



DIVISION OF
CORPORATION FINANCE

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549-0402

DC



05045694

February 23, 2005

Ronald O. Mueller
Gibson, Dunn & Crutcher LLP
1050 Connecticut Avenue, N.W.
Washington, DC 20036-5306

Act: 1934
Section: _____
Rule: 1448
Public
Availability: 2/23/2005

Re: The Dow Chemical Company
Incoming letter dated January 4, 2005

Dear Mr. Mueller:

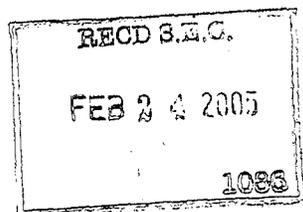
This is in response to your letter dated January 4, 2005 concerning the shareholder proposal submitted to Dow Chemical by Daniel Clowes. We also have received a letter on the proponent's behalf dated February 7, 2005. Our response is attached to the enclosed photocopy of your correspondence. By doing this, we avoid having to recite or summarize the facts set forth in the correspondence. Copies of all of the correspondence also will be provided to the proponent.

In connection with this matter, your attention is directed to the enclosure, which sets forth a brief discussion of the Division's informal procedures regarding shareholder proposals.

Sincerely,

Jonathan A. Ingram

Jonathan A. Ingram
Deputy Chief Counsel



Enclosures

cc: Sanford J. Lewis
P.O. Box 231
Amherst, MA 01004-0231

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January 4, 2005

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C 22013-00029

VIA HAND DELIVERY

Office of the Chief Counsel
Division of Corporation Finance
Securities and Exchange Commission
450 Fifth Street, N.W.
Washington, D.C. 20549

Re: *The Dow Chemical Company; Stockholder Proposal of Daniel Clowes
Securities Exchange Act of 1934 - Rule 14a-8*

Dear Ladies and Gentlemen:

This letter is to inform you that it is the intention of our client, The Dow Chemical Company (the "Company"), to omit from its proxy statement and form of proxy for the Company's 2005 Annual Meeting of Stockholders (collectively, the "2005 Proxy Materials") a stockholder proposal and statement in support thereof (the "Proposal") received from Trillium Asset Management Corporation as the representative of Mr. Daniel Clowes (the "Proponent"). The Proposal addresses the Company's reporting regarding certain toxic substances. Specifically, the Proposal asserts that the disclosures the Company already provides have "gaps" in their coverage and requests that the Company publish "a report filling the gaps in Dow Chemical transparency discussed above." The Proposal and related correspondence are attached hereto as Exhibit A.

On behalf of our client, we hereby notify the Division of Corporation Finance of the Company's intention to exclude the Proposal from its 2005 Proxy Materials, and we respectfully request that the staff of the Division of Corporation Finance (the "Staff") concur in our view that the Proposal is excludable under Rule 14a-8(i)(7) because the Proposal deals with matters related to the Company's ordinary business operations and under Rule 14a-8(i)(10) because the Company has already substantially implemented it.

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Pursuant to Rule 14a-8(j), enclosed herewith are six copies of this letter and its attachments. Also in accordance with Rule 14a-8(j), a copy of this letter and its attachments is being mailed on this date to the Proponent, informing it of the Company's intention to omit the Proposal from its 2005 Proxy Materials. Pursuant to Rule 14a-8(j), this letter is being filed with the Securities and Exchange Commission (the "Commission") no later than 80 calendar days before the Company files its definitive 2005 Proxy Materials with the Commission. On behalf of the Company, we hereby agree to promptly forward to the Proponent any Staff response to this no-action request that the Staff transmits by facsimile to us only.

ANALYSIS

The Proposal seeks to micromanage the form and content of the Company's disclosures regarding certain specifically identified aspects of the Company's environmental and health initiatives. We believe that the Proposal does not address any general policy issue. Rather, the Proposal ignores the broad scope and robust content of the Company's existing disclosures regarding the Company's positions on and responses to various initiatives addressing possible implications of the use and production of toxic chemicals, and seeks to micromanage those disclosures by delving into details that relate to the Company's ordinary business operations. Specifically, the Proposal asserts that the Company's existing disclosures do not adequately address the following four items and requests that the Company take additional steps and provide additional information to fill these purported "gaps:"

- "Analyze implications for the company of the human blood testing trend, including the CDC tests showing pervasive exposures to chlorpyrifos;"
- "Describe how public policies may restrict markets for each category of Dow product lines, including under the Stockholm POPs treaty, emerging state programs, and the proposed European REACH program;"
- "List Dow products anticipated under the proposed European 'REACH' program to require specific authorization or be restricted; and"
- "Provide a plan and timeline for phase-out of each product involving a PBT chemical or byproduct, or an explanation of why alternatives cannot be substituted, explaining how the company will respond to rising regulatory and market pressures to eliminate these substances."

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The Proposal differs slightly from the proposal submitted to the Company last year by the Proponent, which the Staff concurred that the Company could exclude because it related to an evaluation of risks and liabilities.¹

1. The Proposal May Be Excluded under Rule 14a-8(i)(7) Because the Proposal Deals with Matters Relating to the Company's Ordinary Business Operations.

The Proposal properly may be omitted pursuant to Rule 14a-8(i)(7) because the Proposal delves into the ordinary business operations of the Company. According to the Commission's Release accompanying the 1998 amendments to Rule 14a-8, the underlying policy of the ordinary business exclusion is "to confine the resolution of ordinary business problems to management and the board of directors, since it is impracticable for shareholders to decide how to solve such problems at an annual meeting." Release No. 34-40018 (May 21, 1998) (the "1998 Release"). The 1998 Release stated that two central considerations underlie this policy. First, that "[c]ertain tasks are so fundamental to management's ability to run a company on a day-to-day basis" that they are not proper subjects for stockholder proposals. The Commission stated that the other policy underlying Rule 14a-8(i)(7) is "the degree to which the proposal seeks to micro-manage the company by probing too deeply into matters of a complex nature upon which shareholders, as a group, would not be in a position to make an informed judgment."

¹ Last year's proposal asserted that the Company's disclosures reflected "gaps" that should be filled by addressing:

- "How public policies may impact the company's product lines, including the Stockholm POPs treaty, Great Lakes Water Quality Agreement and the proposed European REACH program."
- "The list of Dow Chemical products anticipated to require specific authorization or be restricted under the proposed European "REACH" program."
- "A company plan and timeline for phase-out of each product involving a persistent, bioaccumulative chemical or byproduct, or an explanation of why alternatives cannot be substituted, explaining how the company will respond to rising regulatory, competitive and public pressure."
- "A listing of the reasonable range of projected costs of remediation or liability anticipated for (a) Midland, Michigan, (b) Agent Orange, and (c) each of the other potentially material toxic sites and issues facing the company."

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A. *The Proposal Seeks to Micromanage the Preparation and Content of Information Published by the Company in a Highly Detailed Report.*

As addressed in part 2 of this letter, the Company has published extensive information on the policy issue covered by the Proposal – the implications for the Company and its product lines of various initiatives addressing possible health implications from the use and production of toxic chemicals – and we believe this existing disclosure substantially implements the Proposal. The Proposal does not assert that the Company is failing to take steps to address and publish information on this policy issue, but instead faults certain purported “gaps” in the Company’s disclosures. In addition to the information that the Company has disclosed, the Proposal would have the Company engage in certain analyses and generate additional details to be included in its disclosures. Specifically, the Proposal seeks to have the Company (i) analyze each of its products or product categories separately under each of a variety of regulatory initiatives (regulatory blood testing trends, the Stockholm POPs treaty, emerging state programs and the proposed European REACH program), (ii) present a variety of different reports on how those initiatives may affect markets for various products, and (iii) present specified information on the Company’s product marketing plans for each product involving a PBT chemical or byproduct. The Proposal thus seeks to micro-manage the steps the Company undertakes in the course of developing and presenting its position on this complex issue and the specific information the Company includes in its public disclosures.

In *Ford Motor Co.* (avail Mar. 2, 2004), the Staff concurred that Ford could exclude a proposal that addressed the significant policy issue of global warming, but sought to mandate that Ford undertake specified analyses and present specified information on the issue. As described by the Staff, the report was to include “detailed information on temperatures, atmospheric gases, sun effects, carbon dioxide production, carbon dioxide absorption, and costs and benefits at various degrees of heating and cooling.” The Staff permitted exclusion of the proposal because it related to “the specific method of preparation and the specific information to be included in a highly detailed report.” *See also General Motors Corp.* (avail. Apr. 7, 2004) (concurring on the same ground with exclusion of a substantially similar proposal). Here, as in *Ford Motor Co.* and *General Motors Corp.*, the thrust of the Proposal is to dictate details on how the Company should go about analyzing its response to and reporting on a complex issue. Specifically, the Proposal would have the Company focus on a single testing method for assessing the possible implications of the Company’s products, provide a detailed list of each public policy that may implicate each of the Company’s product lines, provide a list of each product marketed by the Company in Europe that may be subject to a proposed regulatory regime, and provide a product-by-product marketing plan and assessment of alternative products for products that involve a PBT chemical or byproduct. The Proposal does not offer any explanation as to why the information it requests would be more informative or more helpful to stockholders than the information already presented by the Company. Instead, it seeks details in an attempt to second-guess the Company’s management with respect to the format and detail of

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the Company's communications with its stockholders and other stakeholders when addressing the underlying policy issue. Moreover, the detail sought by the Proposal is the type of complex information that stockholders as a group are not in the position to assess. For the foregoing reasons, the Proposal likewise should be excludable under Rule 14a-8(i)(7).

The Proposal's attempt to micromanage the Company is further evidenced by the assertion in the Proposal that the Proponent believes the Company's disclosures "obscure rather than clarify important policy issues." If the Company were to raise a comparable complaint with respect to statements in the Proposal, the Staff would not allow the Company to exclude the statements, since – as reflected in Staff Legal Bulletin No. 14B – the Staff recognizes that statements in a proposal are the responsibility of the proponent, not the company.² For example, in Staff Legal Bulletin No. 14B, the Staff stated that it will not address arguments regarding proponents' statements where the company objects to factual assertions because those assertions may be interpreted by shareholders in a manner that is unfavorable to the company. For the same reason, because the exact content and format of Company statements in Company disclosures is the responsibility of management, we do not believe that a stockholder proposal that objects to factual statements by the Company raises significant policy issues; the fact that the Proponent may have a different view on how best to analyze and report on an issue does not raise a significant policy consideration. That type of objection demonstrates that the Proponent only seeks to micromanage the specific method of preparation and specific information to be included in a highly detailed report.

