeskleba-Dupont	Rolf	Roskilde University, P.5	P.O. Box 260	DK-4000 Roskilde		Denmark	
Dahlman	Olof	STFI, Box 5604		S-114 86 Stockholm		Sweden	
Dalager	Nancy	Office of Env. Epidemiology	1825 K Street N.W. Ste. 322	Washington	DC	USA	20006
Dameworth	William	Potlatch Corp.	P.O. Box 1016	Lewiston	ID	USA	83501
Darskus	Rolf	P.O. Box 1630		Mainz		West Germany	6500
Davidson	Walter	Kratos Analytical Inc.	535 East Crescent Ave.	Ramsey	NJ	USA	07446
Davies	Stephen	MOE-Laboratory Services Br.	125 Resources Rd.	Rexdale	Ontario	Canada	M9W 5L1
Davis	D.	Dept. of Vet. Phys. & Pharm.	Texas A&M University	College Station	TX	USA	77843-4466
De Brou	Gary	Ontario Ministry of the Env.	880 Bay Street, 4th Floor	Toronto	ON	Canada	M5S 1Z8
de Gerlache	Jacques	Solvay et Eie	Rue de Ransbeef, 310	Brussels		Belgium	1120
de Jong	Ad	Nat'l Inst. of Public Health	Willem de Zwijgerlaan 6	Willem de Zw3ijgerlaan 6	Nieuwkoop	The Netherlands	2421 CA

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De Sousa	Filipe	STFI	Box 5604	Stockholm	S-11486	Sweden	
De Toni	Bruno	A.M.N.I.U.P.	Via Savelli, 9	Padova		Italy	35129
de Wit	Cynthia	Nat. Env. Protection Board	Special Analytical Lab.	Solna		Sweden	S-171 25
Dean	Walter	5226 Quince Rd.		Memphis	TN	USA	38117
Demos	Greg	Radian Corporation	8501 Mo-Pac Blvd.	Austin	TX	USA	78759
DeRoos	Fred	662 Cromwell Avenue		St. Paul	MI	USA	551114
Dewailly	Eric	D.S.C.-CHUL 2050	St.-Cyrille O.	Ste-Foy	Quebec	Canada	G1V 2K8
Di Domenico	Alessandro	Via Nomentana, 261		Rome		Italy	00161
Dickson	Leslie	Toxicology Research Centre	University of Saskatoon	Saskatoon	Sask	Canada	S7N 0W0
Dillard	David	100 Wisconsin River Drive		Port Edwards	WI	USA	54469
Doiron	Jill	Dow Chemical Canada Inc.	P.O. Box 3030	Sarnia	Ontario	Canada	N7T 7M1
Dolan	James	Occidental Chemical	2801 Long Rd.	Grand Island	NY	USA	14072
Donetzhuber	Alexander	Stora Technology		Saeffle		Sweden	S-661 00
Donnelly	Joseph	Lockhead Eng. & Science Co.	1050 E. Flamingo Rd. Ste. 126	Las Vegas	NV	USA	89119
Du Manoir	John	C-I-L Inc.	2101 Hadwen Road	Mississauga	ON	Canada	L5K 2L3
Dudley	Judith	ENSR Consulting & Engineering	35 Nagog Park	Acton	MA	USA	01720
Duffy	Maureen	Cambridge Isotope Labs. Inc.	20 Commerce Way	Woburn	MA	USA	01801
Duwel	Uwe	Geierstrasse 1		2000 Hamburg 60		West Germany	
Ebert	David	Chemsyn Sci. Labs	13605 W 96 Terr	Lenexa	KS	USA	66215
Eckert	Rudolf	NATEC, POSTFACH 501560		D2000 Hamburg 50		West Germany	
El-Barnachawy	Sami	Noranda Minerals Inc	P.O. Box 4000	Rouyn-Noranda	Quebec	Canada	J9X 5B6
Erickson	Dennis	9936 - 67th Avenue		Edmonton	AB	Canada	T6E 0P5

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Faengmark	Ingrid	Inst. of Env. Chemistry	University of Umea	Umea	S-90187	Sweden	
Faerden	Kirstin	Norwegian Food Control...	P.O. Box 8187 Dep	N-0034 Oslo		Norway	
Federer	Werner	Schnatzenbichl 12		A-6064 Rum/Innsbruck	Tirol	Austria	6064
Fenwick	John	9420 Cote de Liesse Rd		Lachine	Quebec	Canada	H8T 1A1
Festa	John	1250 Conn Avenue N.W.		Washington	D.C.	USA	20036
Fingerhut	Marilyn	2239 Park Avenue		Cincinnati	OH	USA	45206
Finkelstein	Abe	Environment Canada	351 St. Joseph Blvd.	Ottawa	ON	Canada	K1A 0H3
Ford	Allan	Monsanto Company	800 N. Lindbergh Blvd.	St. Louis	MO	USA	63141
Foster	Glenys	Zenon Environmental Inc.	845 Harrington Court	Burlington	ON	Canada	L7N 3P3
Fouquet	Andre	850, boul. Vanier		St. Vincent-de-Paul (Laval)	PQ	Canada	H7C 2M7
Franke	Stephan	Martin Luther King Platz 6		2000 Hamburg 13		West Germany	
Frawley	John	Hercules Incorporated	1313 N. Market Street	Wilmington	DE	USA	19894
Fredette	Maurice	Albright Wilson Americas	2 Gibbs Rd.	Islington	ON	Canada	M9W 1R1
Friedrich	Kurt	CIBA-GEIGY AG	K-127.3.12	Basel		Switzerland	CH-4002
Frommberger	Rolf	Chem. Landesunt. - Anstalt	7000 Stuttgart 1	Breitscheidstr. 4		West Germany	
Fry	Virginia	ENSR Consulting & Engineering	35 Nagog Park	Acton	MA	USA	01720
Fuhr	Hartmut	Mobay Corporation	Mobay Road	Pittsburg	PA	USA	15205-9741
Funcke	Werner	GfA	Nottulner Laudweg 102	D-4400 Muenster-Roxel		West Germany	4400
Furst	Peter	Chem Landesuntersuchungsamt	Sperlichstr. 19	4400 Munster		West Germany	
Garden	Stewart	25 St. Clair Ave. East	7th Floor	Toronto	Ontario	Canada	M4T 1M2
Garrett	John	Wright State University	3640 Colonel Glenn Highway	Dayton	Ohio	USA	45435
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Golor	Georg	Inst. Toxikologie, Garystr. 5		Berlin 33		West Germany	1000
Goncalves	Ettienne	Aracruz Celulose S/A	P.O. Box 1011	Aracruz	ES	Brazil	29190
Gonnord	Marie-France	DCMR-Ecole Polytechnique		Palaiseau		France	91128
Grafstrom	Anna-Karin	Nat. Env. Protection Board	Special Analytical Lab.	Solna		Sweden	S-171 25
Graham	Peter	235 Queen Street	Room 939C	Ottawa	ON	Canada	K1A 0H5
Greenberg	Alvin	Risk Science Associates	300 Tamal Plaza, Suite 150	Corte Madera	CA	USA	94925
Greenman	Edwin	Kimberly-Clark	2100 Winchester	Neenah	WI	USA	
Greife	Alice	NIOSH	4676 Columbia Parkway	Cincinnati	OH	USA	45226
Greim	Helmut	Jugolstadter Landstr. 1		D-8042 Neuherberg		West Germany	
Gressel	Yale	P.O. Box 271		Palmer	MA	USA	01069
Griffin	Guy	Potlach Corporation	244 California St., Suite 610	San Francisco	CA	USA	94111
Grimstad	Terje	M.D. Hydro MG-div.	Lillejordet	3250 Larvik		Norway	
Gullett	Brian	U.S. EPA	MD-4	Research Triangle Park	NC	USA	27711
Guyan	Steve	801-10 Capitola Drive		Research Triangle Park	NC	USA	27709
Haasz	Tibor	1091 Eastern Avenue		Toronto	ON	Canada	M4L 1A8
Hafskjold	Kristin	Elopak A/S	Hafskjold	Lier	3400	Norway	
Hagenmaier	H.	Inst. fur Organische Chemie	Auf der Morgenstelle 18	D-7400 Tubingen 1		West Germany	
Hahn	Jeffrey	1900 Powell St., Suite 400		Emeryville	CA	USA	94608
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Hallett	Douglas	Eco Logic	143 Dennis St.	Rockwood	ON	Canada	N0B 2K0

