Comments on the Draft Report of the Study Committee to Develop a Comprehensive Plan to Reduce Toxic Emissions and Expand Plastics Recycling drafted by the Maine State Planning Office

Submitted by Michael Belliveau, Environmental Health Strategy Center,
Member of the Plastics Study Group
20 December 2002

This study committee whose discussions informed the drafting of this report by the staff of Maine State Planning Office has its roots in part in Maine legislation proposed in 2001, LD 1543, *An Act to Reduce the Release of Dioxin from Consumer Products*. The originally proposed version of LD 1543 would have defined polyvinyl chloride plastic (PVC, also known as vinyl) as a dioxin-forming product because when it's burned the chlorine in PVC combines with organic matter to form a highly toxic class of chemicals collectively referred to as dioxin. The original LD 1543 would have also encouraged (but not mandated) the diversion of PVC away from incineration by including PVC waste in state funded collection programs for mercury products and household hazardous waste and by expressing a preference for landfilling of PVC waste over incineration.

After considerable opposition to the bill from the chemical industry, the final legislation signed into law did none of these things. Instead it banned the open burning of trash in Maine, because the open burning of PVC waste and other chlorine sources in household waste is a major source of dioxin pollution in Maine. The bill also funded a one-time educational program about open burning, dioxin and PVC in the waste stream.

The Maine legislature wanted further consideration of the need to divert PVC waste from incineration. They passed LD 1775 in 2001 to require a further study of plastics recycling and PVC diversion. The Maine State Planning Office agreed to undertake the study called for under LD 1775. Among other tasks, the Plastics Study Group was charged with:

- Evaluating the feasibility of expanding the State's bottle deposit laws to include containers made of high density polyethylene, polyethylene terephthalate and polyvinyl chloride; and
- Evaluating the feasibility of reducing the toxicity of the waste stream, including diversion of polyvinyl chloride from incineration.

SUMMARY of Comments on Draft Report.

Although the Plastics Study Group failed to reach an across-the-board consensus on any single policy, the draft report fails to reflect areas where significant agreement was developed. For example, no member of the Study Group opposed reasonable efforts to divert PVC away from incineration except for the member from the American Plastics Council, which represents the chemical companies that manufacture PVC plastic. Yet the draft report fails to recommend any action in support of PVC diversion.

Also, several members of the Study Group expressed support for an incremental expansion of the bottle bill to include #1 and # 2 plastic bottles other than those that contained dairy products or hazardous materials with participation optional by grocers and retail facilities that were not redemption centers. Yet the draft report fails to acknowledge this support or recommend any consideration of bottle bill expansion.

Lastly, although some members expressed support for increased emphasis on all-bottle recycling programs advocated by the plastics industry, that support was my no means universal. Yet the draft report fails to acknowledge any of the concerns that were raised about the limits to and adverse potential impacts of all-bottle programs.

These comments call for several changes so that the conclusions and recommendations of the final report will reflect a more balanced representation of the views of the entire Study Group. Other recommendations call for discussion of the critical evidence presented during the Study Group's deliberations, but ignored in the final report. Other changes are recommended to correct errors in the draft report.

I. The draft report wrongfully attributes conclusions to the Study Group that were not made by the Group but rather reflect staff opinion

A. Expansion of the Bottle Bill

The draft report claims that "[T]he group considered expanding the bottle bill …but … decided not to pursue this avenue of action at this time" (Executive Summary, p.3). The draft report further states that: "The members of the 'Plastics Study Group' were unable to arrive at a process by which to recommend expansion of the state's existing bottle redemption program, recognizing the concerns being considered by the other study committee (Conclusions, Recommendations, p. 17).

Contrary to these statements, several members of the Study Group supported expansion of the bottle bill and made recommendations to address the concerns raised. Specifically, a recommendation was forwarded to expand the bottle bill to include only #1 and #2 plastic bottles that did not contain dairy products or hazardous materials and to limit the collection to redemption centers only (excluding grocery stores and other retailers).

CHANGES RECOMMENDED in the Final Report:

1 The final report should describe this recommendation and the support it engendered by several members of the Study Group.