When addressing highly complex matters such as those covered by the Company's current disclosures, it will always be possible for a person with deeply held or adverse positions on an issue to single out aspects of the disclosures that are not addressed in the exact manner or as fully as that person may prefer. We do not believe that this type of micromanagement of a company's response to a significant policy issue is the purpose of the stockholder proposal process. The Proponent does not assert that the Company is failing to address the policy issue raised in the Proposal, but is seeking merely to have the Company add additional detail to that disclosure to "fill gaps" that in the Proponent's opinion exist. In that respect, the Proposal is similar to other proposals that did not reflect a dispute as to whether a company should address a specific policy issue, but only addressed details regarding the manner in which the company was responding to the issue. For example, in *E.I. Du Pont De Nemours and Co.* (avail. Mar. 8, 1991), the proposal requested the company to accelerate its phase-out of certain chemicals (CFC)

² See Staff Legal Bulletin No. 14B (Sept. 15, 2004): "Specifically, because the shareholder proponent, and not the company, is responsible for the content of a proposal and its supporting statement, we do not believe that exclusion or modification under rule 14a-8(i)(3) is appropriate for much of the language in supporting statements to which companies have objected."

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and to develop a program on R&D and marketing substitutes. The company had already committed to a total phase-out of CFC production on a timetable that had been set by management, taking into account the many different business issues that decision involved. In permitting the proposal to be excluded, the Staff stated that “the thrust of the proposal appears directed at those questions concerning timing, research and marketing decisions that involve matters relating to the conduct of the company’s ordinary business operations.” *See also, E.I. Du Pont De Nemours and Co.* (avail. Mar. 8, 1991) (exclusion allowed under predecessor to Rule 14a-8(i)(7) where the company argued that the subject of the proposal – specifics on how the company conducted its uranium milling and related disposal operations – did not raise any policy issue but instead addressed the technical aspects of the issue and therefore involved the sort of decision that is properly left to the management of the company). Here, in addressing the policy issue, the thrust of the Proposal is to seek additional detail on the Company’s assessment of product markets, on its product development and marketing decisions and on its responses to regulatory initiatives, all of which implicate ordinary business decisions which are properly left to management.

B. The Proposal Seeks to Micromanage the Preparation and Content of Information Published by the Company in a Highly Detailed Report.

The Staff also has stated that a proposal requesting the dissemination of a report may be excludable under Rule 14a-8(i)(7) if the substance of the report is within the ordinary business of the issuer. *See* Release No. 34-20091 (Aug. 16, 1983). Certain of the “gaps” that the Proponent alleges exist in the Company’s public disclosures do not involve broad policy issues but instead relate to details of how the Company manages its day-to-day business. In particular, the Proposal seeks what is essentially financial information on the risks that various initiatives pose to the markets for the Company’s products, information on the possible impact of various prospective legislative and regulatory initiatives and information on product research and development.³ Accordingly, the Proposal properly may be omitted from the 2005 Proxy

³ Even if some of the alleged “gaps” in disclosure do not relate to ordinary business matters, the Staff has consistently held that a proposal calling for a report that addresses a number of different items can be excluded if any part of the proposed disclosures relate to a company’s ordinary business. *See* Release No. 34-20091 (Aug. 16, 1983). For example, in *Chrysler Corporation* (avail. Feb. 18, 1998), the proposal requested the company to initiate a review of the company’s code or standards for its international operations and issue a report thereon. The Staff agreed that the proposal could be excluded under Rule 14a-8(i)(7), stating “although the balance of the proposal and supporting statement appears to address matters outside the course of ordinary business, paragraph 5 of the resolution relates to ordinary business matters, and paragraph 6 is susceptible to a variety of interpretations, some of which could involve ordinary business matters.” Likewise, the Staff recently confirmed that “where the subject matter of the additional disclosure sought in a particular proposal involves a matter of ordinary business ... it may be excluded under Rule 14a-8(i)(7).” *Johnson Controls, Inc.* (avail. Oct. 26, 1999). In accordance with all the precedents cited herein, the Company should be permitted to exclude the

[Footnote continued on next page]

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Materials pursuant to Rule 14a-8(i)(7) because the Proposal is not limited to significant policy issues but instead seeks disclosure of matters relating to the Company's ordinary business operations.

The Proposal requests the Company to “Describe how public policies may restrict markets for each category of Dow product lines, including under the Stockholm POPs treaty, emerging state programs, and the proposed European REACH program.” The request for information on the impact on product markets seeks information on the financial impact to the Company from various environmental and health regulatory initiatives. The information sought goes to the Company’s assessment of the economics and risks it faces from the conduct of its ordinary business operations (*i.e.*, marketing its product lines around the world). It is well established that proposals seeking detailed information on a company’s assessment of risks that are incident to its ordinary business operations do not raise significant policy issues and instead delve into the minutiae and details of the ordinary conduct of business. For example, in *Newmont Mining Corp.* (avail. Feb. 4, 2004), the Staff concurred that the company could exclude a proposal requesting that the company’s board of directors publish a report on the risk to the company’s “operations, profitability and reputation” arising from its social and environmental liabilities, where the company argued that an assessment of financial risks of its operations implicated the company’s ordinary business operations. In its response, the Staff noted that the proposal was excludable under Rule 14a-8(i)(7) on the basis that it pertained to the “evaluation of risk.” Here, by requesting that the Company “fill the gaps” by describing how possible regulation may “restrict markets for each category of Dow product lines,” the Proposal basically asks for an assessment of the risks to the Company’s product markets from possible environmental or health regulation. In this respect, the proposal also is similar to the one addressed in *Xcel Energy, Inc.* (avail. Apr. 1, 2003). That proposal requested the company to issue a report on, among other things, the economic risk associated with the Company's past, present, and future emissions of certain chemicals. The Staff concurred that the proposal could be excluded under Rule 14a-8(i)(7) because it related to the evaluation of risks from the company’s operations. *See also, Mead Corp.* (avail. Jan. 31, 2001) (proposal requiring a description of Mead’s liability projection methodology and an assessment of other major environmental risks excludable under Rule 14a-8(i)(7)).

In addition to requesting the Company to “Describe how public policies may restrict markets for each category of Dow product lines, including under the Stockholm POPs treaty, emerging state programs, and the proposed European REACH program,” the Proposal also

[Footnote continued from previous page]

entire Proposal from its 2005 Proxy Materials because it calls, at least in part, for a report on matters related to the Company’s ordinary business operations in contravention of Rule 14a-8(i)(7).

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requests the Company to “List Dow products anticipated under the proposed European ‘REACH’ program to require specific authorization or be restricted.” Both of these prongs of the Proposal thus ask the Company to report on how pending regulatory and legislative initiatives may affect the Company. The Staff consistently has concurred that proposals seeking reports on the impact to a company’s operations of regulations or legislation being considered by national (or in this case, local, international or multi-national) policymakers may be excluded because they seek to involve the company in the political or legislative process relating to an aspect of the company’s operations. For example, in *International Business Machines Corporation* (avail. Mar. 2, 2000) the proposal asked the company to prepare “a report on the potential impact on IBM of pension-related proposals now being considered by national policy makers, including legislative proposals affecting cash balance pension plan conversions and related issues.” Noting that the proposal “appears directed at involving IBM in the political or legislative process relating to an aspect of IBM’s operations,” the Staff concurred that the company could rely on Rule 14a-8(i)(7) to exclude the proposal. *See also Electronic Data Systems Corporation* (avail. Mar. 24, 2000) and *Niagara Mohawk Holdings, Inc.* (avail. Mar. 5, 2001) (both seeking reports evaluating the impact of proposed legislative and regulatory initiatives). In *Brown Group, Inc.* (avail. Mar. 29, 1993), the Staff concurred that the company could exclude a proposal requesting the board of directors to establish a committee that would evaluate and report on the impact of various health care reform proposals because the proposal appeared to be “directed at involving the Brown Group in the political or legislative process relating to an aspect of the Brown Group’s operations.”⁴

Finally, the Proposal requests that the Company report on “a plan and timeline for phase-out of each product involving a PBT chemical or byproduct, or an explanation of why alternatives cannot be substituted, explaining how the company will respond to rising regulatory and market pressures to eliminate these substances.” This prong of the Proposal implicates the Company’s marketing decisions regarding certain of its products; *i.e.*, for how long it will market the products, why it may seek to continue to market certain products and how it will respond to various pressures in marketing its products. In this respect, the Proposal is similar to one that the Staff concurred could be excluded by Johnson & Johnson. In *Johnson & Johnson* (avail. Jan. 12, 2004), the proposal requested that the company review pricing and marketing policies and prepare a report on how the company will respond to regulatory, legislative and public pressure

⁴ To the extent that any of these proposals becomes law, the Proposal would still be excludable because it seeks details on the Company’s compliance with governmental statutes and regulations, which proposals are excludable pursuant to Rule 14a-8(i)(7). In *Duke Power Company* (avail. Feb. 1, 1988) and *Carolina Power and Light Company* (avail. Mar. 30, 1988), for example, the Staff concurred that a proposal requiring an annual report detailing the company’s environmental protection and pollution control activities could be omitted from its proxy statement on Rule 14a-8(i)(7) grounds because compliance with government environmental regulations was considered part of the company’s ordinary business operations.

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to increase access to prescription drugs. Johnson & Johnson noted that the Staff previously had concluded that pharmaceutical pricing may raise a significant policy issue, but distinguished the proposal it had received on the basis that it also sought information on marketing policies, which implicated the company's ordinary business. *See also, Pfizer Inc.* (avail. Jan. 25, 2004) (allowing exclusion of a proposal relating to product research, development and testing). Here, as in *Johnson & Johnson*, the Proposal seeks information on how the Company will respond to regulatory and market pressures in determining what products to market.

As in the foregoing examples, the Proposal here does not raise any new significant policy issues for the Company to address, but instead seeks to micromanage the company by delving into the details of the Company's ordinary business operations and calling for a report on the Company's assessment of risks and financial exposure, of the implications of pending legislative and regulatory initiatives and of marketing practices. As such, we believe that the Proposal may be excluded under Rule 14a-8(i)(7).

2. The Proposal May Be Excluded under Rule 14a-8(i)(10) Because the Company Has Substantially Implemented the Proposal.

Rule 14a-8(i)(10) permits exclusion of a stockholder proposal "if the company has already substantially implemented the proposal." According to the Commission, the exclusion provided in Rule 14a-8(i)(10) "is designed to avoid the possibility of shareholders having to consider matters which have already been favorably acted upon by the management." *See Exchange Act Release No. 12598* (July 7, 1976). When a company can demonstrate that it already has taken actions to address each element of a stockholder proposal, the Staff has concurred that the proposal has been "substantially implemented" and may be excluded as moot. *See, e.g., Exxon Mobil Corporation* (avail. Jan. 24, 2001) (proposal that board conduct a review of a project and report on its results substantially implemented by prior corporate disclosures); *Nordstrom, Inc.* (avail. Feb. 8, 1995) (proposal that the company commit to a code of conduct for its overseas suppliers that was substantially covered by existing company guidelines was excludable as moot). *See also The Gap, Inc.* (avail. Mar. 8, 1996). As detailed below, the Company already provides extensive disclosure on each of the topics addressed in the Proposal, and thus has substantially implemented the Proposal.