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Halman	Ron	Environment Canada	3439 River Rd, Env. Tech. Ctr.	Gloucester	ON	Canada	K1A 6H3
Hamilton	Jeff	1 St. Clair Ave. E.	5th Floor	Toronto	Ontario	Canada	M4V 1K6
Hamilton	Coreen	Seakem Analytical	P.O. Box 2219	Sidney	BC	Canada	V8L 3S1
Hamlin	Phil	801 South 16th		Shelton	WA	USA	98584
Hanberg	Annika	P.O. Box 60208		S-10401 Stockholm		Sweden	
Hanes	Mark	Wright State University	3640 Colonel Glenn Highway	Dayton	Ohio	USA	45435
Harper	Patricia Anne	Clin.Pharm., Sick Kids Hosp.	555 University Ave.	Toronto	ON	Canada	M5G 1X8
Harris	M.	Dept. of Vet. Phys. & Pharm	Texas A&M University	College Station	TX	USA	77843-4466
Harvey	Mike	Finnigan MAT	355 River Oaks	San Jose	CA	USA	95134
Hass	Ronald	801-10 Capitola Drive		Research Triangle Park	NC	USA	27709
Hattemer-Frey	H.						
Hauchman	Fred	US EPA	OAQPS/ESD/PAB/MD-13	Research Triangle Park	NC	USA	27711
Hauge	Paul	N.J. DEP, Div. of Sci. & Res.	CN 409	Trenton	NJ	USA	08625
Haugerod	Oddbjorn	Norsk Hydro a.s		N 3901 - Porsgrunn		Norway	
Hay	David	Environment Canada	Industrial Programs Branch	Ottawa	ON	Canada	K1A 0H3
Hayden	James	465 Canada St.		Fredricton	NB	Canada	E3A 4A8
Hayton	Alan	94 Royal Palm Drive		Brampton	Ontario	Canada	L6Z 1P7
He	Ying-Qiang	Personnel Division	Ji-Nan University	Guang zhow		P.R. China	510630
Headley	John	Chemex Labs Alberta Inc.	2021-41 Ave. NE	Calgary	Alta.	Canada	T2E 6P2
Hecq	Pierre	Rue de La Loi 200		Bruxelles		Belgium	B-1049
Heida	Henk	Amstelveenseweg 08		Amsterdam		The Netherlands	1075 XY
Heidelore	Fiedler	Ecological Chemistry		Bayreuth		West Germany	D-8580

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Herman	Glen	Occidental Chemical	2801 Long Rd.	Grand Island	NY	USA	14072
Herschmiller	Don	425 Carrall Street		Vancouver	BC	Canada	V6B 2J6
Herstad	Solvie	EKA Nobel AB 44501 Surte		Goteborg		Sweden	
Hesso	Antti	Topeliuksenkatu 419 A		SF-00250 Helsinki		Finland	
Hierl	Gerd	Tetra Pak GmbH	Waldburgstr. 79	D-7000 Stuttgart 80		West Germany	D-7000
Hill	Derrick	Flectcher Challege Canada		Crofton	BC	Canada	V0R 1R0
Hill	David	Courtaulds Research		Coventry	Warks	England	CV6 5RS
Hirschberg	Gene	333 Niagara Street		Park Forest	IL	USA	60466
Hise	R.G.	Westvaco Corporation	Box 2941105	North Charleston	NC	USA	29411-2905
Holland	Jack	Dept. of the Arts...	P.O. Box 787	Canberra	ACT	Australia	2611
Hollebone	Bryan	Carleton University		Ottawa	Ontario	Canada	K1S 5B6
Hollinger	David	Ontario Min. of the Env.	220 McComber Cr.	Thunder Bay	ON	Canada	P7A 7E8
Holt	Philip	Occidental Chemical	2801 Long Rd.	Grand Island	NY	USA	14072
Hooper	Anthony	Dept. Primary Industry	GPO Box 990	Darwin	N.T.	Australia	0801
Hope	William	18207 Edison Avenue		Chesterfield	MO	USA	63005
Hope	Dave	3650 Wesbrook Mall		Vancouver	BC	Canada	V6S 2L2
Horaguchi	Mitsuhiro	Mitsubishi Heavy Ind. Ltd.	12, Nishiki-Cho	Naka-Ku	Yokohama	Japan	231
Horn	Joachim	Martin GMBH	Leopoldstr. 248	Munich		West Germany	8000
Houllier	Christophe	CITEPA	3 rue Henri Heine	Paris		France	75016
Hryhorczuk	Daniel	Division of Occ. Medicine	720 S. Wolcott	Chicago	IL	USA	60612
Hubbard	Donald	1210 Sandalwood Dr.		Hattiesburg	MS	USA	39402
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Huynh	Chi	SUNY HSCS College of Medicine	88 Aldrich Ave.	Binghamton	NY	USA	13903
Hwang	Seong	Exp. Assessment Group (RD689)	USEPA 401 M St., S.W.	Washington	DC	USA	20460
Ibbotson	Brett	SENES Consulting Ltd.	52 W.Beaver Creek Rd, #4	Richmond Hill	ON	Canada	L4B 1L9
Ieyama	Kazuo	Hitachi Zosen Kansetsu	3-40 Sakurajima 1-Chome	Konohana-ku	Osaka	Japan	
Infurna	Robert	Exxon Biomedical Sciences Inc.		East Millstone	NJ	USA	08875
Inoue	Saburo	8-34 Tojo-cho		Tennoji-Ku	Osaka	Japan	543
Ivens	Ingeborg	Bayer AG, Toxikologie		D-56 Wuppertal		West Germany	
Jansson	Bo	National Env. Protection Brd.	Box 1302	Solna		Sweden	S-171 25
Jappinen	Paavo	Ritikanranta 20		SF-55120 Imatra		Finland	
Jarman	Walter	Long Marine Lab	100 Shaffer Rd.	Santa Cruz	CA	USA	95010
Jirvall	Nils	Villagatan 1		S-11432 Stockholm		Sweden	
Johansson	Niklas	Nat'l Env. Protection Board	Box 1302	S-171 25 Solna		Sweden	
Johnson	Eric	NIEHS, DBRA, Epidemiology Br.		Research Triangle Park	NC	USA	27709
Johnson	Doug	9936 - 67th Avenue		Edmonton	AB	Canada	T6E 0P5
Johnston	Paul	Biology, Queen Mary College	Mile End Road	London		England	E14NS
Jones	Ivonne	286 Willa Road		Mississauga	ON	Canada	L5G 2G8
Jones	Kay	Roy F. Weston Inc.	201 Elliott Ave.	Seattle	WA	USA	98119
Jones	D.H.	Dept. of Vet. Phy. & Pharm.	Texas A&M University	College Station	TX	USA	77843-4466
Jullien	Dominique	Cerchar BP #2		Verneuil-en-Halatte		France	60550
Kagel	R.						
Kahr	Gerhard	Brehmstrabe 16		Vienna		Austria	1110
Kaisko	Jouko	Ruskontie 4 D		SF-92120 Raahe		Finland	

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Karch	Nathan	1701 K St. NW	Suite 1000	Washington	DC	USA	20006
Karlsson	Per Lennart	AF-IPk AB	Box 47086	Gothenburg		Sweden	S-40258
Kasunic	Claudine	980 Atlantic Ave.	Suite 100	Alameda	CA	USA	94501
Keenan	Russell	Chemrisk-A Mclaren Company	1685 Congress Street	Portland	ME	USA	04102
Keith	Larry	Radian Corporation	P.O. Box 201088	Austin	TX	USA	78720-1088
Kemeny	Thomas	133 Peachtree St. N.E.	P.O. Box 105605	Atlanta	GA	USA	30348 5605
Khandelwal	Bimal	4310 D'Evereux Drive		Pensacola	FL	USA	32504
Kieley	Kathleen	15TH Floor, Queen Square	45 Alderig Dr.	Dartmouth	Nova Scotia	Canada	B2Y 2N6
Kien	Jean-Marc	Union Camp Corporation	Rt 58	Franklin	VA	USA	23851
Kiiskila	Erkki	A. Ahlstrom Corp.	P.O. Box 18	SF-48601 Karhula		Finland	SF-48601
Kilgroe	J.D.	US EPA, Alexander Dr. HWY 54	MD-65 Room G 323 B	Research Triangle Park	NC	USA	27711
Kimura	Shoichi	Dept. of Chemical Engineering	Oregon State University	Corvallis	Oregon	USA	97331
Kirschmer	Paul	Lis Wallneyer Str. 6		4300 Essen 1		West Germany	
Kitunen	Veikko	Mannerheiminitie 172		Helsinki	SF	Finland	00300
Kjeller	Lars-Owe	Inst. of Env. Chemistry	University of Umea	Umea	S-90187	Sweden	
Klicius	Raymond	Environment Canada	351 St. Joseph Blvd.	Hull	Quebec	Canada	J8Y 3Z5
Klopffer	Walter	AM Romerhof 35		Frankfurt AM Main		West Germany	D-6000
Knies	Horst	BASF Aktiengesellschaft	Abt. Dus-M 940	D-6700 Ludwigshafen/Rhein		West Germany	
Knutzen	Jon	NIVA	P.B. 33 Blindern	0313 Oslo 3		Norway	
Koester	Carolyn	Indiana University	Geology 541	Bloomington	IN	USA	47405
Koistinen	Jaana	Tellervonkatu 8		Jyvaskyla		Finland	40100
Kojima	Kohei	1-17-12 Kugahara, Otaku		Tokyo		Japan	146

