

Dioxin Issues in the Pacific Rim Region

We are very excited to welcome hundreds of our friends and colleagues to the 32nd Symposium for Persistent Halogenated Pollutants that will be hosted for the first time in the Southern Hemisphere, in the city of Cairns in Australia in August 2012. This annual symposium which is commonly known as the 'Dioxin Conference' is the premier international gathering forum of scientists from every corner of the world to present their latest discoveries on persistent halogenated organic pollutants and to chart the course of future research. Each year at the Dioxin symposium, more than 600 papers cover all aspects of research related to POPs from sampling and analysis, levels and trends, epidemiology and toxicology to remediation and regulations, are presented and discussed.

“The Dioxin Symposium has played and continues to play an important role in disseminating information on persistent organohalogen pollutants across the world including the Pacific Rim.”

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Dioxins have never been produced intentionally, they are by-products of incineration processes or impurities in many industrial products such as PCBs and the herbicide 2,4,5-T. As a result, these compounds cannot be studied in isolation. This has been realised from the beginning by calling this series “the Symposium on Chlorinated Dioxins and Related Compounds”. The success of the Dioxin Symposium is based on the foresight and initiative of Professor Otto Hutzinger, who organised and led the International Advisory Board (IAB). In subsequent years, the symposium mandate was expanded to include compounds beyond dioxins and now includes: PCBs, polychlorinated naphthalenes, pesticides, brominated flame retardants and perfluorinated compounds. Currently more than half of the papers presented at the Dioxin symposia are related to these compounds. To reflect this expansion the name of the symposium after several iterations has been changed to the International Symposium on Persistent Halogenated Pollutants.

The past 32 symposia have been held 17 times in the Pacific Rim; three times in Japan (1986 in Fukuoka; 1994 in Kyoto and 2007 in Tokyo) once in Korea (in Gyeongju, 2001) and China (Beijing, 2009) and 11 times in North America (7 times in the USA and 4 times in Canada). This year the city of Cairns is hosting the symposium.

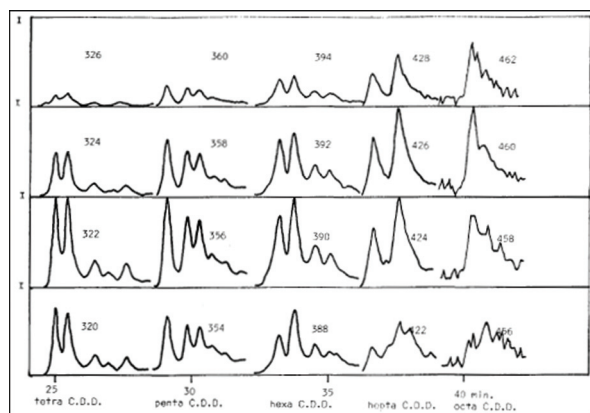
Although this is the first time that the Dioxin Symposium is being held in the Southern Hemisphere, the 'Dioxin Conference' since its inception in 1980 (called The Workshop on Impact of Chlorinated Dioxins and Related Compounds on the Environment when first created), has a long history of including topics specifically related to the Pacific Rim and consequently several symposia were hosted in the region. For example during the first symposium in Rome in 1980, the three main topics of concern were industrial accidents involving dioxins and related compounds, rice oil contamination in Japan and Taiwan, and Agent Orange. Obviously the latter two topics involved Pacific Rim countries. During the second symposium in 1981, which was held in Washington DC, the first discussion on human exposure to the herbicide 2,4,5-T and Agent Orange was presented by Dr. Barclay Shepard, from the US Veterans Administration, and Dr. A.L. Black, from the Commonwealth Department of Health, Australia. In 1986, the Dioxin Symposium was held in Japan for the first time. The symposium was held in Fukuoka where along with the Nagasaki Prefecture the rice poisoning incident called the Yusho incident took place.

Dioxins in the Pacific Rim gained prominence as a result of a couple of situations. In 1968 several farmers from Northern Kyushu in Japan reported that their poultry were dying due to a respiratory problem - in total 400 000 birds were lost. At the same time, about 1400 individuals from the same region reported chloracne eruptions, skin pigmentation, and eye discharge. The cause of this outbreak was tracked back to rice bran oil which was contaminated with polychlorinated biphenyls and



polychlorinated dibenzofurans. A decade later a similar incident occurred in Taiwan where rice bran oil was heated by heating elements that leaked PCBs. Another incident was the discovery of 2378-TCDD as an impurity in the Agent Orange formulation. As a result, several ranch hands handling these compounds received significant exposure, and several investigations on the effects of these compounds have been carried out by the US and Australian governments. Over the years several sessions at Dioxin Symposia have been dedicated to this issue.