The Proposal refers to four alleged "gaps in transparency" with respect to topics addressed in the Company's existing public disclosures. We have attached to this letter at Exhibit B copies of some of the Company's materials addressing the items listed in the Proposal, and have set forth below the website links to that information. These disclosures are set forth on websites maintained by the Company and its businesses. On the section of the Company's website entitled "Our Commitments: Environmental Stewardship" that appears at <http://www.dow.com/commitments/stewardship/index.htm> and <http://www.dow.com/commitments/debates/index.htm>, the Company addresses both the public

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policy issues and the Company's actions and/or responses to the items enumerated in the Proposal. Much of this information is published and regularly updated. In addition, the Company provides detailed information regarding its environmental policies and expenditures in The Dow Global Public Report (the most recent edition of this report was published in February 2004 and appears at <http://www.dow.com/publicreport/2003/>, which is supplemented by a report presented in the format recognized by the Global Reporting Initiative that appears at <http://www.dow.com/publicreport/2003/pdf/233-00225.pdf>. These web sites include specific and substantive discussions on each of the items listed in the Proposal.

- The Proposal requests that the Company “Analyze implications for the company of the human blood testing trend, including the CDC tests showing pervasive exposures to chlorpyrifos.” The Company addresses the implications of biomonitoring, which is the laboratory measurement of chemicals in blood or other body fluids, at <http://www.dow.com/commitments/debates/biomonitoring/index.htm>. The Company's Dow AgroSciences business provides extensive disclosure on chlorpyrifos at <http://www.dowagro.com/chlorp/index.htm>.
- The Proposal requests the Company to “Describe how public policies may restrict markets for each category of Dow product lines, including under the Stockholm POPs treaty, emerging state programs and the proposed European REACH program.” The Company's discussion on the Stockholm POPs Treaty is set forth at <http://www.dow.com/environment/dioxin/treaty.htm>. This site describes the Stockholm Treaty as it relates to the Company, including the fact that the majority of the substances addressed in the treaty are pesticides that are neither created nor emitted by the Company. The site also describes the Company's approach to meeting the requirements of the treaty, and provides a direct link to the official Stockholm Treaty web site. As stated elsewhere on the Issues and Challenges site (<http://www.dow.com/commitments/debates/dioxin/background.htm>), the Company actively supports the Stockholm Treaty. The discussion on the Great Lakes Water Quality Agreement (“GLWQA”), at <http://www.dow.com/environment/debate/d12.html>, discusses the agreement (with a direct link to the official GLWQA web sites in both the US and Canada), its principle areas of focus and the Company's actions in regard to the agreement. A list of the Company's public reports for various localities can be found at <http://www.dow.com/publicreport/2003/download/index.htm> and at <http://www.dow.com/publicreport/2003/world/index.htm>. Discussions of other local programs are presented at <http://www.dow.com/commitments/debates/dioxin/issues.htm>.
- In addition to the reference to the European REACH project above, the Proposal requests the Company to “List Dow products anticipated under the proposed

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European "REACH" program to require specific authorization or be restricted." The discussion on the proposed European Union's Registration, Evaluation, and Authorization of Chemicals ("REACH") program is set forth at <http://www.dow.com/environment/debate/d13.html> and at http://www.dow.com/commitments/debates/reach/eu_comm.htm. This site describes the Company's understanding and analysis of, and position on, the proposed regulatory requirements of REACH, explaining that REACH has not been formally adopted so that rules and protocols are not yet developed. The site provides a direct link to the European Union's official REACH web site for current information. The 2003 Global Report also states that the Company is continuing to assess the impact of various new regulatory proposals, including the European "REACH" program, which could apply to some 30,000 chemicals currently on the market.

- The Proposal requests that the Company "Provide a plan and timeline for phase-out of each product involving a [persistent bioaccumulative toxic] PBT chemical or byproduct, or an explanation of why alternatives cannot be substituted, explaining how the company will respond to rising regulatory and market pressures to eliminate these substances." The Company's position on persistent bioaccumulative toxic (PBT) compounds is set forth at <http://www.dow.com/commitments/debates/dioxin/dioxintreaty.htm>. The Company clearly states that its focus has been and continues to be on reducing emissions of PBTs, rather than phasing out of products.

We believe that the disclosures described above and maintained on the Company's website, when compared to the disclosure items that the Proposal specifically addresses, demonstrate that the Company has substantially implemented the Proposal in The Dow Global Public Report and other public disclosures. The fact that the Company's disclosures may not appear in a single report as requested by the Proponent or may not provide as extensive detail as the Proponent would prefer does not mean that the Company has failed to substantially implement the Proposal. *See, for example, Exxon Mobil Corporation* (avail. Jan. 24, 2001); *E. I. Du Pont de Nemours and Company* (avail. Feb. 14, 1995); *The Boeing Company* (avail. Feb. 7, 1994); *Houston Industries Inc.* (avail. Apr. 21, 1988); *Houston Industries Inc.* (avail. Apr. 10, 1987). Accordingly, we believe that the Proposal may be excluded under Rule 14a-8(i)(10).

Based on the foregoing, we hereby respectfully request that the Staff of the Commission concur that it will take no action if the Company excludes the Proposal from its 2005 Proxy Materials. We would be happy to provide you with any additional information and answer any questions that you may have regarding this subject. Please do not hesitate to call me at (202)

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955-8671, or the Company's Corporate Secretary, Tina S. Van Dam, at (989) 636-2663, if we can be of any further assistance in this matter.

Sincerely,



Ronald O. Mueller

Enclosures

cc: Tina S. Van Dam, Corporate Secretary, The Dow Chemical Company
Daniel Clowes, Proponent
Shelley Alpern, Assistant Vice President, Trillium Asset Management Corporation

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SHAREHOLDER PROPOSAL

Submitted by Trillium Asset Management

REPORT ON CERTAIN TOXIC CHEMICALS FROM DOW CHEMICAL PRODUCTS WIDELY DETECTED IN HUMANS**Whereas:**

- The U.S. Centers for Disease Control recently reported on the testing of 9,282 people nationwide. The study found that 93% of the US population has levels of chlorpyrifos metabolites in their bodies. The average tested child aged 6-11 was found to have exposure to the neurotoxic pesticide chlorpyrifos at four times the level the U.S. Environmental Protection Agency considers acceptable for long term exposure. One market analysis concluded that Dow Chemical was likely to have contributed at least 80% of the chlorpyrifos exposure in the U.S. Although all residential uses of chlorpyrifos were phased out beginning in 2000, agricultural and industrial uses are still allowed.

In the opinion of the proponents, such test results will aid the correlation of exposure to disease, and increase the likelihood of liability suits against chemical producers, including our company.

- Dow's Midland, Michigan facility releases dioxin to air, land and water. The surrounding city and floodplain are contaminated with dioxin. Levels detected downriver are up to 80 times the state's residential cleanup standard, and blood testing has detected dioxin levels above average in some residents. State advisories warn residents to limit exposure to contaminated soil and consumption of fish and wild game. A class action lawsuit representing up to 2000 residents asserts property damages and seeks medical monitoring.
- The herbicide Agent Orange was contaminated with dioxin, exposing soldiers and residents in Vietnam. US and Vietnamese veterans and their families are suing Dow for compensation. A 2003 Supreme Court decision may allow thousands of new US veterans' suits to proceed.
- Emerging public policies may alter markets for certain Dow product lines. The European Union proposes requiring manufacturers that sell chemicals to provide data on hazards and uses, and to require approval of certain "very high concern" chemicals, including persistent and bioaccumulative toxins (PBT), carcinogens, mutagens and reproductive toxins. The Stockholm Treaty on Persistent Organic Pollutants and the Great Lakes Water Quality Agreement both encourage elimination of PBT products and precursors.

In the proponents' opinion, management's disclosures obscure rather than clarify important policy issues confronting Dow because they fail to:

- Analyze implications for the company of the human blood testing trend, including the CDC tests showing pervasive exposures to chlorpyrifos;

SHAREHOLDER PROPOSAL

Submitted by Trillium Asset Management

- Describe how public policies may restrict markets for each category of Dow product lines, including under the Stockholm POPs treaty, emerging state programs, and the proposed European REACH program;
- List Dow products anticipated under the proposed European "REACH" program to require specific authorization or be restricted; and,
- Provide a plan and timeline for phase-out of each product involving a PBT chemical or byproduct, or an explanation of why alternatives cannot be substituted, explaining how the company will respond to rising regulatory and market pressures to eliminate these substances.

RESOLVED: Shareholders request that the Board publish by October 2005, at reasonable cost and excluding proprietary information, a report filling the gaps in transparency discussed above.



*Van Dam
McGuire*

To: Mr. Richard Manetta
General Counsel
Dow Chemical Co.

From: Robyn Young
Research and Advocacy

Tel: (989) 636-1000

Tel: 617 292 8026 x252

Fax: (989) ~~636-1000~~ 636-7711

Fax: 617 482 6179

Re: Shareholder resolution

Date: 11/19/2004

of Pages: 3

Dear Mr. Manetta,

Enclosed is the documentation for Trillium Asset Management's shareholder resolution with Dow Chemical Co. regarding the creation of a toxic waste emissions report. Please confirm receipt of this fax by emailing me at: ryoung@trilliuminvest.com.

Sincerely,

Robyn Young
Social Research & Advocacy
Trillium Asset Management Corporation

RECEIVED

NOV 23 2004

T.S. Van Dam



Trillium Asset Management Corporation
711 Atlantic Avenue • Boston, Massachusetts 02111-2809
tel 617-423-6655 fax 617-482-6179 toll-free 800-548-5684

20 Years of
Investing for
a Better World

November 19, 2004

Richard L. Manetta
Vice President, General Counsel
Dow Chemical Co.
2030 Dow Center
Midland, MI 48674

Dear Mr. Manetta:

I am hereby authorized to notify you of our intention to file the enclosed shareholder resolution with Dow Chemical Co. TRILLIUM ASSET MANAGEMENT CORP. submits this resolution for inclusion in the proxy statement, in accordance with Rule 14-a-8 of the General Rules and Regulations of the Securities and Exchange Act of 1934. TRILLIUM ASSET MANAGEMENT is the beneficial owner of 1,200 shares managed on behalf of Daniel Clowes, who acquired this position more than one year prior to this date. We will forward to you shortly a letter from Daniel Clowes authorizing TRILLIUM ASSET MANAGEMENT to represent him in this matter, and stating his intention to hold his position through the date of the 2005 annual meeting. Verification of ownership will also be provided.

Sincerely,

Shelley Alpern
Assistant Vice President

cc: Mr. Andrew Liveris, President & CEO, Dow Chemical Co.
Mr. Daniel Clowes

Boston

Durham

San Francisco

Botte www.trilliuminvest.com



Our Commitments Environmental Stewardship



In 1996, Dow announced a series of ambitious goals to improve Environment, Health, and Safety performance. We did this because we value the safety of our people and neighbors. This section of the report will demonstrate our progress toward these goals. The graphs displayed are compelling, but we must all look beyond the numbers and recognize that behind each statistic there are people. In essence, since adopting these goals, 10,000 Dow employees and contractors would otherwise have been injured if we had been content with "business as usual." These goals and their attendant improvements prevented these injuries.

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Our "Vision of Zero" means we want no injuries, illnesses, accidents, or environmental harm to result from our enterprise. It is a lofty goal, but it is also the only acceptable Vision for us to work toward.