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Korte	Maria	Inst. Toxikologie, Garystr. 5		Berlin 33		West Germany	1000
Koznareck	Mark	2000 Market Street		Philadelphia	PA	USA	19103
Krasny	Edward	1400 Malcomb Bridge Road		Roswell	GA	USA	30076
Krishnan	Radha	PEI Associates Inc.	11499 Chester Road	Cincinnati	OH	USA	45246
Kristiansen	Tor Yngve	Norsk Hydro a.s		N 3900 - Porsgrunn		Norway	
Kroesa	Renate	2623 West 4th Avenue		Vancouver	BC	Canada	V6K 1P8
Krolik	Stefan	VG Instruments, Canada	5929 Transcanadienne	St.-Laurent	Quebec	Canada	H4T 1A1
Kruger	N.	Freie Universitat Berlin	Garystr. 5	D-1000 Berlin 33		West Germany	
Kruse	Hermann	Eichendorff Str. 47		2313 Raisdorf	S-H	West Germany	2313
Krutz	Michael	Letteweg 62		Iserlohn 9		West Germany	D-5860
Ku	Robert	3401 Hillview		Palo Alto	CA	USA	94303
Kubiak	Ken	P.O. Box 344		Niagara Falls	NY	USA	14302
Kuernheim	Arne Lund	SI, Box 124 Blindern		N-0314 Oslo 3		Norway	
Kulo	Juhani	Olof Palmes Gata 11		Stockholm		Sweden	
Kuroki	Hiroaki	22-1 Tamagawa-cho	Minami-ku	Fukuoka	815	Japan	
Kutz	Frederick	4967 Moonfall Way		Columbia	MD	USA	21044
Ladwig	Gerald	106-2124 Ghent Avenue		Burlington	ON	Canada	L7R 3K2
LaFleur	Larry	720 SW Fourth Street		Corvallis	OR	USA	97333
Lakshman	Raj	Lipid Research	V.A. Medical Center	Washington	DC	USA	20422
Lamparski	L.						
Landvoigt	Werner	Postfach 296		4021 Linz		West Germany	
Lang	Dagmar	Eiebhofstr 24		Kiel	Schl.-tr	West Germany	2300

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Le	Dai Cao	SUNY HSCS College of Medicine	88 Aldrich Ave.	Binghamton	NY	USA	13903
Leach	John	BC Research	3650 Wesbrook Mall	Vancouver	BC	Canada	V6S 2L2
Lebel	Guy	EHC, Tunney's Pasture		Ottawa	ON	Canada	K1A 0L2
Liem	Antoine Keng Djien	RIVM	Bies 4	Huizen	NH	The Netherlands	1273 CH
Lindner	Gloria	CA Air Resources Board	826 Eureka Ave	Davis	CA	USA	95616
Lindsey	Alan	2533 Broad Leaf Cove		Germantown	Indiana	USA	
Lindstrom	Gunilla	Ins. of Environmental Chem.	University of Umea	Umea	S-90187	Sweden	
Lipsky	David	Dynamic Corporation	2 Executive Drive	Fort Lee	NJ	USA	07024
Lorenzen	Angela	Hospital for Sick Children	555 University Ave	Toronto	ON	Canada	M5G 1X8
Lovett	Annette	VG Instruments Canada Inc.	190 Colonnade	Nepean	ON	Canada	K2E 7J5
Luksemburg	William	2544 Industrial Blvd.		West Sacramento	CA	USA	95691
Luotamo	Marita	Institute of Occupational	Health	Helsinki		Finland	00370
Lusis	Maris	Air Resources Branch	880 Bay St., 4th Floor	Toronto	ON	Canada	M5S 1Z8
Luthe	Corinne	Pulp and Paper Research	570 St. John's Blvd.	Pointe Claire	Quebec	Canada	H9R 3J9
Lutrick	David	3230 Forest Hills		Redding	CA	USA	96002
Macauley	Richard	Michigan Agent Orange Comm.	963 Daisy Lane	East Lansing	MI	USA	48823
Maddocks	Derrick	NFLD. Dept. of Env.	P.O. Box 8700	St. John's	Nfld.	Canada	A1B 4J6
Magagni	Aulo	A.M.N.I.U.P.	Via Savelli, 9	Padova		Italy	35129
Mageau	Camille	200 Kent Street		Ottawa	ON	Canada	K1A 0E6
Mah	F.T.S.	Environment Canada	502-1001 West Pender Street	Vancouver	BC	Canada	V6E 2M9
Maisel	Bruce	ENSR	35 Nagog Park	Acton	MA	USA	01720

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Marcassa	Maurizio	A.M.N.I.U.P.	Via Savelli, 9	Padova		Italy	35129
Marklund	Stellan	Inst. of Env. Chemistry	University of Umea	Umea	S-90187	Sweden	
Marlow	David	NIOSH	4676 Columbia Parkway	Cincinnati	OH	USA	45226
Masuda	Yoshito	22-1 Tamagawa-cho	Minami-ku	Fukuoka	815	Japan	
Mathar	Wolfgang	Federal Health Office	P.O. Box 330013	Berlin 33		West Germany	D-1000
McAllister	David	P.O. Box 2200		West Lafayette	IN	USA	47906
McCarty	Harry	Viar & Company	209 Madison St.	Alexandria	VA	USA	22314
McCubbin	Neil	N. McCubbin Consultants, Inc.	140 Fishers Point	Foster	Quebec	Canada	J0E 1R0
McCurvin	Donna	Beak Analytical Services	14 Abacus Rd.	Brampton	ON	Canada	L6T 5B7
McKee	Paul	Beak Consultants Ltd.	14 Avacus Road	Brampton	ON	Canada	L6T 5B7
McKeown	James	NCASI	Tufts University	Medford	ME	USA	02155
McKibbins	Sam	Champion Int'l Corp.	West Nyack Road	West Nyack	NY	USA	10994
McKinley	Jim	BC Research	3650 Wesbrook Mall	Vancouver	BC	Canada	V6S 2L2
McLachlan	Michael	University of Bayreuth	Ecological Chemistry	8580 Bayreuth		West Germany	
McNealey	J. Jeffrey	Porter,Wright,Morris & Arthur	41 S. High, 30th Floor	Columbus	OH	USA	43215
McNicoll	Bernard	B.P. 1010		Windsor	PQ	Canada	J1S 2L9
Meier	Hans	BC Research	3650 Wesbrook Mall	Vancouver	BC	Canada	V6S 2L2
Meijer	Dirk	TAUW Infra Cousult Deventer	Maria Stuartstraat 29	Apeldoorn	gld	The Netherlands	7315 UA
Melin	Agneta	EPB Sweden	Box 1302	171 25 Solna		Sweden	
Merriman	John	30 Fairmount Avenue		Hamilton	ON	Canada	L8P 3Z5
Messier	Francois	850 Boulevard Vanier		St.Vincent de Paul	PQ	Canada	M7C 2M7
Metcalfe	Chris	Env. & Resource Studies Prog.	Trent University	Peterborough	ON	Canada	K9J 7B8