Prior to the introduction of the electron capture detector in 1958, there was no technique available for detection of micro-pollutants at levels low enough for the protection of the environment and human health. In the early 1920's, scientists were aware of the toxic effects of PCNs, however they were not able to identify and measure them with the technology available at the time. Using gas chromatography combined with an electron capture detector, it was possible to detect DDT, its metabolites and other organochlorine pesticides in the environment and relate their effects to the egg shell thinning of bald eagles which were almost extinct. These observations were a key driving force in the publication of "Silent Spring" by Rachel Carlson. Shortly after, the introduction of gas chromatography combined with mass spectrometry ushered in a new era in discovery of several other micro-pollutants such as PCBs and dioxins. With the introduction of these new techniques dioxins were identified in several environmental compartments including biota and human tissue. Dioxins have been detected in municipal waste incinerators, in Love Canal, and pulp bleaching processes that use chlorine. In response to the potential hazard posed by these compounds, several regulations in North America, Western Europe and Japan were introduced. Of particular mention is the introduction of the MSW incinerator regulation in Japan in 1997.



The demand for analytical laboratories that could determine these micro pollutant compounds in different environmental matrices emerged. Up to the early 1980's the majority of these measurements were carried out in academic or government laboratories. Consequently several commercial laboratories started to offer PCDD determinations as part of their analytical services.

Initial measurements were done with low resolution MS - however with the introduction of capillary gas chromatograph coupled with high resolution mass spectrometry it was possible to achieve better sensitivity and eliminate potential isobaric interferences

from other compounds such as PCBs. Today virtually all dioxin determinations are accomplished using gas chromatography combined with high resolution mass spectrometry which is considered the gold standard.

In the past decade Dioxin symposia have been the venue of choice to promote understanding of polychlorinated naphthalenes (PCNs), the forgotten pollutants. PCNs were first synthesised in 1833, and were marketed under the names of Halowax in the US, Seekay Waxes in the UK and Nibren Waxes in Germany. Similar to PCBs the manufacturing process results in a complex mixture of up to 75 congeners. The use of these compounds predates the use of PCBs although they were used in a similar manner as dielectrics for flame-resistance and insulating in capacitors, transformers, cable and wires. Due to their high toxicity their use was replaced with PCBs. However recent reports indicate a resurgence of these compounds in several products. In addition, several sessions in the past have been dedicated to understanding the sources, transport and fate of organochlorine pesticides including Toxaphene and chlordane, including long range transport to cold regions such as the Arctic. Detection of brominated flame retardants in the environment was first reported at Dioxin symposia - however it did not attract much attention until the 18th Symposium on Halogenated Compounds when a dramatic increase in the levels of PBDEs in human breast milk was demonstrated. Since then investigations on BFRs have taken a prominent spot at Dioxin

Symposia. Hence, providing an ideal venue to discuss the latest discoveries in this emerging field. In recent years, perfluorinated compounds have gained prominence at Dioxin Symposia. Even though these compounds were first detected in the 1980's, it was not until the introduction of sensitive and robust ESI-LC/MSMS systems that made it possible to analyse for these compounds on a routine basis.

In summary, from the early days the Dioxin Symposium has played an important role in disseminating information on persistent organohalogen pollutants across the world including the Pacific Rim. Over the years, as a result of the information generated and shared at this conference along with other scientific gatherings, many governments have banned the use of several of these compounds and put controls on emission of others, resulting in lower levels of POPs in several regions. This is a success story that we celebrate. We cannot forget that we are facing different challenges not only from emerging contaminants but also from growing economies particularly in the Pacific Rim. It is our belief that by continuing to provide a forum to exchange new information and foster collaboration among scientists from the four corners of the world, along with continued adaptation to new environmental demands, it is possible to serve the needs of the environmental community for the years to come and to continue to be the premier venue for environmental scientists and toxicologists to present their latest discoveries.