Accountability for Progress

Our progress is based on two things:

- Implementation of a global management system and global standards providing standardized approaches shared among facilities
- Clear accountability

The entire Dow workforce is responsible for the achievement of our Environment, Health, and Safety (EH&S) 2005 goals. Each business, site, and function is directly accountable for its EH&S performance. A portion of many individuals' variable compensation is tied to progress on our EH&S goals. Clear accountability also includes accountability toward society. When the goals were launched in 1996, we committed to annual public progress reports.

Our Environmental Stewardship data takes into account divestitures, mergers, and acquisitions and reflects these activities.

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Our Commitments Environmental Stewardship

Business Case

Doing good for the environment is not just driven by moral considerations. It simply makes good business sense as well. The ability to integrate the principles of Sustainable Development might very well become a determining factor in the long-term survival of companies.

In 2002, we revisited the business case for meeting the EH&S 2005 goals that we had established, based on recent performance and expectations for future performance, costs and benefits.

For our [Resource Productivity Improvement goals](#) (Energy, Waste, Wastewater, Overall Chemical Emissions, Priority Compounds, and Dioxins), we estimate that we will ultimately spend close to \$1 billion and achieve overall value of \$3-5 billion, largely dependent on the volatile price of energy and feedstocks.

Achieving significant improvements in overall energy use is especially important in the current environment of rapidly increasing feedstock and energy costs.

We also assessed the cost/benefit of achieving our [EH&S 2005 Incidents goals](#) (Process Safety, Personal Safety, Loss of Primary Containment, and Transportation). We estimate a total cost of \$95 million, and an overall value of \$130 million. The value was determined using a methodology adapted from the Total Cost Assessment methodology developed by the Center for Waste Reduction Technologies, a working group of the American Institute of Chemical Engineers.

The world is rapidly changing. Scarcity of resources, continuing population growth, and the influence of human activity on the future of the world are causes for concern. Society, which ultimately holds our license to operate and grow, expects industry to play its part in the resolution of these issues. In return, companies that take on this challenge can look forward to a better relationship with community neighbors, a boost in employee motivation, increased customer loyalty, reduced costs and liabilities, and a better corporate reputation – all of which have a direct or indirect influence on a company's financial results.

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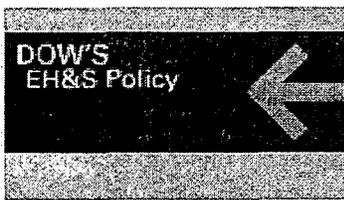


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Our Commitments Environmental Stewardship



At Dow, protecting people and the environment is part of everything we do and every decision we make. Each employee has a responsibility to ensure that our products and operations meet applicable government or Dow standards, whichever is more stringent.

Our goal is to eliminate all injuries, prevent adverse environmental and health impacts, reduce wastes and emissions, and promote resource conservation at every stage of the lifecycle of our products. We will report our progress and be responsive to the public.

For a complete listing of Dow policies, see [Dow's Code of Business Conduct](#).

2005 Goals Update

In 1996, we publicly announced aggressive, voluntary, global EH&S Goals for the Year 2005. While we continue to make progress as compared against our baseline year, several of our goals will require additional attention and action. The data indicates that our performance is improving overall. We update our performance records annually or quarterly, depending on the goal.

→ [Responsibility and Accountability](#)

Global Progress on Responsible Care® Codes of Management Practice

→ [Prevent EH&S Incidents](#)

Injury and Illness Rate
Loss of Primary Containment (Leaks, Breaks, and Spills)
Transportation Incidents
Process Safety Incidents
Motor Vehicle Incident Rate
Repeat Incidents at Customer Facilities
Fatalities
EH&S Capital Spending

→ [Increase Resource Productivity](#)

Emissions of Priority Compounds
Dioxin Emissions to Air and Water
Chemical Emissions
Global Production
Waste
Wastewater
Energy Use

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[Prevent Environment, Health & Safety Incidents](#)
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Our Commitments Environmental Stewardship

Government Reportables

Measurements for government reportables, notices of violation and compliance orders, and fines and penalties are truly lagging indicators of performance. Simply put, they are not an accurate measurement of current performance but are typically one to two years behind because of the various stages in the regulatory process. Despite the timeframe involved, our current performance in these areas is not up to the standards that we have set for ourselves. These numbers should be declining, and they are not. We are not content to accrue government penalties as a way to run our business. Information about how we plan to improve our performance is detailed below. These measurements, however, are all strongly impacted by loss of primary containment (LOPC) performance. As we've made great strides recently in our LOPC performance, we expect that these lagging indicators will generate an improvement on these measurements on the near horizon. Therefore the acceleration of improvement in LOPC performance will improve these lagging indicators but not necessarily concurrent with the same timeframe.

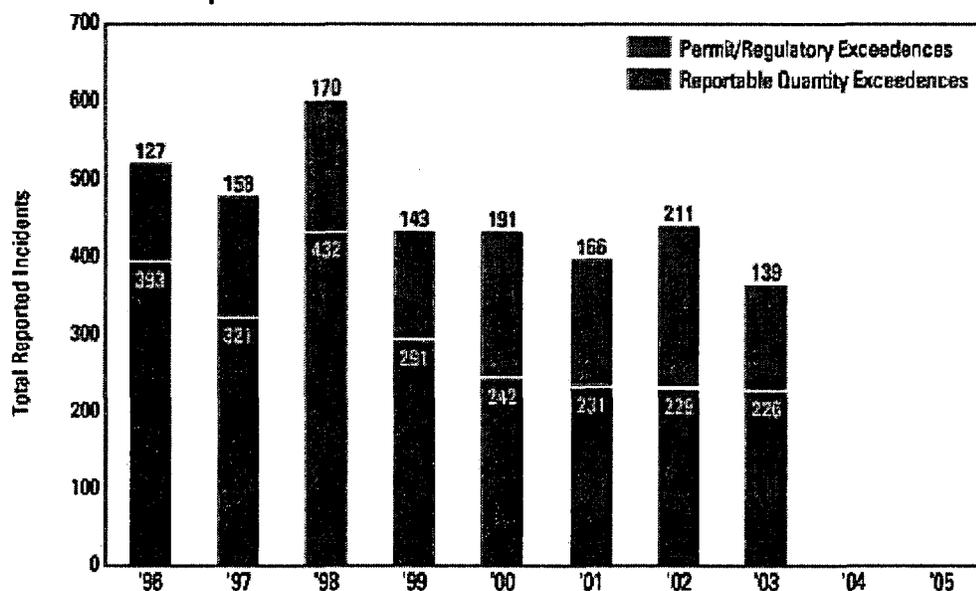
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Government Reportables

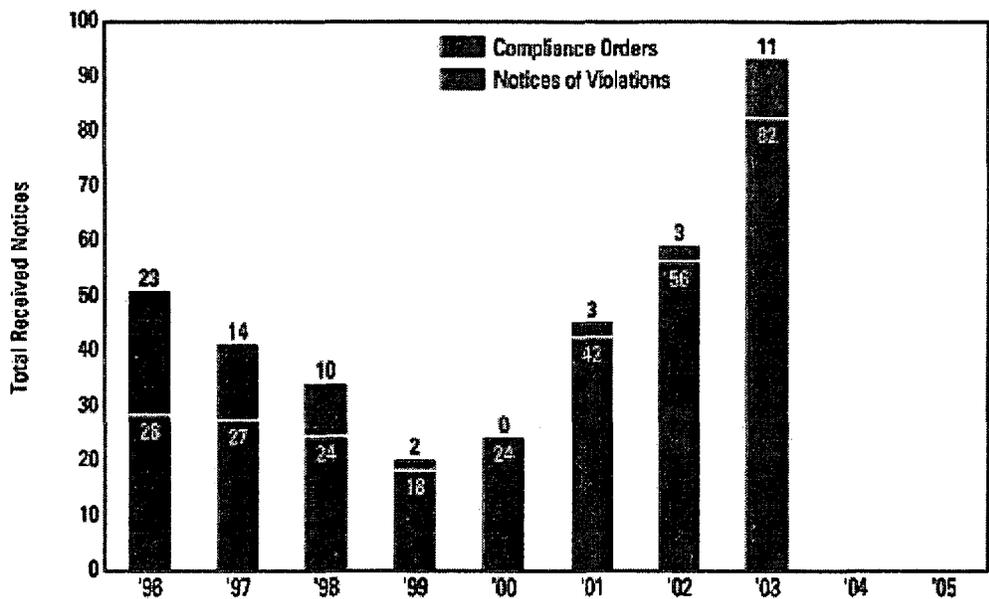


Government reportables are those incidents that are reported to government agencies – both voluntarily and required. They represent either spills or releases that exceed reportable quantities established by the government, or incidents that exceed our permit level.

In 2003, we reported a total of 226 reportable quantity exceedences and 139 permit/regulatory exceedences worldwide.

Government reportables are primarily triggered by loss of primary containment (LOPC) incidents and permit exceedences. As we have been successful at reducing our overall LOPC numbers, we are optimistic that an LOPC reduction initiative at just a few of our facilities will turn this performance around. Our approach to improvement includes not only reliance upon the LOPC initiative at targeted sites, but continued focus on assuring permit requirements are institutionalized in our management system and effective implementation of our improvement tools in that system.

Notices of Violation and Compliance Orders



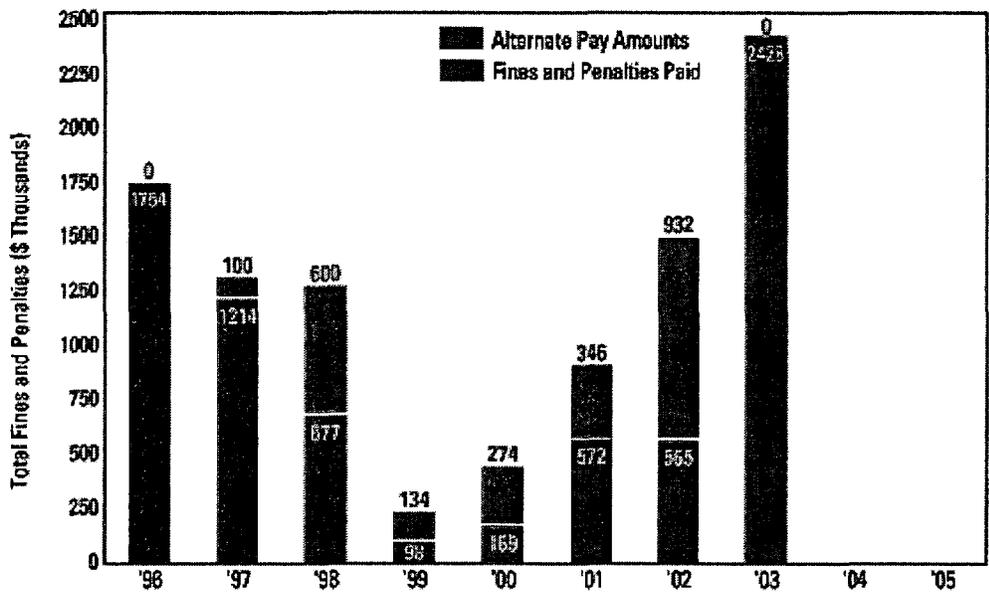
The number of notices of violation increased from 56 to 82 in 2003. The majority of these violations occurred within our North American operations. There is an overlap between government reportables and notices of violation (NOV's) and compliance orders. Government reportables typically use a self-reporting mechanism to commence their enforcement actions.