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Molde	Christina	Villagatan 1		S-11432 Stockholm		Sweden	
Moncur	John	Kratos Analytical	Barton Dock Road	Manchester	Urmston	England	M3I 2LD
Morey	Lorne	240 Hart St.		Gatineau	Quebec	Canada	J8P 4J8
Morrison	Dave	Government Of BC	810 Blanshard Street	Victoria	BC	Canada	V8V 1X5
Moser	Fredrika	N.J. DEP, Div. of Sci. & Res.	CN 409	Trenton		USA	08625
Moss	Wendy	394 Camelot Court		Oshawa	ON	Canada	L1G 6P7
Muller	Eric	Environment Canada	1021 Barwell Ave.	Ottawa	ON	Canada	K2B 8H4
Mulvihill	Michael	Cdn. Wildlife Service	Nat'l Wildlife Research Centre	Ottawa	Ontario	Canada	K1A 0H3
Murarka	Suresh	Abitibi-Price Inc.	2240 Speakman Drive	Sheridan Park Mississauga	ON	Canada	L5K 1A9
Myreen	Bertel	Jaakko Poyry Oy	PB 16	00441 Helsinki		Finland	
Naf	Carina	University of Stockholm	Department of Zoology	Stockholm		Sweden	106 91
Nagao	Tetsuji	Institutit Toxikologie		1000 Berlin 33, Garysh 5		West Germany	
Nagayama	Junya	Kyushu Univ. Sch. of Health	ences, 1-1-3, Mairlashi	Higashi-ku	Futeroke	Japan	812
Naikwadi	Krishnat	University of Waterloo		Waterloo	Ontario	Canada	N2L 3G1
Nakagawa	Izo	Takuma Co. Ltd.	3-23 Dojima-Hama, 1-Chome	Kitaku	Osaka	Japan	530
Nakahama	Takayuki	2-2-1, Miyama		Funabashi-shi	Chiba	Japan	274
Nakai	Jamie	Dept. of Chem. & Biochemistry	University of Guelph	Guelph	Ontario	Canada	N1G 2W1
Nakazato	Kunihiro	Takuma Co. Ltd.	3-23 Dojima-Hama, 1-Chome	Kitaku	Osaka	Japan	530
Nam	K.S.	5450 S. Sinclair Road	Route #3	Columbia	MO	USA	65203
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Nelson	Peter	Pulp & Paper Fed. of Australia	37 Walpole St.	KEW	Vic.	Australia	3101
Nestrick	T.						
Newton	Wayne	4282 Genesee Avenue	# 101	San Diego	CA	USA	92117
Nguyen Van	Tri	National Technical Unversity o	of Hanoi	Hanoi		Vietnam	
Nichols	Alan	Radian Corporation	8501 Mo-Pac Blvd., Box 201088	Austin	TX	USA	78720-1088
Nicolle	Francois	CP Forest Prods. Ltd.	1155 Metcalfe Street	Montreal	Quebec	Canada	H3B 2X1
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Nilsson	Bengt	Ruben Rausings Gata		S-221 86 Lund		Sweden	S-221 86
Nisse-Ramond	Catherine	Institut de Medecivedo Irvail	1 Place de Verdou	Lille		France	59045
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Noren	Koidu	Karolinska Institutet		Stockholm		Sweden	S-10401
Norlsraathen	Karl	P.O. Box 8100 Dep.		Oslo 1		Norway	N0032
Norstrom	Ross	Environment Canada	1481 Forest Valley Dr.	Gloucester	Ontario	Canada	K1C 5P5
Nottrodt	Adolf	Goepfert, Reimer & Partner	Bramfelderstr. 70	Hamburg 2000		West Germany	
Novickova	Kira	Ugreshskaya, 31		Moscow		USSR	109088
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Okey	Allan	Dept. Pharm., Med. Sci. Bldg.	Univ. of Toronto	Toronto	ON	Canada	M5S 1A8
Olie	Kees	Nieuwe Achtergracht 166		Amsterdam		The Netherlands	1018 WV
Olsen	Larry	P.O. Box 6000		Prince George	BC	Canada	
Ordsmith	Nick	VG Analytical	Floats Road,	Wythenshawe	Manchester	England	
Orita	Norihiko	Mitsubishi Heavy Ind. Ltd.		12 Nishiki-Cho, Naka ku	Yokohama	Japan	231
Owens	James	6100 Center Hill Road		Cincinnati	Ohio	USA	
Ozvacic	Vlado	880 Bay Street	4th Floor	Toronto	ON	Canada	M5S 1Z8
O'Keefe	Patrick	Wadsworth Centre for NY State	Health Dept.	Albany	NY	USA	12201
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Pamidi	Kris	Champion International Corp.		West Nyack	NY	USA	10994
Papke	Olaf	ERGO Forschungsgesellschaft	Luruper Chaussee 145	D-2000 Hamburg 50		West Germany	D-2000
Park	John	ASL Laboratories	1650 Pandora St.	Vancouver	BC	Canada	V5L 1L6
Patterson	D.G.	1600 Clifton Road	B17C/RM 1814 (F17)	Atlanta	GA	USA	30333
Pauliny	Ingeborg	Brehmstrabe 16		Vienna		Austria	1110
Pearson	Ron	880 Bay Street		Toronto	Ontario	Canada	
Pendreigh	Kevin	Canadian Waste Management	201-2034 West 12th	Vancouver	BC	Canada	V6T 2G2
Persinger	Harvey	Wayerhaeuser Co - Wtczfzz		Tacoma	WA	USA	98477
Peterson	Gary	439 University Avenue	10th Floor	Toronto	ON	Canada	M5G 1Y8
Peterson	Robert	2544 Industrial Blvd.		West Sacramento	CA	USA	95691
Pettit	Karl	Rechem Environmental Research	Charleston Rd., Hardley, Hythe	Southampton		England	S04 6ZA
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Pocratsky	Linda	312 Directors Drive		Knoxville	TN	USA	37923
Poggi	Daniel	Noranda Technology Centre	240 Hymus	Pointe Claire	Quebec	Canada	H9R 1G5
Pollitt	Frances	Dept. of Health & Social Sec.	North Fylde Central Office	Norcross	Blackpool	England	FY5 3TA
Posen	Gary						
Poulin	Ted	Kamyr Canada Inc.		Ridge Center Glens Falls	NY	USA	12804
Prahacs	Steven	Paprican	570 St. John's Blvd.	Pointe Claire	Quebec	Canada	H9R 3J9
Pries	C.	TNO Primate Center	151 Lange Kleiweg, Box 5815	2280 HV Rijswijk		The Netherlands	
Pritzl	Gunnar	Morkhoj Bygade 26H		Soborg		Denmark	2860
Prokipcak	Becky	Clin. Pharm., Sick Kids Hosp.	555 University	Toronto	ON	Canada	M5G 1X8
Prough	Bob	Kamyr Canada Inc.		Ridge Center Glens Falls	NY	USA	12804
Pruell	Richard	160 Narragansett Avenue		Jamestown	RI	USA	02835
Pryke	Douglas	1020 Logan Avenue		Toronto	ON	Canada	M4K 3E5
Pustovit	Nickoly	Uljanovyh, 65		Ufa		USSR	450029
Putnam	Dave	Texaco Canada (OPA)	1210 Sheppard Ave. E.	Willowdale	Ontario	Canada	M2K 2S8
Quill	Terry	Beveridge & Diamond, P.C.	1350 I At. NW, Ste.700	Washington	DC	USA	
Rackwitz	Dieter	Bruecherhofstr. 69		D-4600 Dortmund 30		West Germany	D-4600
Raisanen	Seppo	Instrument Centre for Chem.	Meritullink 1A	SF-00170 Helsinki		Finland	
Ramamoorthy	Sub	Alberta Environment	9820-106 Street, 6th Floor	Edmonton	ALTA	Canada	T5K 2J6
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Reed	Simon	Tudor Road		Altringham	Cheshire	England	WA14 5RZ
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Reiner	Bacher	University of Ulm, Oberer	Eselsberg	Ulm		West Germany	D-7900
Reisinger	Knut	Julich GmbH	5170 Julich	Norkrhein-Westfalen		West Germany	
Renberg	Lars	Alby Systems	P.O. Box 16100	Stockholm		Sweden	S-10322
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Rippen	Gerd	Battelle Europe		Frankfurt/Main		West Germany	6000
Riss	Alarich	Federal Env. Agency	Biberstr. 11	Wien		Austria	
Roberts	Gladwin	P.O. Box 9848		Canberra City	ACT	Australia	2601
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Rohleder	Friedemann	Friedr. Hebbel Str. 13		D-4712 Werne		West Germany	
Rolff	Carl	University of Stockholm	Department of Zoology	Stockholm		Sweden	106 91
Rolle	Robert	One Lafayette Road West		Princenton	N.J.	USA	08540
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Rose	Gerard	Nalco Chemical Company	One Nalco Center	Naperville	IL	USA	60566-1024
Rosenberg	Christina	Institute Occupational Health	Topeliuksenk, 41A	Topeliuksenk	Helsinki	Finland	SF-0025
Rotard	Wolfgang	Corrensplatz 1		D 1000 Berlin 33		West Germany	
Roth	Rolf	Dekonta GmbH	Lothar Str. 26	Mainz/Rhine		West Germany	D-6500
Rouisse	Lorraine	A.I.F.O.	1200 av. Germain-des-Pres	Bur. 102, Sainte-Foy,	Quebec	Canada	H1V 3M7
Rowe	Albert		197 Village Hill Rd.	W. Willington	CT	USA	06279
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Salkinoja-Salonen	Mirja	University of Helsinki		Helsinki	Mannerheimint 172	Finland	SF03300
Salmons	Robert	Box 7500		Quesnel	BC	Canada	V2J 3J6
Sarna	Leonard	University of Manitoba	Department of Soil Science	Winnepeg	Manitoba	Canada	R3T 2N2
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Schellenberg	David	MOE-Laboratory Services Br.	125 Resources Rd.	Rexdale	Ontario	Canada	M9W 5L1
Scherrer	Marie Claude	Rhone Poulenc	24 Avenue Jean Jaures	Decines		France	69151
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Schlesing	Hendrick	P.O. Box 1630		Mainz		West Germany	6500
Schlumpf	Erich	P.O. Box R-1055.322		CH-4002 Basel		Switzerland	
Schmid	Peter	Schorenstrasse 16		Schwerzenbach		Switzerland	CH-8603
Schneider	Uwe	Dept. of Chem. & Biochemistry	University of Guelph	Guelph	Ontario	Canada	N1G 2W1
Schoner	Peter	Hessische Industriemull GmbH		Wiesbaden	Hessen	West Germany	6200
Schulz	Volker	BASF AG, Dept. of Toxicology		D-6700 Ludwigshafen/Rhein		West Germany	
Schulz	Carl	9300 Lee Highway		Fairfax	VA	USA	
Seeker	William	EER Corp.	18 Mason	Irvine	CA	USA	92718
Selenka	Fidelis	Roomersheide 73		Bochum	NRW	West Germany	D-4630
Sergeant	David	P.O. Box 5050		Burlington	ON	Canada	L7R 4A6
Shariff	Azim	Domtar Inc.	P.O. Box 300	Senneville	Quebec	Canada	H9X 3L7
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Short	Jeffrey	Headquarters, U.S. Air Force	Env. Operations Branch	Bolling AFB,	DC	USA	20332-5000
Shortyk	Lorne	Crestbrook Forest Industries	P.O. Box 4600	Cranbrook	BC	USA	V1C 4J7
Silbergeld	E.K.	1616 P Street N.W.		Washington	DC	USA	20036
Simerly	Dana	312 Directors Drive		Knoxville	TN	USA	37923
Simon	Mary	Cdn. Wildlife Service	Nat'l Wildlife Research Centre	Ottawa	Ontario	Canada	K1A 0H3
Sjogren	Johnny	AF-IPk AB	Box 47086	Gothenburg		Sweden	S-40258
Skjold-Jorgensen	Steen	Novo Alle		DK-2880 Bagsvaerd		Denmark	2880
Skramstad	Jan	Dept. of Chem., Univ. of Oslo	P.O. Box 1033 Blindern	N-0315 Oslo 3		Norway	
Smerko	Robert	The Chlorine Institute	2001 L Street, NW Suite 506	Washington,	DC	USA	20036
Smith	Linda	43 Marsham Street	Romney House, Room A334	London		England	SW1p 3PY
Smith	James	7A Grace's Drive		Coatsville	PA	USA	19320
Smith	Allan	Health Risk Associates	2030 Addison St. Suite 510	Berkeley	CA	USA	94704
Smith	Andrew	40 Halifax St.		Jamaica Plain	MA	USA	02130
Solch	Joe	Wright State University	8370 Heilman Drive	New Carlisle	Ohio	USA	45344
Spear	P.A.	P.O. Box 22		Chelsea	Quebec	Canada	J0X 1N0
Spira	Paul	Noranda Technology Centre	240 Hymus Boulevard	Pointe Claire	Quebec	Canada	H9R 1G5
Spitsbergen	Jan	Department Avianand	Aquatic Medicine	Cornell University, Ithaca	NY	USA	14853
Stahlmann	Ralf	Inst. Toxikologie, Garystr. 5		Berlin 33		West Germany	1000
Stanley	John	425 Volker Blvd.		Kansas City	MO	USA	64110