2. The final report should amend the untrue statement in the Executive Summary – the Study Group never formally decided not to pursue expansion of the bottle bill.

B. PVC Diversion Away from Incineration

The draft report concludes that: "[W]ithout agreement on the science of dioxin formation, sources of compounds necessary, or verification of emission values, movement could not be realized on this task." (Executive Summary, p.4). The draft further states: "There was a fair amount of debate over the information presented from both sides but an acceptable model for carrying the discussion ahead did not get designed." (Conclusions, Recommendations, p.18).

These conclusions are not supported by the actual discussions of the Study Group or the preponderance of the data submitted during the Study Group process. The only member of the Study Group to oppose efforts to divert PVC away from incineration was Steve Rosario from the American Plastics Council representing the manufacturers of PVC plastic. No one disputed the dioxin emissions inventory data from the Maine Department of Environmental Protection, which show that in Maine municipal solid waste incinerators are a significant source of dioxin air emissions and are also the overwhelmingly dominant source of dioxin releases to land in the form of landfilling of incinerator ash.

Further, based on the discussions of the Study Group, the staff developed an excellent model to carry forward a PVC diversion program. This model is attached as Appendix D to the draft report and is entitled Possible Pathways for Management of Polyvinyl Chloride Plastics to Keep Them Out of MSW Incinerators. Again, the only member of the Study Group to raise objections to this model was the representative of the American Plastics Council.

CHANGES RECOMMENDED in the Final Report:

3. The final report's conclusions should be changed to indicate that there was substantial support for efforts to divert PVC away from incineration, but that consensus was not achieved due solely to the objections of the American Plastics Council

II. The draft report fails to cite the disadvantages of the so-called 'all-bottle recycling' programs advocated by the plastics industry

While the draft report is careful to record all the possible concerns about an expanded bottle fill (p.9), including some that strain credulity, the draft report is completely silent in itemizing the concerns that were raised in the Study Group about increased reliance on all-bottle recycling programs as a way to expand plastics recycling in Maine.

The draft report describes the so-called 'all bottle recycling' approach and claims that many members of the Study Group supported trying municipal pilot programs using this approach with an evaluation of these results (p.9). [Note, in contrast, that many members of the Study Group supported expanding the bottle bill and diverting PVC away from incineration, but that such support was not reported in the draft report].

CHANGES RECOMMENDED in the Final Report:

4. The final report should itemize all of the concerns raised in the Study Group about increased reliance on 'all bottle recovery' programs in an attempt to increase plastics recycling. These concerns, which should be included in the final report, include:

a. All-bottle collection programs increase the collection of PVC containers, which impairs PET (#1 plastic) recycling because PVC and PET have similar densities and can not easily be separated except at great expense, which makes the recycling uneconomical; as few as one PVC container mixed with 100,000 PET containers is enough to contaminate a bale of PET and render its recycling impractical. This concern was documented in great detail in a report shared with the Study Group entitled An Evaluation of All-Bottle Programs, prepared for the California Integrated Waste Management Board by Peter Anderson of RecycleWorlds Consulting, a firm with considerable expertise in plastics recycling;

b. All-bottle programs unfairly shoulder municipalities with the costs of collection and recycling the discarded plastics, which limits their potential for success due to lack of municipal financing. They also contradict the principle of producer responsibility, embodied in the bottle bill and the recent Maine mercury switch recovery program, which holds manufacturers responsible for the costs of managing their products at the end of their useful life; and

c. All-bottle program have limited applicability in Maine because they require curbside collection of discards yet barely 40% of Maine's population is served by curbside recycling leaving the majority of the state behind.

III. The Draft Report Mischaracterizes the PVC Plastics Issue

The draft report makes several errors of fact and omission and ignores the preponderance of scientific evidence regarding the problems with PV C plastic in the solid waste stream.