Compliance orders are issued by the government setting out the conditions a facility must meet to continue operation. In 2003, we had eight more compliance orders than in 2002.

NOV's also are primarily triggered by LOPC's. To improve this performance, we again are relying upon our LOPC reduction initiative applied at specific sites, which are currently experiencing the most difficulty in this area.

The use of NOV's and compliance orders are a reflection not only of our performance, but also of the enforcement culture of the governmental entities in authority.

Fines and Penalties



Fines and penalties are tracked globally and are recorded in the year they are paid. In lieu of paying a fine or penalty, alternate pay amounts usually encompass projects benefiting the environment or local community, such as pollution prevention or remediation programs, public awareness, education activities, or wetland conservation activities. Fines and penalties are troubling not only

because they indicate government-mandated performance, but also because they require cash outlays at the same time we are so focused on cost containment within the Company.

In 2003, Dow paid \$2,428,070 in fines and penalties. One North American facility accounted for 92 percent of the fines. Because fines and penalties are again a lagging indicator, we expect that our recent improvement in LOPC performance will begin to reflect the progress that we have made.

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Our Commitments Environmental Stewardship

Recognition

We target our EH&S goals and practice our Sustainable Development mindset to achieve business excellence. Recognition from government agencies, other experts, and our peers help to confirm that we are focusing on the right things.

While we will never be without our critics, our commitment to dialogue and transparency serves us well in continuing our progress.

During 2003, Dow and its affiliates received the following EH&S awards:

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Responsible Care Sustained Excellence Award

In 2003, the American Chemistry Council awarded Dow the Responsible Care® Sustained Excellence Award for the second year in a row. Given annually, the award recognizes companies that have demonstrated excellent safety records over the past three years. To be eligible for the award, a company must perform in the top 10 percent of its peers and be fully implementing the Responsible Care Employee Health and Safety Code at all of its sites.

OSHA Star of Excellence

The U.S. Occupational, Safety, and Health Administration (OSHA) recognized Dow "as one of the safest workplaces in the country." Seven of Dow's manufacturing sites have been certified or recertified as OSHA Voluntary Protection Program Star worksites. These sites – located in Russellville, Arkansas; Dalton, Georgia; Plaquemine, Louisiana; Ludington, Michigan; Greensboro, North Carolina; La Porte, Texas; and Freeport, Texas – were awarded the Star of Excellence, given only to sites that have achieved a safety performance 90 percent better than the national average within their industry during the past 12 months. Dow has a goal of 0.24 injuries or illnesses (per 200,000 work hours) for the entire organization, which is a 90 percent reduction from its 1994 rate of 2.57.

Cleaning Production Award

The Dow Brazil Guarujá site has received the "Cleaning Production Award" from the State Environmental Agency of São Paulo (CETESB), as a result of an initiative regarding elimination of liquid effluents through a recycle methodology that took place in the Latex Plant. The removal of all hydrocarbon air emissions was accomplished by sending it to be burnt inside the existing boiler. Besides the production improvement, this new manner allows Dow Brazil a reduction of more than 5.5 thousand gallons per year of fresh water and enables additional steam production without fuel oil consumption.

What Do You Think?

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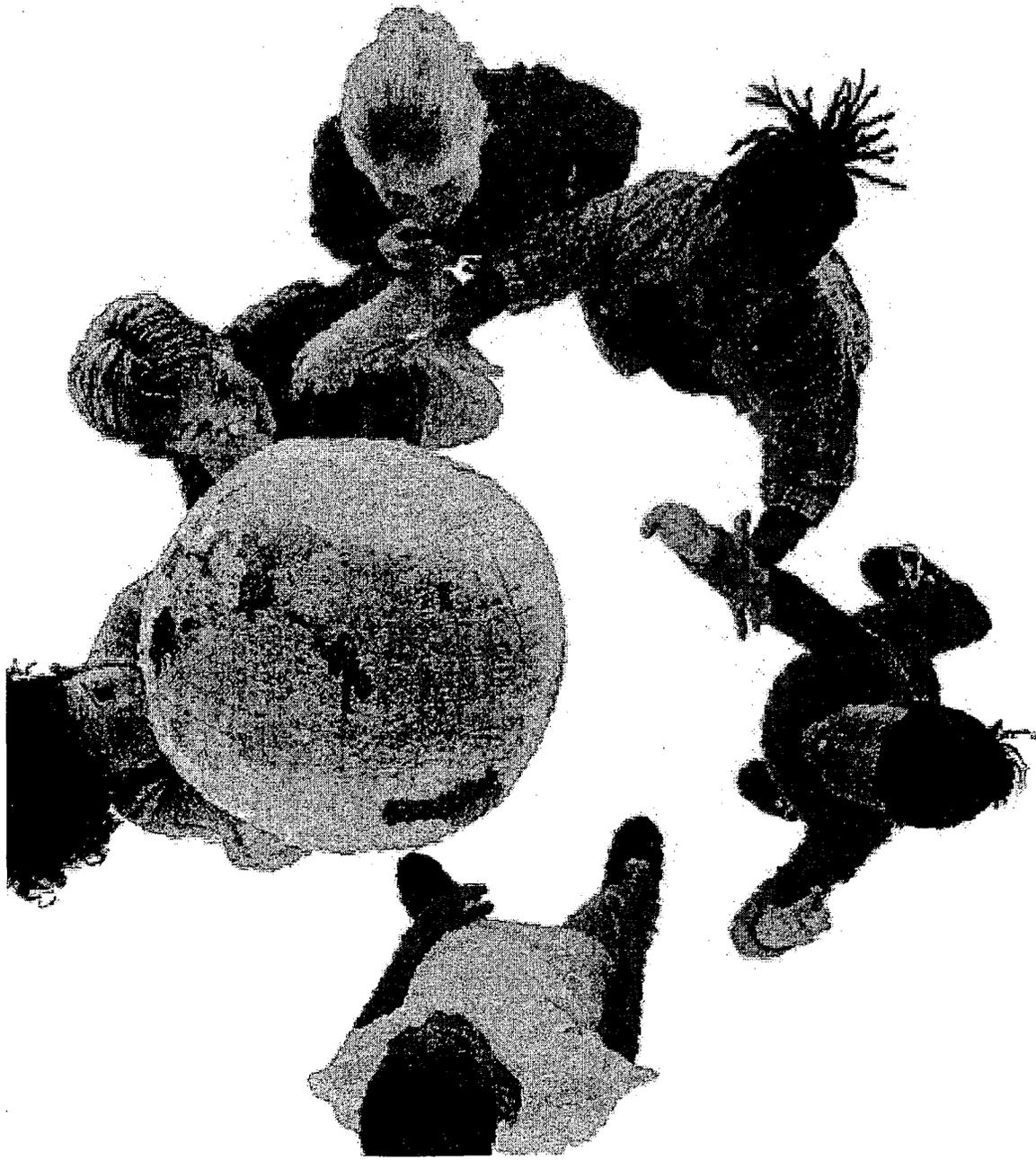
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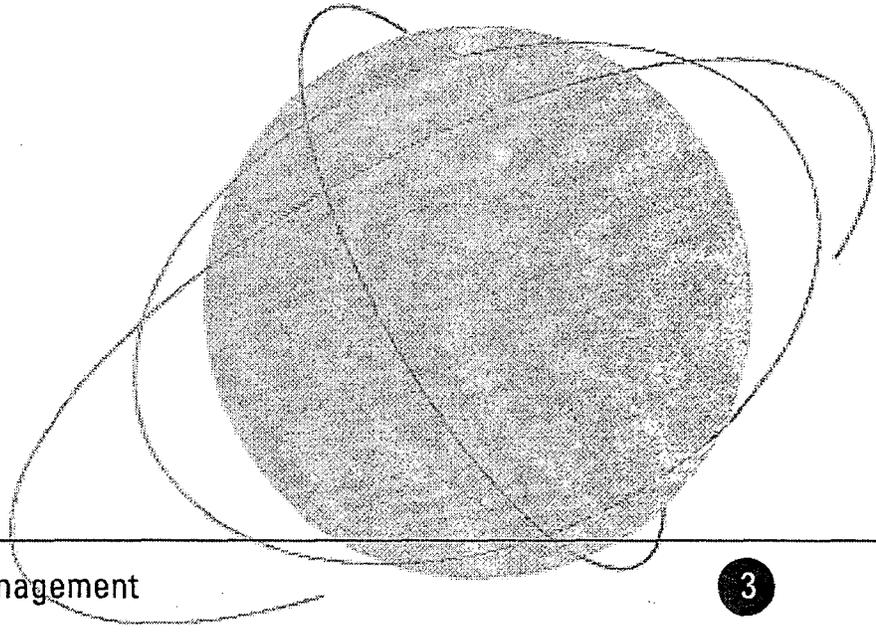


The Dow Global Public Report 2003



Sustainability

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Letter from Dow Management



From left to right—Lawrence J. Washington, William S. Stavropoulos, and Andrew N. Liveris

2003 Demonstrates the Strength of Dow's Commitment to the Triple Bottom Line of Sustainability

2003 was a year of substantial progress for Dow. In the face of very difficult conditions, including an unprecedented \$2.7 billion increase in feedstock and energy costs, industry overcapacity, and a fragile economy, we increased earnings, improved cash flow, and reduced net debt. Just as important, we continued our focus on the other areas of Sustainable Development, delivering all-time best performance records in environment, health, and safety.

Early in 2003, we pledged that the entire Dow organization would focus on improving both our financial and safety results, regardless of how difficult industry conditions might be.

Dow people answered the call. 2003 earnings were \$1.87 per share, including a tax benefit of \$0.49 per share, compared with a loss of \$0.37 per share in 2002, which included a net charge of \$0.71 per share for restructuring and other items. Excluding all of the special items, earnings increased from \$0.34 per share in 2002 to \$1.38 per share in 2003.

We also made substantial progress toward improving our cash flow. In 2002, free cash flow (cash from operations minus capital expenditures and dividends paid to stockholders) was a negative \$732 million. In 2003, it was a positive \$1.45 billion, a turnaround of \$2.2 billion—well beyond our turnaround target of \$1 billion. We also improved our financial ratios, including a reduction in our net debt to total capital ratio from 56 percent to 50 percent.

Meanwhile, Dow's stock rose 40 percent during the year. As measured by total shareholder return, Dow has outperformed the Standard & Poors (S&P) 500 and the S&P Chemicals Index both in 2003 and over the past five years.

Governance

The Company continues its focus on sound corporate governance.

In 2003, the Board of Directors elected its first Presiding Director, Harold T. Shapiro, instituted and disclosed new Corporate Governance Guidelines, and launched a corporate governance web site with a link to contact the Directors by email. Committee charters were adopted for each standing Board Committee and are posted on the governance web site. At the 2004 Annual Meeting, stockholders will be asked to approve a return to annual election of all Directors to allow for greater accountability. The Board has also adopted an updated Code of Business Conduct to reinforce the importance of ethical business practices worldwide.