DIOXIN '89 DELEGATE LIST
SEPTEMBER 17 - 22, 1989

Name		Address					
Startin	James	Ministry of Agricluture & Food	Science Lab, Haldin House	Queen St.	Norwich	England	NR2 4SX
Steer	Peter	Environment Ontario	880 Bay Street, 4th Floor	Toronto	ON	Canada	M5S 1Z8
Stenhouse	Ian	Diverse Analyticals Ltd.	197 Spring Road	Southampton	Hamps.	England	SO2 7NY
Stephens	Robert	2151 Berkeley Way,	Room 234	Berkeley	CA	USA	94704
Stewart	Shelley	4649 Sunnyside Avenue North		Seatle	WA	USA	98103
Stewart	John	P.O. Box 141		Axis	Alabama	USA	36505
Stieglitz	Ludwig	Nuclear Reaserch Center	P.O. Box 36 40	7500 Karlsruhe 1		West Germany	
Stinchfield	Alan	James River Corporation	1915 Marathon Ave.	Neenah	WI	USA	54956
Storr-Hansen	Eva	Ministry of the Environment	Morkhoj Bygade 26 H	Soborg		Denmark	DK2860
Stott	George	27 Perth Street		Edinburgh		Scotland	EH3 5RB
Strandell	Michael	SNV Box 1302		S-171 25 Solna		Sweden	
Stromberg	Birgitta	Studsvik Energy		S-61182 Nykoping		Sweden	
Stromberg	Lars	AF - IPK AB	P.O. Box 8309	Stockholm		Sweden	S-10720
Suda	Shoichi	NKK Co. Ltd.	1-1 Minamiwaterida-machi	Kawasaki-shi	Kanagawa	Japan	210
Sueper	Charles	Twin City Testing	662 Cromwell Ave.	St. Paul	MN	USA	55114
Sullivan	Michael	2646 Palma Drive	Suite 230	Ventura	CA	USA	93003
Suter	Sharon	Ministry of the Environment	40 St. Clair Ave. W., 5th Flr.	Toronto	Ontario	Canada	M4V 1P5
Svensson	Thure	National Chem. Inspectorate	Institite of Zoophysiology	P.O. Box 560, 751 22 Uppsala		Sweden	
Swanson	Stephen	Argonne National Laboratory	4057 Glendenning	Downens Grove	Ill	USA	60515
Sweeney	Marie Haring	N.I.O.S.H.	4676 Columbia Pkwy., R-15	Cincinnati	OH	USA	45226
Szakolcai	Akos	MOE-Air Resources Branch	880 Bay St. 4th Floor	Toronto	ON	Canada	M5S 1Z8
Tabor	Stephen	Westvaco	299 Park Ave.	New York	NY	USA	10171
Taguchi	Vincent	MOE-Laboratory Services Br.	125 Resources Road	Rexdale	Ontario	Canada	M9W 5L1

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Takayama	Koji	Setsunan University	Faculty of Pharmaceutical Sci.	45-1 Nagaotoge-Cho, Hirakata	Osaka	Japan	
Takeda	Nobuo	Dept. of Env. & Sanitary Eng.	Kyoto University	Sakyo-ku, Kyoto		Japan	606
Talka	Esko	Finish Pulp & Paper Institute	Box136	Helsinki		Finland	SF-00101
Tamagawa	Shigeo	9-29-905 Miyanomae		Hiratsuka	Kanagawa	Japan	254
Tame	Chikashi	Ebara Corp.	1-6-27 Kohnan, Minato-ku	Tokyo		Japan	108
Tang	Lai Wa	9420 Cote de Liesse Rd		Lachine	Quebec	Canada	H8T 1A1
Tarhanen	Juhani	University of Kuopio		SF - 70211 KUOPIO		Finland	
Tashiro	Colleen	125 Resources Road		Rexdale	ON	Canada	M9W 5L1
Tatry	Veronique	Air Quality Agency (AQA)	Touf Gan Cedex 13	Paris La Defense 2		France	
Tay	Seika	Abitibi-Price Inc.	Sheridan Park	Mississauga	ON	Canada	L5K 1A9
Taylor	Roy	Atomic Energy of Canada		Pinawa	Manitoba	Canada	R0E 1L0
Teichmann	Helmuth	Hallein Papier AG	P.O. Box 62	A 5400 Hallein		Austria	
Tejima	Hajime	3-23, Dojima-Hama	1-Chome, Kitaku	Osaka		Japan	530
Tessier	Paul	Domtar Pulp & Paper Products	P.O. Box 7211	Montreal	Quebec	Canada	H3C 3M2
Thakore	Arvind	Fletcher Challenge Canada	Crofton Pulp & Paper	Crofton	BC	Canada	V0R 1R0
Theelen	Rob	P.O. Box 1		Bilthoven		The Netherlands	3720 BA
Thielen	Daniel	Occidental Chemical	2801 Long Rd.	Grand Island	NY	USA	14072
Thies	Jurgen	Laverkusen - Bayerwerk		D-5090 Leverkusen		West Germany	D-5090
Thomas	Terry	1825 K. Street, N.W.	Suite 322	Washington	DC	USA	20006
Thompson	Patsy	1141 Route de L'Eglise		St. Foy	PQ	Canada	G1V 4H5
Thompson	Tom	MOE-Laboratory Services Br.	125 Resources Rd.	Rexdale	Ontario	Canada	M9W 5L1
Thomson	Rod	Zenon Environmental Inc.	845 Harrington Court	Burlington	On	Canada	L7N 3P3
Thornburg	Kelly	425 Volker Blvd.		Kansas City	MO	USA	64110
Thornton	Nada	385 Melrose Avenue		Toronto	ON	Canada	M5M 1Z6