A. The draft report mischaracterizes the legislative history on PVC

L.D. 1543, *An Act to Reduce the Release of Dioxin from Consumer Products*, (120th legislature) never proposed to "eliminate the incineration of polyvinyl chloride plastics" as stated in the draft report (pp. 3, 5, 12). Instead, LD 1543 as proposed, would have promoted voluntary efforts to divert PVC away from municipal solid waste incineration by adding PVC to the list of items collected through state-funded collection programs for mercury products and household hazardous waste. The bill as proposed would have also established a state policy goal that expressed preference for landfilling of PVC over incineration. Neither of these policy measures adds up to a proposal to eliminate PVC incineration, which could only practically be achieved by eliminating the use of all

disposable PVC products. [The draft report is correct in stating that the bill would have prohibited the incineration of construction and demolition debris containing PVC].

This mischaracterization, which occurs at the very beginning of the draft report, biases the reader against the desired outcome of establishing a voluntary program to divert PVC away from incineration by suggesting pursuit of a more extreme policy outcome, a legislative ban on PVC incineration, that would be impractical and ineffective in minimizing the problems associated with PVC disposal.

The original intent of LD 1543 became the basis for the study mandate carried forward in LD 1775, to evaluate "the feasibility of reducing the toxicity of waste, including the diversion of PVC away from incineration."

CHANGES RECOMMENDED in the Final Report:

5. The final report language should be clarified to reflect a proper statement of legislative history as described above. Delete the reference to eliminating the incineration of PVC.

B. The draft report ignores evidence that PVC is the major source of chlorine in the municipal solid waste stream

Evidence with documentation was submitted to the Study Group that PVC accounts for more chlorine in the municipal solid waste stream than any other material. (A chlorine source is a necessary precursor to dioxin formation along with organic matter and a high temperature environment). Yet no mention of this fact is included in the draft report. The American Plastics Council claimed they disagreed with this fact, yet they presented no evidence to the contrary. In fact, during the legislative debate over LD 1543 before the Natural Resources Committee, Bill Carroll of the Vinyl Institute conceded that on average about 50% of the chlorine in municipal solid waste comes from PVC plastic.

The final report, unlike the draft, can not credibly cite an impasse or scientific disagreement when one industry lobbyist has presented no contrary evidence and the other industry expert previously conceded the point.

Here's a brief review of the evidence submitted to the Study Group:

"In municipal incinerators, PVC contributes at least 80 percent of the organically-bound chlorine and 50 to 67 percent of the total chlorine (organochlorines plus inorganic chloride) in the waste stream, although it makes up only about 0.5 percent of the trash stream by weight." – Joe Thornton, PhD, in *Pandora's Poison: Chlorine, Health, and a New Environmental Strategy*, Cambridge: MIT Press, 2000, p.317. Dr. Thornton cites four sources in support of this statement:

- Danish Environmental Protection Agency, *PVC and Alternative Materials*, English tran. Copenhagen: Danish Environmental Protection Agency, 1993.

- Ecocycle Commission of the Government of Sweden, *PVC: A Plan to Prevent Environmental Impact*, Stockholm: Ecocycle Commission, 1994.
- DTI (Danish Technical Institute). *Environmental Aspects of PVC*. Copenhagen: DTI, November 1995.
- TNO Institute of Environmental and Energy Technology, *Sources of Dioxin Emissions to the Air in Western Europe*, Brussels: Eurochlor, 1994

Further the Commission of the European Communities, in its Green Paper: Environmental Issues of PVC, recently concluded that: "PVC waste contributes between 38% and 66% of the chlorine content in waste streams being incinerated. The other main sources of chlorine are putrescibles (about 17%) and paper (10%). On average it can be estimated that about 50% of the chlorine input into the incinerators are due to the presence of PVC." (p.25), 26 July 2000, available on the web at http://europa.eu.int/comm/environment/waste/pvc/en.pdf.

CHANGES RECOMMENDED in the Final Report:

6. A paragraph should be added to the final report that identifies PVC plastic as the major contributor of chlorine, a necessary precursor of dioxin formation, in municipal solid waste.

C. The draft report errs in dismissing dioxin emission inventory data from government agencies

The draft report claims that a lack of adequate data on dioxin releases to the environment was one of the key reasons why no recommendation could be made regarding diversion of PVC away from incineration. The draft reports states: "[A] basic need for the discussion to move positively was the existence of verifiable numbers relating to the production of dioxins and their release to the environment, on both the state as well as national levels. Such data, unfortunately, was not available in a format and or from sources that would allow for comparative analysis of emissions." (p.13)

This statement is untrue. The dioxin inventory for 2000 produced by the Maine Department of Environmental Protection was submitted for discussion to the Study Group and defended as accurate by the agency. No contradictory evidence was presented by the plastics industry, which nonetheless criticized the inventory in general terms.