In November, as part of its succession planning responsibilities, the Board named Andrew N. Liveris as President and Chief Operating Officer. Andrew, an Australian with a 27-year Dow career, brings a wealth of experience to his new role, including many years working in Dow's Asian operations and as head of Performance Chemicals. He is leading our effort to further improve the Company's productivity and to accelerate implementation of the Company's strategy. We have also now formed the Office of the Chief Executive, a group of senior managers that oversees the Company's strategic priorities.

Two new Directors were added in 2003: Jeff M. Fetting, President and Chief Executive Officer of Whirlpool Corporation, and Keith R. McKennon, retired Chairman and Chief Executive Officer of PacifiCorp and former Dow Director. They bring valuable experience and insight to our Board.

Environment, Health, and Safety

Of all our accomplishments, our environmental, health, and safety results were probably what gave Dow people the most satisfaction. These represent our concern for one another and for the communities where we work and live.

We improved our injury and illness rate by 19 percent in 2003, and there were no injuries at all in more than 70 percent of our plants. Overall, we have reduced our injury and illness rate by 77 percent from 1994 when we set our ambitious 2005 Environmental, Health, and Safety Goals. We also posted a 23 percent yearly reduction in leaks, breaks, and spills; a 63 percent improvement from 1994.

Our recognition of the strong interrelationship between economic prosperity, environmental stewardship, and corporate social responsibility, and our ongoing commitment to improving our performance in all three areas have enabled us to proactively strengthen our Company instead of operating in a weak or reactive mode.

Energy Management

One example of Dow leadership was in the area of energy use. The chemical industry has been hit hard by increases in energy costs and, in some cases, by shortfalls in the supply of oil and gas. Take away the huge impact of energy costs on Dow in 2002 and 2003, and our financial results would have been much better.

In the long run, we need to take a more strategic look at energy use and exert greater control over our energy supply. In 2003, we took initial steps to do just that. We announced our collaboration with General Motors Corporation in the world's largest application to date of hydrogen fuel cells in a new power generation project in Freeport, Texas. It is the first time a carmaker has used its fuel cell technology to provide electricity and heat for buildings and manufacturing inside a chemical plant. Dow will ultimately use about 400 GM fuel cells to generate 35 megawatts of electricity. This represents two percent of the total electricity used by Dow in Freeport and is roughly the equivalent power used by 25,000 average homes for a year. This is a big step for evaluating fuel cell technology and a significant step on the road to the hydrogen economy.

Dow sees fuel cells as one potential solution to the environmental challenges associated with being an energy-intensive company. Through our commitment to the principles of Sustainable Development, Dow continues to explore and invest in alternative energy solutions.

Other Examples

While energy use is one area where our Company is benefiting from the sustainability mindset we have embraced, we would like to draw your attention to some of our other innovative solutions to global sustainability issues, such as:

- *Dow's innovative and life-saving pharmaceutical products for cancer, allergy treatment, glaucoma, kidney failure, and heart disease are only a few drugs the Company currently manufactures.*
- *Dow's ion exchange resins, used to purify water around the world for drinking water, power plants, wastewater treatment, and to manufacture pharmaceuticals.*

- A new soybean-based technology is meeting market demands for a sustainable resource for the production of high-performance carpet backings. BIOBALANCE polymers replace a portion of the system required to make polyurethane carpet backings.
- In 1986, Dow introduced the Waste Reduction Always Pays (WRAP) Award program. Since the inception of WRAP, Dow has recognized 395 projects and presented their sponsors with "WRAP Awards." Globally, the projects have accounted for the reduction of 230,000 tons of waste, 13 million tons of wastewater, and eight trillion BTU's of energy. The estimated value of all of these projects is about \$1 billion.

You'll find many other examples in this 2003 Public Report.

Debates and Dilemmas

Despite making what we believe is good progress on the multiple dimensions of Sustainable Development, we still have a number of challenges and dilemmas—almost all of which are issues from our past. We cover those that are of most interest to the widest set of stakeholders in this report. We also realize that our position on a few of these issues is in conflict with some stakeholders—we continue to look for ways to resolve these issues.

Next Generation Goal Setting Process—Stakeholder Engagement

As we approach the end of our 10-year commitment to Environmental, Health, and Safety Goals, we have initiated a process to develop a second set of progressive, long-term, stretch goals using the Triple Bottom Line framework. We started this process in 2003, with a significant amount of both internal and external stakeholder dialogues focused on an understanding of what are the critical expectations of our Company—and we will continue this process in 2004.

Global Reporting Initiative

Globalization and increased access to information via the Internet have helped expand the scope and direction of these reports. The Global Reporting Initiative (GRI) is a multi-stakeholder process and independent institution. Its mission is to develop and disseminate globally applicable Sustainability Reporting Guidelines. Dow is supportive of the mission of the GRI, and for the 2003 report, we have included a downloadable GRI report addressing specific elements of the GRI Guidelines. This report has been prepared in accordance with the 2002 GRI Guidelines. It represents a balanced and reasonable presentation of our organization's economic, environmental, and social performance—yet we still consider it a "work in progress."

The progress reflected in this Report provides a clear indication of the importance we continue to place on the Triple Bottom Line. Sustainable Development—and our integrated efforts to improve our economic, environmental, and social performance—is making Dow a stronger company as well as a better neighbor. Now more than ever, we consider Sustainable Development a business priority in the 21st century.



William S. Stavropoulos
Chairman and
Chief Executive Officer



Andrew N. Liveris
President and
Chief Operating Officer



Lawrence J. Washington
Corporate Vice President,
Environment, Health, and Safety,
Human Resources, and Public Affairs

February 11, 2004

Dow's Commitment to the Triple Bottom Line

The Convergence of Mission and Sustainability

Dow's Mission is to "constantly improve what is essential to human progress by mastering science and technology." It's an ambitious promise, one that is boldly expressed under our corporate theme line as "Living. Improved daily."—a clear declaration of both our past achievements and our aspirations for the future.

However, it is sometimes difficult to see how a chemical company contributes to the quality of life around the world. Our products are not generally used by consumers, although they are great enablers for our customers and their customers as well. The Top Industries for Dow Products table shows where our products end up in everyday life. We participate in many markets that are critical to long-term sustainability.

Further detail on some of these applications is provided below:

- STYROFOAM brand insulation is producing more energy efficient homes around the world. In North America alone, over two million homes are insulated with STYROFOAM insulation, resulting in \$200 million per year in energy savings and a significant reduction in fossil fuel consumption and carbon dioxide emissions.
- Dow's innovative and life-saving pharmaceutical products for cancer, allergy treatment, glaucoma, kidney failure, and heart disease are only a few drugs the Company manufactures.
- Dow AgroSciences provides farmers globally with crop protection products. New innovations using biotechnology are reducing environmental risks associated with crop protection products and improving the agricultural industry's ability to feed the world.
- Dow's ion exchange resins are used to purify water around the world for drinking water, power plants, wastewater treatment, and pharmaceuticals.
- Dow epoxy technology makes it possible to create lighter, larger, and more durable windmill blades offering higher energy yields, increasing the use of renewable energy. This same technology is used in making composite structures for bus panels—significantly decreasing fuel consumption for this type of public transportation, and saving valuable nonrenewable resources in the process.

Top Industries for Dow Products

Automotive & Transportation
Building Maintenance & Construction
Electronics & Entertainment
Food & Food Packaging
Furniture & Furnishings
Health & Medicine
Home Care & Improvement
Paper & Publishing
Personal & Household Care
Water Purification

- Innovative Dow thermoplastic resins eliminate the need for paint in consumer products such as televisions, reducing volatile organic compound emissions and improving the recyclability of television cabinets.
- Saran resins provide food protection, extending the food available to the world. In developing countries where refrigeration is scarce and expensive, meat products are formed into sausages covered with Saran film that can be shipped and stored without refrigeration for up to six months.

Our Corporate Mission explains why Dow has wholeheartedly embraced the principles of sustainability, both to set direction for our global enterprise and to assess the real and potential impacts of our work.

We understand that improving life is not possible without a clear understanding of, and sensitivity to, the effects of our business operations on the world around us. The days when for-profit corporations seemed to exist exclusively to maximize shareholder value are behind us. Today, our Mission compels us to consider and address the interests of customers, neighbors, employees, governments, nongovernmental organizations (NGOs), as well as shareholders in everything we do.

The Ultimate Balance Sheet

The manifold interests of all Dow stakeholders converge under the Triple Bottom Line of Sustainable Development. The Triple Bottom Line is the ultimate balance sheet, calling attention to the three fundamental areas—economics, environment, and society—where companies impact the quality of life. The Triple Bottom Line provides a clear means to assess Dow progress against our goals for improvement. And, it provides a framework that directs all Dow activities to ensure that we continue on the course prescribed by our Mission statement.

Transparency and Accountability

This Public Report is an accounting of the progress Dow has made in 2003 against the Triple Bottom Line. We continue to be guided by the Global Reporting Initiative (GRI), achieving "in accordance with" status with the latest guidelines for the first time, and, in compiling this report, we have also been guided by two overarching imperatives—transparency and accountability—to ensure that we honor both the spirit and the substance of those guidelines.

In the pages of the 2003 Public Report, you will find updates on our progress toward our 2005 goals. Each year, Dow strives for the most exhaustive and accurate accounting

of our progress so that you and other stakeholders can assess how we are doing, and also so that we can assess how true we have been to our Mission statement.

Seeing Is Believing

As you would expect from a science and technology company, the 2003 Dow Public Report quantifies our progress in detail through the use of data and supporting descriptions. But statistics alone can't fully convey how Dow is making life better. We recognize that for many, "seeing is believing."

To better communicate the extent to which we are striving to deliver against the promise of our Mission and the Triple Bottom Line, the 2003 Dow Public Report contains a wide range of case study examples—allowing readers to see for themselves how Dow science, technology, products, people, sponsorships, and alliances are making a positive difference in real life around the world.



Since beginning our sustainability reporting in 1999, we have made significant progress against the Triple Bottom Line. In 2003, the Dow Public Report continues this trend. Here are some of the year's highlights:

Economic Prosperity

- Despite continued difficult economic conditions, Dow increased earnings, improved cash flow, and reduced net debt.
- Dow declared a cash dividend to its shareholders in each quarter of 2003. Through the end of the year, Dow had paid dividends in 369 consecutive quarters.