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Name		Address					
Thut	Rudolph	Weyerhaeuser Co., Tech. Cntr.	32901 Weyerhaeuser Way S.	Federal Way	WA	USA	98003
Tiernan	Thomas	Wright State University	175 Brehm Lab	Dayton	Ohio	USA	45435
Timms	Christopher	Sulzbacher Street 40		Swalbach		West Germany	D-6231
Tondeur	Yves	801-10 Capitola Drive		Research Triangle Park	NC	USA	27709
Tong	Huayi	Dept. of Chemistry	University of Nebraska	Lincoln	NE	USA	68588-0304
Tornaeus	Jarkko	Inst. of Occupatonal Health	TTL, c/o H.Y. Kemia	Vuorikatu 20, Helsinki		Finland	SF-00100
Tosine	Helle	880 Bay Street	4th Floor	Toronto	ON	Canada	
Travis	Curtis	Oak Ridge Laboratory		Oak Ridge	TN	USA	378-316109
Trawick	Steve	UPIU	P.O. Box 1475	Nashville	TN	USA	37202
Turner	Edward	1 St. Clair Ave. E.	5th Floor	Toronto	Ontario	Canada	M4V 1K6
Tyler	Rick	No Address Available					
Tysklind	Mats	Inst. of Env. Chemistry	University of Umea	Umea	S-90187	Sweden	
Vaheri	Marja	Enso-Gutzeit Oy Research Ctr.		55800 Imatra		Finland	
Valerio	Francisco	Aracruz Celulose S/A	P.O. Box 1011	Aracruz	ES	Brazil	29190
Valley	Richard	Michigan Pulp & Paper Corp.	5243 West Q Ave.	Kalamazoo	MI	USA	49009
Van den Berg	Martin	University of Utrecht	Dept. of Veterinary Toxicology	P.O. Box 80176, Utrecht		The Netherlands	3508 TA
Van Donkelaar	Arie	NLK & Associates	501-5562 Balsam St.	Vancouver	BC	Canada	V6M 4B7
Van Wijnen	Joop	Public Health Dept. Mun.	Health S.	P.O. Box 20244, Amsterdam		The Netherlands	1000 HE
VanNess	Garrett	Wright State University	3640 Colonel Glenn Highway	Dayton	Ohio	USA	45435
Vega Canovas	Rogelio	CPFP Research Ltd.	120 Pointe Claire Ave.	Pointe Claire	Quebec	Canada	H9S 4M5
Vera	Gustavo	Laja Pulp and Paper Mill	Laja	108 Laja		Chile	
Vikelsoe	Jorgen	Morkhoj Bygade 26		Soborg		Denmark	2860
Villard	Serge	125 Resources Road		Weston	ON	Canada	M9W 5L1

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Villinger	Johannes	Leopoldstrasse 55 A		A-6020 Innsbruck	Tirol	Austria	6020
Vilppunen	Pekka	University of Oulu		Oulu		Finland	90570 - SF
Vincent	Frank	James River Corporation	1915 Marathon Ave	Neenah	WI	USA	54956
Waddell	David	Wellington Laboratories	398 Laird Rd.	Guelph	ON	Canada	N1G 3X7
Waern	Fredrik	P.O. Box 60 208		S-104 01 Stockholm		Sweden	
Wagel	Daniel	Wright State University	175 Brehm Lab	Dayton	Ohio	USA	45435
Wall	Kevin	VG Instruments	Crewe Road	Manchester		England	
Wallace	Warren	250 E. Superior	Wesley 296	Chicago	IL	USA	60611
Waller	John	Diachem Industries Ltd.	5705 Greenland Dr.	Delta	BC	Canada	V4L 2E3
Walsh	Pierre	2360 Chemin Ste-Foy	2E Etage	Sainte-Foy	Quebec	Canada	G1V 4H2
Walters	Richard	Dept. of Civil Engineering	University of Maryland	College Park	MD	USA	20742
Warman	Kristofer			Nyroeping	S	Sweden	61182
Warnoe	Kirsten	Miljostyrelsen	Strandgade 29	Copenhagen		Denmark	DK-1401
Watanuki	Reiko	Science Writer	Nataacho 2-12-11	Musashino	Tokyo	Japan	180
Waters	Jim	New Zealand Dept. of Health	P.O. Box 5013	Wellington		New Zealand	
Wearing	Jim	3800 Wesbrook Mall		Vancouver	British Columbia	Canada	V6S 2L9
Webb	Leslie	Pira, Paper & Board Division	Randalls Road	Leatherhead	Surrey	England	KT22 7RU
Webster	John	Dupont Chem. & Pigments Dept.	Chestnut Run Pl. Box 80709	Wilmington	DE	USA	19880 0709
Webster	Barrie	Dept. of Soil Science	University of Manitoba	Winnipeg	MB	Canada	R3T 2N2
Webster	Tom	Queens College		Flushing	NY	USA	11367
Wendlick	Joseph	851 S. Marine Hills Way		Federal Way	WA	USA	98003
Weston	Alan	Occidental Chemical Corp.	P.O. Box 728	Niagara Falls	NY	USA	14302
Whittemore	Ray	Tufts University		Medford	MA	USA	01890
Wiesmuller	T.	Auf der Morgenstelle 18		Tubingen 1		West Germany	D-7400

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Name		Address					
Wilding	Stephanie	839 Bestgate Road		Annapolis	MD	USA	21401
Wile	I.						
Wiley	Eric	Kamyr Canada Inc.		Ridge Center Glens Falls	NY	USA	12804
Wilkinson	John	Vulcan Chemicals	1225-19th St. NW	Washington	DC	USA	20036
Wollwage	Paul	Weyerhaeuser Co	WTC 2G25	Tacoma	WA	USA	98477
Won	Henry	100 Gamelin Blvd.		Ottawa	Ontario	Canada	K1A 0H3
Woznow	Ron	700 W. Georgia St.	P.O. Box 10058 Pacific Ctr.	Vancouver	BC	Canada	V7Y 1J7
Yamamoto	Takeshi	Osaka City Inst. Public Health	8-34 Tojo-Cho, Tennoji-Ku	Osaka		Japan	
Yanders	Armon	ETSRC 5450 S. Sinclair Road		Columbia	MO	USA	65203
Yang	Kathy	International Paper	Long Meadow Rd.	Tuxedo	NY	USA	10987
Yao	C.	c/o Stephen H. Safe		College Station	TX	USA	77843-4466
Yemc	Bernard	Novo Labs Inc.	33 Turner Road	Danbury	CT	USA	06810-5101
Yoshio	Akimoto	2-2-1, Miyama		Funabashi-shi	Chiba	Japan	274
Young	Brian	Abitibi Price	Sheridan Park	Mississauga	Ontario	Canada	L5K 1A9
Yrjanheikki	Erkki	WHO Regional Office for Europe	8 Scherfigsvej	Copenhagen		Denmark	DK-2100
Zagar	John	Weyerhaeuser Canada Ltd.	P.O. Box 800	Kamloops	BC	Canada	V2C 5M7
Zimmerman	Michael	ICF Technology	2700 Chandler, Bldg. C	Las Vegas	NV	USA	89120

GUIDELINES TO DELEGATES REGARDING THE COPY CENTRE - Casson Room

The Copy Centre is open from 8:30 a.m. to 6:30 p.m. from Monday, September 18 until Friday, September 22. The Centre will close earlier on Wednesday and Friday.

Availability

- The copy centre will have available copies of those presentations made on that particular day and those of preceeding days.
- Copies of poster presentations are available throughout the week.
- Each morning, a list of available oral presentations will be posted. At the end of each session or full day of sessions, conference delegates can submit a request for copies along with $1.00 per copy. The copies will be available for pickup at a specified time.

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DIOXIN '89

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DIOXIN '89 POSTER PRIZE

BALLOT

Please choose 1st/2nd Best Posters In Any of the Research Areas Listed Below. Please Consider the Following When Making Your choices:

- Content and Scientific merit
- Organization of ideas
- Visual Impact/Quality of Presentation

		1st	2nd
1.	Analytical Methods, QA/QC	____	____
2.	Properties, Transport/Fate	____	____
3.	Sources/Levels	____	____
4.	Risk Assessment and Regulation	____	____
5.	Combustion/Incineration, Formation/Destruction	____	____
6.	Human/Animal Levels and Effects, Mechanism of Action	____	____

To Vote:
- Write poster numbers of your choice in the appropriate spaces above
- Return ballots to ballot box at Dioxin '89 registration desk
- Deadline for ballot return Thursday, Sept. 21 @ 1800h
- Awards will be announced at closing ceremonies Friday, Sept. 22nd.

TOXIC CHEMICAL SPECIALISTS

ECO LOGIC

ECO LABORATORIES INC.

143 Dennis St., Rockwood, Ontario, Canada, N0B 2K0 (519) 856-9591
2395 Huron Parkway, Ann Arbor, Michigan, U.S.A. 48104 (313) 973-2780

ECO LOGIC

PROVIDING
INDUSTRY AND GOVERNMENT
WITH COMPREHENSIVE SOLUTIONS TO
TOXIC CHEMICAL PROBLEMS

ELI Eco Laboratories, Inc.
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Rockwood: (519) 856-9591 Toronto Line: (416) 450-7691
FAX: (519) 856-9235

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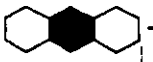


THE TOXIC CHEMICAL SPECIALISTS

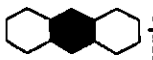
Eco Logic provides corporate and government clients with authoritative answers to questions about toxic substances.

