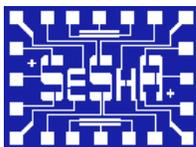


Pandora's Poison: Chlorine Health and a New Environmental Strategy

By Joe Thornton

MIT Press



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As the environmental arena enters its fourth decade and a new millennium, there is a strong possibility that a new paradigm of regulatory oversight could occur. Under the current approach, most regulatory programs look at end of pipe discharges and regulate individual point sources based on some acceptable level of discharge. An exception to this approach was the program addressing chlorofluorocarbons (CFCs), where, in a worldwide effort, the focus was on the elimination of the entire class of compounds within the industrial arena. New regulatory efforts on persistent organic pollutants (POPs) and even perfluorocompounds (PFCs), with a worldwide scrutiny covering whole chemical families, represent the most recent efforts in this type of regulation. In Pandora's Poison, Joe Thornton proposes that the entire class of organochlorines -- chemicals and feed stocks ranging from vinyl chloride and PVC to numerous solvents and pesticides -- are so toxic and long lasting that they should be eliminated from production due to their impacts on all levels of bioactivity. This book characterizes and labels the current regulatory framework a Risk Paradigm, where chemicals are allowed unless proven dangerous. Its argues a shift to an Ecological Paradigm, where safety and necessity must be proven before any production or use is allowed. Citing data that purports no safe levels of exposure to these compounds, he argues that the world must move to an

Ecological Paradigm with respect to organochlorines. Although the semiconductor industry is not directly involved in using the targeted compounds, it is interesting to note that two speakers at the SSA2000 conference (including one who mentioned the book by name) mentioned moving to a broader ecological examination of chemicals, a move which mirrors the Ecological Paradigm.

Pandora's Poison makes interesting, although not easy, reading. It runs 400 pages of text with another 150 pages of footnotes and references. The tendency is to frequently check the sources to determine the impartiality and bias of the research. As a former research coordinator for Greenpeace, Thornton's mindset and reference base may be inherently more liberal than many. The book contains three major sections, named (appropriately) The Problem, The Cause and The Solution. Throughout all the sections, his presentation, although attempting impartiality in some areas, clearly is written with a pervasive sway to the more radical interpretation of the data and results. Consequently, the validity of his concerns and of some of the issues raised gets lost in the bias of delivery.

The opening case against chlorine chemistry makes useful reading even with the inherent bias. In study after study, example after example, across the

northern hemisphere, results are quoted purporting the impacts of organochlorines on life. The discussion on why organochlorines act the way they do, from both the chemical and physiological perspectives, provides a useful backdrop for the argument. The starting premise against these compounds, while potentially sound, is weakened by the proclivity to focus the accusation exclusively on organochlorines. "Cancer mortality has increased throughout the entire industrialized world, and it has recently begun to rise in developing countries as they have adopted the technologies and habits of industrialized nations. Clearly something has caused cancer to grow to epidemic proportions." The cause stated here is the expanded use of, and contamination of the environment by, organochlorines. These sections attempt to provide a balanced approach, or at least tackle the obvious counter-arguments. Yet the discussion of key issues, such as age adjustment of cancer prevalence, the increase in childhood cancers from birth to 14 years, and increased cancers in developing countries, are shortchanged in their development, to the detriment of a more unbiased debate.

Outside of the debate on regulatory approaches, the discussion of the chlorine industry and the development of organochlorine compounds provides interesting reading from the historical perspective. From the start of the chloro-alkali business, which generated chlorine that needed a market, the path includes the development of the PVC industry and its role in organochlorine pollution both through the chemical production as well as the use and disposal of the resulting compounds. Unfortunately, even this section, entitled "Chemistry Out of Control" has a noticeable slant in its

perspective. The expanded growth of PVC usage in developing countries is laid at the feet of the organochlorine market – while ignoring a balanced discussion of alternative reasons for the increased use of PVC in developing countries. New production facilities in third world countries are attributed to the engine of organochlorine production. Yet while it is almost certain that the discussed lack of environmental restrictions plays a significant role in the construction of these facilities, the other dominant factors of low wages, cheap energy, available land, and absence of other regulatory controls, are virtually ignored.

What, then, does Thornton propose as a solution to this highly documented danger to the health of life on earth? Nothing too radical—only a "chemical sunset" for the entire organochlorine family of chemicals, with ripple effects across major portions of the world economy. Buried in the rhetoric are several points worth considerable discourse. One example is a discussion on the lack of assimilative capacity of the ecosphere for synthetic chemicals, a point that certainly should be considered when discharge limits are established for non-degradable materials. Net cumulative effect is too often ignored, as was discovered with the ozone hole and global warming. Yet are to take at face value that the proposed solution, a Zero Discharge policy for persistent non-assimilative chemicals, is the only or even best solution to this issue? Another subtle point raised is a brief discussion of the rights of businesses. It correctly reminds us that, since they have historically not been "persons" under the law, corporations do not and should not have the same rights as individuals with respect to government actions, or with respect to a global commons.

Thorton does a better job in presenting a balanced evaluation of how this sunset could be instituted than he does in the first section of the book on the reasons for the sunset, at least in terms of the obvious issues of impact and alternatives. His perspective is constant – that there are always alternatives to organochlorines and they are generally cheaper and better than the chemicals, products and processes they replace. And always the drumbeat that this family of chemicals is so dangerous that it must be eliminated. Even so, the analysis would make an interesting starting point for policy discussions for the major industries involved. Pulp and paper reportedly could go chlorine free if they only modernized. The author proposes eliminating PVC plastics, replacing them with the compounds and materials (such as wood for window frames, concrete for pipes, and less harmful plastics elsewhere) that were initially replaced by PVC. Unfortunately, there is insufficient discussion of overall impact, issues such as industrial applications of PVC due to chemical resistance, or the collateral effects of changes. The discussion on pesticides shows some of the weakness of arguments even where strength of ideas exists. The solution of moving to alternative agriculture, with less pesticide, more labor and more skill, and better yields, doesn't ring right. Not even part of the equation are discussions of

where the labor pool will come from, what happens to the price of food, and what happens to those marginal areas made fertile only through use of pesticides. And yet, his contention that conversion to a non-chlorine economy would be an undertaking equal or greater than the post Cold War demilitarization shows that the author understands the enormity of the effort. Would that the arguments for this Herculean effort been more balanced so that a public dialogue could be better initiated and facilitated.

The semiconductor industry does not use organochlorines, and so in a narrow sense is untouched by the book and its arguments. However, in a broader sense this book does set forth ideas on environmental policy and effects that can and may affect us, and hence its review here. It is an interesting book with an interesting premise. The current dialogue over PFC gases is a policy debate, worldwide, over a family of chemicals that have global impacts to their use. The major difference is that this industry recognized the issue before government did, and established a proactive program to address the issues. As more items, from POPs to lead bans, fall into this type of approach, it may be a shift in the regulatory paradigm. Hopefully, we will stay on the leading edge of that wave.