The Maine DEP inventory showed that municipal solid waste incinerators in 2000 were responsible for about 13 %of the dioxin air emissions in Maine and about 95 % of the dioxin releases to Maine land (from land disposal of incinerator ash). When all quantified dioxin releases to air, water and land are considered together, the Maine DEP inventory shows that municipal solid waste incinerators are by far the largest source of dioxin formation and release in the state.

CHANGES RECOMMENDED in the Final Report:

7. In the final report, the paragraph cited above on page 13 should be deleted. A new paragraph should be substituted that cites the state's authoritative environmental agency as the source for concluding that municipal solid waste incineration in Maine is a major source of dioxin formation and environmental releases to the air and land.

D. The draft report either ignores or mischaracterizes the relationship between incineration of PVC and the formation of dioxin

In key parts of the draft report, it fails to characterize at all the scientific facts and uncertainties associated with PVC incineration and dioxin formation. Instead, it simply and conveniently throws up its hands and claims that it's too complex to justify any recommendation to divert PVC away from incineration. This conveniently dismissive tone is demonstrated when the report states: "[W]ithout agreement on the science relating to the incineration of plastics and analyses of the emissions released to the environment, as well as what may be found in the ash and residues, the desired debate could not be held. There was a fair amount of debate over the information presented from both sides but an acceptable model for carrying the discussion ahead did not get designed." (p.13)

Where the report does attempt to characterize the PVC and dioxin link, its misses the mark factually, making both simple errors and misstatements about the degree of uncertainty. For example, the report concludes that: "… incineration of polyvinyl chloride plastics, which release chlorine gas upon being combusted, and in the proper setting, may combine with organic compounds to form dioxins and furans, which are carcinogenic, and could be released either through air emissions or become part of the ash from the incinerator's operation." (pp. 3,5 and in a shorter form on p.12). It further implies more uncertainty than actually exists when it begins a sentence with the following words: "[D]iscussion on the science necessary to support the proposition that incineration of polyvinyl chloride plastics may lead to the formation of dioxins …" (p.4).

First, a correction of chemistry: incineration of PVC releases hydrogen chloride (hydrochloric acid, HCl) not chlorine gas, when combusted. Hydrogen chloride becomes the chlorine donor that reacts with organic matter to form polychlorinated dibenzodioxins polychlorinated dibenzofurans (collectively known as dioxin), probably through the intermediary precursor chemicals, the chlorophenols.

Second, the tentativeness implied by the report's language does not in fact exist. Regardless of being "… in the proper setting" (whatever that means), the chlorine released during PVC waste incineration <u>does</u> form dioxin compounds, not "may combine." Dioxin formed during PVC incineration <u>is</u> released, not "… could be."

There are several incontrovertible facts related to PVC, incineration and dioxin. These include the facts that PVC is the only plastic high in chlorine content, that PVC is the major source of chlorine in the municipal solid waste stream, that burning pure PVC produces large amounts of dioxin and that incinerators remain a major source of total dioxin formation. The only area of major scientific uncertainty is regarding the exact

quantitative relationship between chlorine input from PVC and other chlorine sources and dioxin output in air emissions and dioxin output in ash.

No one disputes the importance of variables other than chlorine content that also affect the amount of dioxin produced from incineration including temperature, oxygen content, residence time and quenching. Yet when all of these variables are consistently optimized, dioxin formation can be minimized but never eliminated. Under optimal conditions in a finely tuned incinerator, only a reduction in chlorine content can further reduce dioxin formation. Air pollution controls, such as carbon injection added only at mass burn incinerators (two of the four in Maine) by 2000, only serve to transfer some dioxin from air to land, and some evidence suggests that the carbon may actually catalyze greater dioxin formation.