Clients gain access to expertise and state–of–the–art facilities in all fields related to environmental science, human toxicology, chemical analysis, and hazardous waste destruction technologies. This helps clients to understand and solve their toxic chemical problems.

Eco Logic professionals emphasize full quality assurance of all aspects of every project. Clients receive useful and defensible advice based wholly on sound science. Eco Logic's "one–stop" approach leads to time and money savings for clients.

This is a time of increasing concern surrounding toxic chemicals. Regulations for these materials are steadily increasing, both in number and in complexity, and affect day to day operations and decisions. Eco Logic's past experience, and on–going participation, in the regulatory process keeps clients familiar with current and pending legislation. Clients are able to make well–informed and proactive decisions, and can avoid costly reactive approaches to perceived toxic chemical problems.

ECO LOGIC



ENVIRONMENTAL DIVISION

Eco Logic's Environmental Division provides scientific expertise and consultation in the areas of environmental chemistry, ecology, geography, hydrogeology, meteorology, computerized data management and the interpretation of environmental legislation.

A team of in-house consultants provides technical and field expertise to assess and remedy environmental issues. The Division participates in the siting of new waste management facilities, including Energy-From-Waste incinerators and landfills, assessment of ecosystem health, mediation of liability claims, interpretation of environmental policies and legislation, and the remediation of contaminant spills and leaks.

The Division performs complete environmental assessments and audits. Interaction with the client facilitates mitigation of the impacts of any problems or concerns identified. Information is expertly interpreted and explained to the public, government and other interested parties. The Division also assesses and negotiates environmental approvals with affected parties.

LABORATORY DIVISION

Eco Logic's experienced laboratory team consists of two senior analysts and three technicians. The consistently high quality achieved by the Laboratory Division results from the emphasis placed on quality assurance and quality control in all phases of sampling, analysis and data processing. The Division ensures that clients' needs are fully addressed by developing a detailed project plan prior to commencing analysis.

Quality control and quality assurance protocols are the cornerstone of the Laboratory Division's success. Surrogate standards for each chemical class are added to samples prior to extraction to follow chemical recoveries through all stages of analysis. This unique technique provides great confidence in the accuracy and precision of data. Duplicate analyses are performed on every tenth sample, and instrument performance is constantly monitored. Regular maintenance and calibration of all instruments ensures optimum performance.

The Eco Logic laboratory is equipped with state-of-the-art equipment for trace organic analysis. Instrumentation includes a Hewlett Packard (HP) 5890 gas chromatograph fitted with dual electron capture detectors, and a HP5890 gas chromatograph interfaced to a HP5970 mass selective detector. Fully automated analysis is performed with the aid of a HP1000 computerized data system.

OCCUPATIONAL AND HEALTH ASSESSMENT DIVISION

The Occupational and Health Assessment Division conducts investigations relating to the potential impacts of toxic substances on human health.

Eco Logic professionals design sampling and analysis programs to obtain concentration data for hazardous chemicals found in workplace or home environments. Exposure risks are estimated using proprietary computer software tailored to the specific environment being studied. This approach enables simultaneous evaluation of regulatory compliance and possible health risks to humans resulting from exposures under different conditions.

The Division also supervises long-term drinking water characterization programs for municipalities. Such projects integrate sampling, analysis, toxicology, regulatory assessment, reporting, trend analysis and data management into a single, cohesive service. These activities enable proactive decision making in the management of drinking water resources.

The Division has prepared review articles for publication by the Department of Health and Welfare. These have centred around toxic chemical levels in Canadian human tissue samples. The Division will shortly begin a three year program of laboratory research to characterize chemical hypersensitivity disorders in Ontario populations.

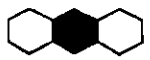
ECO LOGIC

TECHNOLOGIES DIVISION

ELI Eco Technologies, Inc., a subsidiary of Eco Logic, develops technologies for the measurement and elimination of toxic chemical problems. ELI Eco Technologies is currently developing applications of the V & F Analysetechnik on-line mass spectrometer for the continuous monitoring of organic compounds in stack gases and ambient air. A total service package is offered, which includes installation of the system, on-going maintenance, emission monitoring by remote computer link with our Rockwood headquarters, and regulatory reporting.

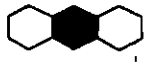
Bench-scale tests of a prototype hazardous waste destructor are currently being conducted, with financial assistance from the National Research Council of Canada. This patented system involves a thermo-chemical reduction process suitable for wastes containing either high or low concentrations of chlorinated organic species, such as PCBs and dioxins, in either aqueous or organic matrices. Construction and testing of a full-scale reactor is planned for the near future. Other waste treatment technologies are also being assessed. These include vitrification of ash combined with thermo-chemical destruction of organic compounds, and solvent extraction of contaminated soils and solids.

ECO LOGIC



PRODUCTS AND SERVICES

ECO LOGIC



TRACE LEVEL ORGANIC ANALYSIS

Eco Logic has been performing high-quality trace organic analysis for over two years at its Rockwood laboratory. The laboratory has analyzed a wide range of environmental matrices, including drinking water, effluents, sediments, air and biota.

Eco Logic's analytical laboratory is equipped to analyze for a wide range of contaminants, including the following:

- Industrial Contaminants
  - polychlorinated biphenyl mixtures (PCBs)
  - individual PCB congeners
  - chlorinated benzenes
  - chlorinated phenols
  - volatile aromatic chemicals (benzene, etc.)
  - volatile organochlorines (trihalomethanes, etc.)
  - polynuclear aromatic hydrocarbons (PAHs)
  - aliphatic hydrocarbons

- Pesticides
  - organochlorine pesticides and herbicides
  - organophosphate pesticides
  - carbamate pesticides

- Dioxins/Dibenzofurans
  - chlorinated dibenzodioxin and dibenzofuran isomers including 2,3,7,8-TCDD and 2,3,7,8-TCDF

- Full-scan GC/MS volatiles and/or extractables

ECO LOGIC

AIR AND EMISSION MONITORING

Eco Logic has developed a unique air sampling apparatus. A pump is connected to two sampling trains, one for sampling volatile chemicals, and the other for simultaneous collection of semi-volatile substances. Primary and backup adsorbent cartridges are connected to each sampling train. Primary columns are spiked with known amounts of surrogate chemicals before sampling, allowing chemical recoveries in the sample to be determined. A simple solvent extraction procedure is then used to prepare the sample for analysis by full-scan gas chromatography/mass spectrometry. The sampler has been used successfully in a major study of air in the high-humidity environments found in sewage treatment plants.

For on-line monitoring of plant air, stack emissions or process gas streams, Eco Logic can supply custom-made systems featuring a unique chemical ionization mass spectrometer (CIMS) recently developed in Austria. The CIMS can simultaneously measure ppb to percent levels of up to 36 contaminants on a continuous basis, and is especially useful in identifying individual hydrocarbons. The Ontario Ministry of Environment's Clean Air Program will require continuous emission monitoring of many compounds which cannot be measured using currently available systems. The CIMS represents an effective solution to this problem. Fully developed software automates the gathering and reporting of data, and process control capabilities make it possible to reduce emissions while monitoring.

A complete range of standard stack-testing and in-plant air testing services is also available.

ECO LOGIC

DRINKING WATER MONITORING

Public concern over the quality of drinking water has grown in recent years. Governments require high quality, accessible and timely data in order to make well-informed decisions about drinking water supplies. Eco Logic offers complete drinking water monitoring programs, comprising sampling, analysis, interpretation and data management.

Eco Logic has developed a unique water sampling system to meet the needs for low detection limits and built in quality assurance and quality control. An adsorbent cartridge is attached to existing drinking water outlets and used to extract trace level organic contaminants from large volume samples (200 – 300 L). The sampling cartridge is then returned to Eco Logic's Rockwood laboratory for analysis.

All drinking water data is interpreted for clients. Chemical concentrations are assessed against worldwide standards, and contaminants are evaluated in terms of potential impacts on human health. To facilitate identification of chemicals of concern, all data is electronically transferred into a computerized database tailored to clients' specific needs. This proprietary software contains information on drinking water standards and guidelines, and can be used to identify any chemicals whose concentrations exceed a specified fraction of a relevant guideline. Thus, rising contaminant levels can be detected before they present a danger to human health.

ECO LOGIC

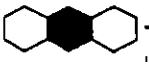
MISA PROGRAM ANALYSES

Clients who already possess in-house capabilities for inorganic analyses can take advantage of Eco Logic's expertise in trace organic analysis to satisfy their MISA program requirements.

Eco Logic's state-of-the-art laboratory performs analyses for all MISA target organic parameters. Complete organic characterization of process effluents is provided using gas chromatography/mass spectrometry. These techniques enable Eco Logic to obtain detection limits orders of magnitude below those required under MISA. Rigorous application of quality assurance and quality control techniques ensures accurate and timely data. Eco Logic's analytical capability for all MISA organic parameters means that clients save time and money in meeting program requirements. Analysis of inorganic parameters can also be arranged.