Environmental Stewardship

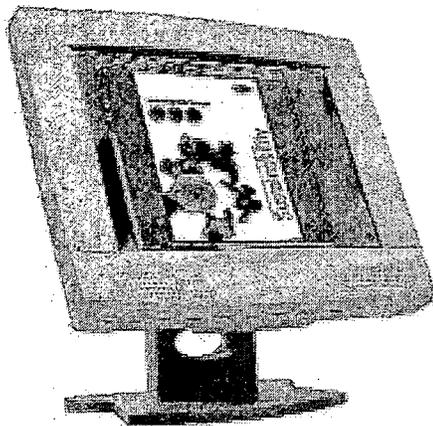
- Dow achieved its lowest illness and injury rate in its history in 2003—continuing the steady progress since the inception of the EH&S 2005 Goals. The current rate is 0.58 per 200,000 work hours, a 19 percent improvement over last year and a 77 percent improvement since 1994.
- Dow's internal WRAP (Waste Reduction Always Pays) Award program was expanded in 2003 to include reprocessing of waste into raw materials, enabling Dow to capture value while reducing waste. The estimated value of all WRAP projects since 1986 totals roughly \$1 billion.
- The American Chemistry Council awarded Dow the Responsible Care® Sustained Excellence Award for the second year in a row. The award recognizes companies that have demonstrated excellent safety records over the past three years.

Corporate Social Responsibility

- Dow adopted a revised Code of Business Conduct in July. The Code is available to employees in 14 different languages. A mandatory global, online training program was initiated in the fourth quarter of 2003.

External Assurance

- Dow received a 2003 BEST Award from the American Society for Training & Development (ASTD). The ASTD BEST Awards recognize organizations demonstrating enterprise-wide success as a result of employee learning and development.
- Dow received the 2003 Outstanding Corporate Innovator Award from the Product Development & Management Association, the first time a chemical company has received the honor in the award's 27-year history.



Multiple Formats Enhance Reporting Transparency

The 2003 Dow Public Report is published—online and in downloadable pdf format—as a companion to the 2003 Dow Annual Report, which provides in-depth financial results for our Company. This enables Dow to report its progress against the Triple Bottom Line in a highly accessible and transparent fashion to meet the needs of the majority of our stakeholders. However, for stakeholders who wish to review our information in a single, combined document conforming to the text-based Global Reporting Initiative (GRI) format, we are issuing a

second report in the GRI format. This downloadable document combines information provided by the 2003 Dow Public Report with detailed supplemental data drawn from Dow financial reports and other documents as prescribed by the GRI. We expect this GRI format report will be most useful to independent sustainability assessment bodies. You may download a copy of this alternative report, titled “The 2003 Dow Chemical Company Global Reporting Initiative Report,” by visiting

www.dowpublicreport.com

Debates and Dilemmas

Despite making what we believe is good progress on the multiple dimensions of Sustainable Development, we still have a number of challenges and dilemmas—almost all of these are “legacy” issues. We cover those that are of most interest to the widest set of stakeholders in this report. We also understand that our position on some of these issues is in conflict with a number of stakeholders. We continue to look for ways to resolve these dilemmas, understanding that in some cases we may have to “agree to disagree” on

some aspects. We are constantly looking for constructive ways to put these aspects behind us and recognize that, in some circles, our legacy issues continue to define who we are and what we do.

www.dow.com/environment/debate.html

We Take Sustainability Personally

The progress reported in the 2003 Dow Public Report represents the combined efforts of Dow’s approximately 46,000 employees globally. As members of the communities where we operate, Dow people have a very personal stake in our efforts to improve life. They understand that aggressive pursuit of Dow’s Corporate Mission will provide benefits that are both far-reaching as well as important to us all close to home.

www.dowsustainabledevelopment.com

Dow's To Do List

In 2003, we continued to report on our progress against a set of "To Do" List activities. We started this reporting mechanism in 1999, with eight specific tasks that guided our efforts for two years. Since then, we have completed many tasks and added new ones.

New Tasks

Sustainable Development Training

Integrate the World Business Council for Sustainable Development's (WBCSD) Chronos Training tool into the Dow online training resource, learn@dow.now.

Start: 2003/Deadline: Year-end 2004

Sustainable Development Goals

Build on the success of our EH&S 2005 Goals, develop a new set of Sustainable Development-based corporate goals, using extensive internal and external stakeholder dialogues.

Start: 2003/Deadline: Year-end 2005

Supply Chain

Develop an effective and efficient method for questioning our supplier base on their overall environmental and social performance and integrate the results into the purchasing decision-making process.

Start: 2004/Deadline: Year-end 2005

Communications

Upgrade both the Sustainable Development Intranet (for Dow employees) and the Internet (for all other stakeholders) to include more useful and timely information about our processes, results, and plans for the future.

Start: 2004/Deadline: Year-end 2004

Last year, we made significant progress on a number of tasks, and completed four additional tasks in the areas of Community, Dialogue, Solutions Development, and Sustainable Development Workshops. We also added four new tasks to our list, reflecting a maturing Sustainable Development ethic

within the Company and an assessment of areas for improvement. See pages 12–15 for 2003 activity detail. On our web site, you can read more specifics about many of the tasks and their background.

www.dowpublicreport.com



Ongoing Tasks

The "up" trend arrows  next to our ongoing tasks indicate where we have made good progress toward our goals. The "down" arrows  indicate tasks with less progress achieved.

Brand

Sustainable Development will be an integral component of how our corporate reputation will be measured and grown.

Start: January 2002/Deadline: Year-end 2005

Transparency

We will publish Dow's opinions on topics relevant to us and our stakeholders, and we will have developed a set of Internet-based tools that can be used for meaningful discussions about these topics.

Start: January 2002/Deadline: Year-end 2004

Integration

All businesses, functions, and major sites will integrate the Sustainable Development principles into their respective strategies and plans and have specific implementation plans in place.

Start: January 2002/Deadline: Year-end 2005

Citizenship[†]

We will publish a position paper on Citizenship based on internal and external stakeholder dialogue, for use as a guide in developing growth opportunities.

Start: January 2002/Deadline: Year-end 2005

Environment, Health & Safety (EH&S)

Dow will strive to meet its 2005 EH&S goal commitments.

Start: 1995/Deadline: Year-end 2005

Industry Alignment

We will provide leadership to the American Chemistry Council and other global industry associations to establish additional performance requirements and external verification to the Responsible Care initiative and implement these at Dow.

Start: January 2002/Deadline: Year-end 2004

Community Surveys

Conduct regular perception surveys to track progress toward our goal of being seen as a "good neighbor and valued member of the community" by at least 80 percent of the residents in communities where Dow has a major impact.

Start: September 1999/Deadline: Year-end 2005

[†] Redefined from "Responsible Globalization" in late 2002.

Completed Tasks

✓ Sustainable Development Principles

Articulate and endorse a set of Sustainable Development Principles building on the current Responsible Care Guiding Principles.

Completed: 2000

✓ Refine Dow's Sustainable Development Measurements

Develop a global set of measurements to evaluate business performance and monitor progress of each global business against economic, environmental, and social goals.

Completed: 2000

✓ Sustainable Development and New Businesses

Integrate Sustainable Development Principles into the strategic planning process through New Businesses—the global business unit where new commercial and technology opportunities are identified.

Completed: 2000

✓ Heighten Product Stewardship Efforts Globally

To reach 100 percent implementation of Responsible Care globally, we will accelerate our Product Stewardship efforts in developing countries.

Completed: 2000

✓ People

We will communicate Dow's People Strategy to all employees globally and have it integrated into all Business Strategies and all Functional and Geographic Plans.

Completed: 2002

✓ Advocacy

We will incorporate a review screen into our advocacy process for ensuring that Dow's approach is consistent with our Sustainable Development Principles.

Completed: 2002

✓ Six Sigma

Six Sigma will deliver \$1.5 billion in EBIT (Earnings Before Interest and Taxes) cumulatively from the combined impact of revenue growth, cost reductions, and asset utilization.

Completed: 2002

✓ Balanced Scorecard

To bring more balance into how we measure our success and progress on the integration of the Triple Bottom Line, Dow will launch a Balanced Scorecard.

Completed: 2002

✓ Community

A best practice process will be in place for dialogue with community leaders at our largest sites to begin a sustainable community visioning process that includes a plan for accomplishing specific Dow and Community goals.

Completed: 2003

✓ Dialogue

We will formalize our principles and process for external stakeholder engagement, which will allow businesses, functions, and sites to incorporate external inputs in their decision-making process.

Completed: 2003

✓ Solutions Development

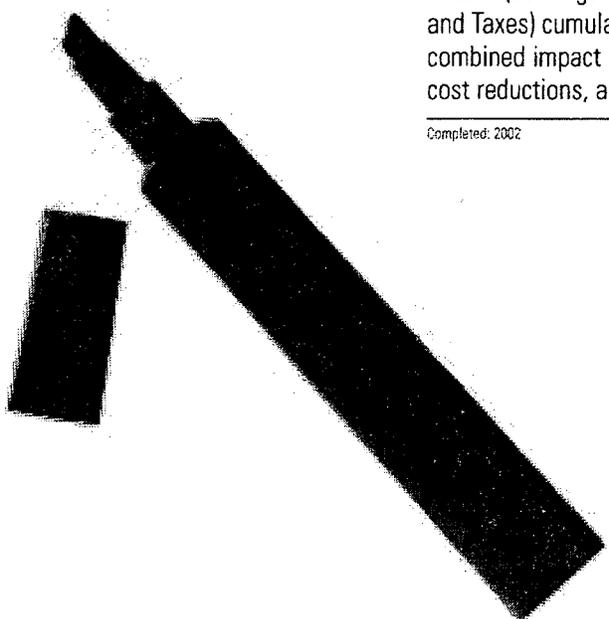
Sustainable Development principles and key probing questions will be an integral part of Dow's decision-making process for developing and commercializing technology.

Completed: 2003

✓ Sustainable Development (SD) Workshops

We will expand SD workshops to more businesses. During these meetings, business leaders analyze the gaps between current performance and a defined set of metrics, and develop plans to improve performance.

Completed: 2003



2003 Activity

↑ Brand

In 2002, we established a model to clarify and align our understanding of corporate reputation:

Brand + Performance = Reputation

In 2003, we strove to identify metrics to track reputation across our key stakeholder groups of employees, customers, shareholders, and communities.

As a result, we identified the following reputation metrics as best practice and plan to draw the data from existing Dow research efforts to further quantify the impact of our brand and performance efforts on our overall reputation:

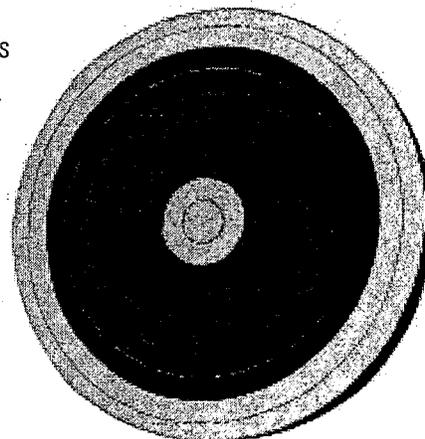
- Quality of Products—Offers quality products and services.
- Strength of Management—Experienced senior executives lead the Company through strategic and visionary thinking.

- Effective Communications—Communicates with customers, analysts, employees, and members of the community in an open and transparent manner.
- Innovation—Develops new ideas for products, services, or ways of doing business.
- Financial Soundness—Financially strong in terms of sales, profits, or stock price.
- Attracting and Retaining Talent—Recruits and retains high-performing employees.
- Social Responsibility—Operates in a way that contributes to the communities in which it does business.
- Environmental Responsibility—Operates in a way that is safe for the environment.
- Ethical Business Practices—Manages our business in a way that follows related principles and laws.
- Overall Reputation Rating—Perception rating of the Company's overall reputation.