The relationship between PVC incineration and dioxin formation has been strongly supported and not effectively disputed. Several lines of evidence supporting this statement were included in the materials submitted to the Study Group. Although the representative from the American Plastics Council orally disagreed with virtually every statement of environmental concern related to PVC, no evidence was presented by the chemical industry that fundamentally refutes the preponderance of scientific data. To summarize these lines of evidence previously submitted that strongly suggest that PVC is a major – and preventable – source of dioxin from waste incineration:

- Numerous well-conducted laboratory studies published in the peer reviewed literature show that burning PVC and other organochlorines produces dioxin;

- In many (but not all) studies of pilot-scale and full-scale incinerators, the evidence also supports a relationship between burning organochlorines like PVC and dioxin;

- Some studies show that combustion of inorganic chlorides (salts) can also produce dioxin while other studies show that organically-bound chlorine, such as PVC, are much more important sources;

- Historically, dioxin levels in the environment as demonstrated from lake sediment cores and mummified human remains were extremely low; environmental levels of dioxin grew rapidly with the commercial development of chlorine chemistry in the 1940's, the leading product of which today is PVC plastic;

- A well-publicized study paid for by the Vinyl Institute (the Rigo report) showing no correlation between chlorine input and dioxin air emissions in incinerators is highly biased and scientifically flawed.

These issues are thoroughly documented in the 30 pages of expert testimony submitted in March 2001 by Dr. Joe Thornton during the debate on LD 1543. In a more recent review, Thornton quotes the Danish Technical Institute which concluded: "It is most likely that reduction of the chlorine content of the waste can contribute to the reduction of the dioxin

formation, even though the actual mechanism is not fully understood." (Joe Thornton, PhD, *Environmental Impacts of Polyvinyl Chloride Building Materials*, A Healthy Building Network Report, 2002, available on the web at www.healthybuilding.net).

CHANGES RECOMMENDED in the Final Report:

8. The final report language should be changed to acknowledge the numerous lines of evidence supporting the association between incineration of PVC and dioxin formation, while acknowledging the scientific uncertainties regarding the exact mechanism and quantitative relationship between PVC and dioxin.

E. The draft report ignores the environmental release of other toxic substances from incineration of PVC plastic including phthalates, lead, cadmium and organotin compounds

The draft report fails to even mention another significant source of concern with PVC incineration for which evidence was submitted during the Study Group process. PVC contains more toxic additives than any other plastic including plasticizers, primarily from the class of chemicals known as phthalates, used to soften and make flexible the naturally rigid and brittle PVC resin. Also, since PVC catalyzes its own decomposition, additives known as stabilizers are added particularly for PVC products that will encounter heat or light. The stabilizers used in PVC have contained compounds of lead, cadmium and tin. Thus the disposal of PVC accounts for significant amounts of phthalates and toxic heavy metals in the municipal solid waste stream. Incineration of PVC waste can serve to mobilize these toxic chemicals for release to air, land or water.

CHANGES RECOMMENDED in the Final Report:

9. The final report must acknowledge the environmental concerns related to the toxic additives present in PVC to a much greater extent than any other plastic and the potential environmental benefits of source reduction (avoiding PVC plastic) and diversion of PVC away from incineration.

IV. Conclusion

While consideration of expansion of the bottle bill can plausibly be deferred while another legislatively mandated study committee examines operational issues related to the bottle bill, no such excuse exists for inaction on reasonable efforts to divert PVC away from incineration.

Without even going so far as to propose specific legislative recommendations, the final report will do a great disservice to the public health and environment of Maine people unless it acknowledges that as a matter of precaution it would be a good thing if there were less PVC plastic in the municipal solid waste stream.

Flowing from that scientifically-based common sense conclusion, the final report should recommend that voluntary efforts be undertaken to divert PVC away from incineration. Only one voice on the Study Group opposed such a measure – the vested economic interests of the chemical industry that makes PVC plastic and does want the public to the know the full extent of the hazards posed by PVC – the most environmentally harmful plastic in use and in the waste stream today.

Comments submitted by

Michael Belliveau, Executive Director
Environmental Health Strategy Center
P.O. Box 2217
Bangor, Maine 04402
(207) 827-6331
mbelliveau@preventharm.org
www.preventharm.org