A comprehensive MISA package, including both organic and inorganic parameters, is available upon request.

ECO LOGIC

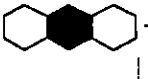


DATA MANAGEMENT SOFTWARE

Long–term chemical monitoring programs generate large amounts of data. This poses a clear need for comprehensive approaches to data management. The diversity of types of data collected and the difficulties associated with storage, retrieval and data processing make customized computer–based systems essential for efficient data management.

Eco Logic provides a full range of services to help clients manage analytical data. Services include reviewing of data management strategies, and design, development and implementation of custom data management systems. User training, and maintenance of new and existing systems ensure that clients have ready access to important data.

Eco Logic's computerized data management systems feature full data input, editing and querying capabilities, and password protection to ensure data integrity and security. Utilities include flexible report–quality data output, a graphical interface for on–line trend analysis, and routines for backup, archiving, and manipulation of data.



QUALIFICATIONS

THE PROFESSIONAL TEAM THAT ENSURES CREDIBILITY

All programs dealing with toxic chemical problems face increasing difficulty on the routes to acceptance and success. In a time of pervasive public distrust, serious challenges to both industrial and toxic cleanup programs must be anticipated. Success, while under the scrutiny of regulatory agencies and public interest groups, is ultimately a function of the credibility of the proponent and its consultants.

The professional team at Eco Logic ensures that each project meets the five criteria essential to credibility:

- Third party objectivity
- High quality data
- Expert chemists, toxicologists and engineers
- Understanding of current and future regulations
- Clear communication with technical experts, regulators and the public

Eco Logic professionals combine more than 50 years of scientific research experience, 45 years of regulatory development and enforcement expertise and 35 years of toxicological expertise.

Detailed C.V.'s are available for all staff.

ECO LOGIC

QUALIFICATIONS

Douglas J. Hallett, Ph.D.

Toxicologist

(President)

United Nations Silver Medal for Environmental Stewardship

Assessment: Canada–U.S. hazard and risk assessment of PCBs, Mirex, 2,3,7,8–TCDD, toxaphene; environmental impact assessment of a solid waste landfill, a sewage treatment plant, a solid waste destructor, Energy–From–Waste incinerators; fingerprinting of spills and hazardous leakage from underground storage tanks; groundwater quality assessment; liability assessment of PCB fires

Analysis: Discovery of 2,3,7,8–TCDD PCDFs, photomirex and PAHs in Great Lakes biota

Toxicology: Genetic toxicology of crude oil fractions, ecotoxicology of fenitrothion and photomirex; over 65 reviewed scientific papers on occurrence, impacts and trends of environmental contaminants in Great Lakes biota

Regulatory: Past Chairman, MISA Advisory Committee, Ontario Ministry of the Environment; Past Chairman, Federal Great Lakes Toxic Chemical Program; Past Chairman, Canada–U.S. Committee for the Assessment of Great Lakes Chemicals; Senior Scientific Advisor, Environment Canada (12 years)

ECO LOGIC

QUALIFICATIONS

Wayland R. Swain, Ph.D.

Aquatic Toxicologist

(U.S. Vice President)

Assessment: Primary assessments of pollution of the Great Lakes, Lake Baikal (USSR), Het IJsselmeer (the Netherlands), the Maarsseveen Lake System (the Netherlands), Lake Managua (Nicaragua); public health and human impact of PCBs in Lake Michigan fish; investigation of liablility claims related to accidents involving lead, cyanide and dioxane; investigation of cattle vaccine contamination by bovine viral diarrhea virus

Analysis: Discovery of atmospheric transport of PCBs in the Great Lakes; discovery of toxaphene in Great Lakes fish

Toxicology: Aquatic toxicology of PCB congeners; maternal–infant transmission of PCBs in humans; human health effects of organochlorine compounds; past Chairman, Department of Aquatic Ecology, University of Amsterdam, Beatrix Crown Professor (5 years)

Research: Over 100 reviewed scientific papers

Regulatory: Past Director, U.S. Environmental Protection Agency; principal investigator Reserve Mining (Lake Superior), Waukeegan Harbour (Lake Michigan), Saginaw Bay (Lake Huron)

ECO LOGIC

QUALIFICATIONS

Ronald W. Brecher, Ph.D.

Human Toxicologist

(Manager, Occupational and Health Assessment)

Assessment: Human tissue levels of organic and inorganic contaminants; pathways of human exposure to toxic chemicals; occupational assessment of sewage treatment plants; assessment of drinking water; assessment of pesticides in fruits and vegetables

Analysis: Discovery of heptachlorostyrene in the Great Lakes; analysis of Hyde Park landfill leachate and the Niagara River

Toxicology: Computerized modelling of human exposures to toxic chemicals; early detection of inflammatory disease in humans

Research: Characterization of chemical hypersensitivity disorders in humans

Regulatory: Canadian focus case studies of PCBs, chlorophenols, mercury, Mirex and photomirex for the International Joint Commission Great Lakes Water Quality Board; Great Lakes Water Quality Objective for PAHs; Chemist, Canadian Wildlife Service, Environment Canada (2 years)

ECO LOGIC

QUALIFICATIONS

Kelvin Campbell, P.Eng.

Environmental Engineer

(General Manager,
ELI Eco Technologies, Inc.)

Assessment: Optimization and monitoring of industrial processes and combustion facilities; destruction efficiency testing of hazardous waste destruction processes; measurement of stack emissions of common pollutants, such as SO_2, H_2S, NO_x and HCl, as well as trace organics such as PAHs, PCBs, dioxins, furans and pesticides

Design: Specialized gas sampling systems and instrumentation; adaptation of monitoring systems to existing process equipment; development of process equipment for a newly-patented method of destruction of hazardous wastes

Research: Bench-scale testing of a thermo-chemical process for the destruction of wastes containing chlorinated organic chemicals, such as PCBs and chlorobenzenes

Regulatory: Stack emission testing for the purpose of demonstrating compliance with provincial or federal regulations; industries tested include pulp and paper, mining and smelting, chemical and petrochemical, manufacturing, food processing, lime and cement kiln operations, secondary lead smelting, and incineration associated with hazardous waste, municipal solid waste, sewage sludge and landfill gas

ECO LOGIC

QUALIFICATIONS

Jillian G. Daffern, M.Sc.

Environmental Chemist

(Manager, Environmental Division)

Assessment: Environmental assessment for siting of waste disposal facilities, including landfills and Energy–From–Waste incinerators

Analysis: Atomic absorption and emission spectroscopy, UV/Visible spectroscopy, voltammetry; analysis of trace metals, nutrients, organic contaminants in water, soil and plant tissues

Research: Atmospheric processes, including long range transport of pollutants and acid precipitation; PCB combustion and thermal decomposition; environmental contaminant distributions; forest nutrient dynamics

Public Policy and Consultation: Great Lakes–St. Lawrence River Ontario Legislation and Regulations (EAA/EPA/OWRA/CHA; Regulations 308 and 309); public consultation; dispute resolution

ECO LOGIC

QUALIFICATIONS

Karen D. Nicol, C.E.T.

Technologist

(Laboratory Manager)

Assessment: Participated in the investigation of the St. Clair River "blob", conducted by Environment Canada and the Ontario Ministry of the Environment

Analysis: Over 15 years experience in trace organic contaminant analysis using gas chromatography with electron capture and mass selective detection; analysis of fish, clams, sediments, water, air, soil, paper products, and foods.
for chlorobenzenes, organochlorine pesticides congener specific PCBs, PAHs, chlorophenols, chlorinated dioxins and dibenzofurans

Research: Development of cartridge sampling systems for air and water suitable for simultaneous analysis of over 150 volatile and semi-volatile organic compounds; field testing of a large volume liquid-liquid extraction device for Environment Canada

Instrumentation: Hewlett Packard 5890 gas chromatograph fitted with dual electron capture detectors; Hewlett Packard 5890 gas chromatograph fitted with Hewlett Packard 5790 mass selective detector

ECO LOGIC

QUALIFICATIONS

Peter J. Kornelsen, M.Sc.

Hydrogeologist

Assessment: Hydraulic characterization of porous and fractured geologic media; assessment of contamination in geologic materials; contaminant transport in groundwater; geochemical properties of natural materials

Research: Hydraulic testing of basal sands of MacMurray Formation, Fort MacMurray, Alberta; *in situ* hydraulic conductivity profiling, East Bull Lake, Ontario; tracer testing and hydraulic interconnectivity testing, Chalk River, Ontario; laboratory assessment of theoretical laws for fluid flow in fractured geologic materials

Design: development and testing of specialized equipment for use in hydrogeologic research; development and assessment of a computer simulation for transient flow behaviour in viscous solids; development of a computer based data management system for water quality data