↑ Transparency

Corporate transparency has emerged as a focal point of societal expectations. Corporations like Dow are experiencing pressures from stakeholders to be more transparent about their values, commitments, and performance. In this “show me” world, stakeholders want to know who the Company is, what it stands for, and whether it is living up to its values and commitments to society.

Our Global Public Report, Benelux regional report, and our 20 individual site reports are the best evidence we can offer of our commitment to transparent operations. We strive to provide the most comprehensive report of our progress and challenges in a format that is approachable and understandable to Dow stakeholders everywhere.



In 2003, Dow was a member of the Global Environmental Management Initiative (GEMI) Transparency Work Group. The Chair of the Communication and Marketing committee is also a working member of the Transparency Work Group and a senior Dow employee. Working with other global companies of similar size, Dow is helping define a standard for transparent operations.

↓ **Integration**

In 2002, we made significant progress in integrating Sustainable Development Principles with the various businesses, functional, and site strategies within the Company. Over a dozen businesses have added Sustainable Development Principles, looking for gaps and areas of strength. This has led to action items for the individual businesses.

In 2003, as Dow focused principally on improving its financial performance, very little additional activity took place in terms of further integration of Sustainable Development within the Company. A couple of businesses and sites did proceed with integration of Sustainable Development into their business strategies, as they were undergoing an overall review at the time.

We were successful in adding key Sustainable Development criteria into our "Class of Facility" value improvement practice. This is a facilitated review that triggers business team input to establish the kind of facility that is needed to meet the business plan.

Sustainable Development criteria that are now included in this evaluation include energy intensity and type, material intensity, overall emissions, priority emissions, illnesses and injuries, and fresh water use.

Given the continued focus on cost reduction, we are extending this activity out to year-end 2005—allowing us to incorporate Sustainable Development thinking into emerging long-term corporate and business strategies.

↓ **Citizenship**

Of all the tasks on the To Do List, this one caused the greatest dialogue and debate within the Company. Even the name was heavily debated. (Task was redefined from "Responsible Globalization" in late 2002.) One view was that if we called this activity Responsible Globalization we might (erroneously) indicate that we as a company were irresponsible in the past. Another view was that we simply don't have the ability to define the term—it has been defined in the outside world by our stakeholders, and we will need to respond to the concerns inherent in the term.

In the end, we decided that we wanted our internal element name to reflect a positive, forward-looking approach to the group of issues associated with this element. We chose Citizenship as the term, and defined it as:

"The manner in which Dow will achieve value growth to meet societal needs, while being held accountable for our actions."

The struggle we continue to have is to fully understand what is viewed as good corporate citizenship, what is not, and what are the boundary conditions that define our actions and behaviors. As a result, we did not complete or publish the position paper in 2003, as described in our To Do List. Dow is committed to further understanding this complex set of issues through active stakeholder dialogue. In 2004, we will use our standing stakeholder dialogue mechanisms, such as our Corporate Environmental Advisory Council and our Community Advisory Panels throughout the world, together with other stakeholder forums, to more extensively explore Globalization and Citizenship, and Dow's role. As such, we have moved the completion date for this task out to the end of 2005.

↑ Environment, Health & Safety

Throughout the Company, we remain focused on Environment, Health & Safety (EH&S) excellence. Progress toward meeting the 2005 EH&S goals will continue while we maintain compliance with Dow and regulatory requirements.

Dow senior leadership regularly reviews our Company's results and sets future direction through quarterly meetings of the EH&S Management Board.

As we near the end of our 2005 goal commitments, we continue to aim for our Vision of Zero—zero injuries, zero incidents, and zero environmental harm.

↑ Industry Alignment

In 2003, Dow established an internal, global network of EH&S leaders to provide input into strategic reviews and various discussions (e.g., Business Value) on Responsible Care in Europe, Brazil, Canada, the U.S., and Asia/Pacific. Dow had active representation on two of the five Responsible Care sub-teams chartered by the International Council of Chemical Associations (ICCA) and selected industry CEOs from around the world. They are carrying out a strategic review of Responsible Care at the global level and will develop a more consistent global approach to meeting evolving and emerging stakeholder needs and expectations. Good progress was

made toward the finalization of a global Responsible Care Strategy by mid-2004. Internally, Dow continued to strengthen the global utilization of its Responsible Care Management System and to drive improvement of EH&S metrics via our focus on Dow's EH&S 2005 goals.

✓ Dialogue

During 2003, we developed Dow's strategy, principles, and process for external stakeholder engagement. Our strategy highlights the value of dialogue with stakeholders and our commitments to principles and values. It calls for enhancement of our existing dialogue processes to achieve more and better dialogue. It also calls for a strategic focus on dialogue with NGOs seeking solutions to issues of mutual interest.

We carried out internal and external validation exercises to refine and endorse this strategy. Internally, a series of focus groups that involved NGO relationship leaders, geographic public policy, the Sustainable Development Advisory Council, and business leaders helped to achieve clarity and consensus. The Sustainable Development Steering Group and the Public Policy Leadership Team provided the final endorsements. We achieved external validation with the cooperation of the Corporate Environmental Advisory Council (CEAC) and other key individuals.

Our focus groups concluded that new principles for dialogue were not needed. Many of the principles that Dow already has in place are directly applicable to our conduct of dialogue and relationships with external stakeholders. We have, therefore, documented the ways in which these existing principles guide our external engagement efforts.

Solutions Development

Develop and Commercialize Technology (D&CT) is the multifunctional discipline used by Dow to evaluate, develop, and implement new products, processes, services, applications, line extensions, and strategic alliances. This work process uses a stage-gate approach and includes the participation of research and development, marketing, financial, environmental/health, and manufacturing functions.

The D&CT process was revised in 2003 to more formally incorporate Sustainable Development principles and key probing questions into the guidelines and decision screens.

As a result of a question on the Dow Jones Sustainability Index, we recently conducted a review of all of our businesses to determine the sales over the last five years that have resulted from eco-efficiency improvements. We used the U.S. Environmental Protection Agency (EPA) definition of Green Chemistry as our guide for reporting by the businesses:

“Green chemistry is the use of chemistry for pollution prevention. More specifically, green chemistry is the design of chemical products and processes that are more environmentally benign.”

Some more-specific criteria applicable to Dow included the following:

- Processes derived or partially derived from renewable resources
- Product or process development aimed at increasing material intensity, decreasing waste, decreasing water consumption, or decreasing energy consumption without otherwise adversely affecting environmental performance
- Research designed to recover or recycle products within a production system, again, without otherwise adversely affecting environmental performance

The final summary indicated just over 15 percent of sales in the last five years can be attributed to “greener chemistry.”



Economic Prosperity

For many years, reporting on the economic impact of Dow and other corporations focused largely on the Company's financial health, with only secondary discussion of how our economic contributions impact the quality of life in our society.

The Triple Bottom Line of Sustainability and Dow's Mission

"to constantly improve what is essential to human progress by mastering science and technology"

call for a broader assessment of our economic performance. This does not mean that we are reducing the emphasis on financial performance.

A strong financial balance sheet provides us with the resources we need to help improve life and achieve our specific sustainability goals.

But a true assessment of Dow's economic performance must include not only our Company's financial performance, but also our total contributions to local, national, and global economic prosperity.

How is Dow improving life from an economic perspective? Our contributions fall into two basic categories: the impact of our products, practices, and services on society, and the Company's economic impact on the regions in which we operate.

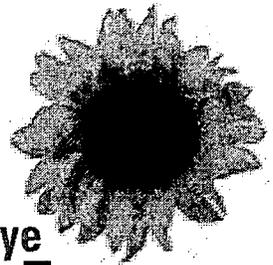
In the first category, Dow has fully integrated sustainability principles into our product development process, equipping our people with the mindset and skills to develop products in a more sustainable way, while also creating more sustainable products and practices that contribute to higher quality of life around the world. We know that Sustainable Business is also Good Business. Sustainability-driven product, service, and process innovations create revenue opportunities and reduce operating expenses, enhancing rather than encumbering our financial performance, and securing our future financial health.

Dow's economic impact on the local communities where we operate is often great, considering the scale of our operations and the modest size of many of our site communities. Dow jobs, taxes, and purchases all contribute significantly to local economies, infrastructure, civic institutions, and culture. Despite our need to actively manage costs, Dow continues to work closely with local government, civic groups, labor unions, local supplier firms, and others to provide opportunities for employment, business relationships, community alliances, and other collaborations that enhance the quality of life for our neighbors as well as ourselves.

Products and Services

How do the products and services of a chemical company contribute to Sustainable Development? We're answering that challenge by integrating sustainability principles into all of our businesses, as promised in the original Dow Public Report (1999). Special workshops in the business units provide training that results in both mindset and skills to develop and market more sustainable products.

"Living. Improved daily." is our articulation of this approach to products and services. As a \$33 billion enterprise serving customers in more than 180 countries, Dow provides innovative "building block" chemicals, plastics, and agricultural products that add value across a wide spectrum of consumer industries. However, it's difficult to measure the exact economic impact of Dow ingredients in consumer products or separate the economic impact from the impact on the other areas of the Triple Bottom Line.



Goodbye Trans Fats

Vegetable oils are widely used for frying, cooking, and salad dressings, and to prepare many processed foods, like chips, fast food, frozen dinners, and popcorn. Many of these oils contain trans fats. Most recent research shows that trans fats raise the level of the "bad" cholesterol that increases the risk of heart disease. It is estimated that over 40 percent of food products on grocery store shelves contain trans fats. In fact, a new U.S. Food and Drug Administration (FDA) rule effective January 2006 will require that the Nutrition Facts panel for all products list the trans fats content. As more people learn of the harmful effects of trans fats, manufacturers are seeking oils that are functional and healthy.

NATREON canola and sunflower oils from Dow AgroSciences help manufacturers eliminate trans fats in their products. NATREON also provides the lowest saturated fat and increased levels of healthy monounsaturated fats compared to other oils. NATREON oils do not affect the quality or taste of food products. Already, NATREON oil has seven percent of Japan's canola oil market, and is now being launched in North America and the European Union.

www.dowagrosciences.com



Local, Regional Economic Impact

The economic prosperity of a city, state, or country is largely dependent on the amount, and type, of business being conducted there.

Jobs, taxes, and corporate purchases all contribute significantly to economic health—and, indirectly, to infrastructure, civic institutions, and culture. Economists estimate that, over time, a company's spending often generates a multiple value six to 10 times that of the original spending. Dow is especially sensitive to how its operations affect the lives of people in the many locations in which it operates around the world. Here again, we sometimes face a very difficult trade-off. We are fully aware of the impact many of our purchases can have on a given local economy; but, as a competitive global enterprise, we have to find a responsible balance between supporting the local economy and actively managing our costs to a minimum.

For certain products this means consolidating purchases and buying in great volume independent of the location of the supplier. However, there are other products and services that by their very nature will be bought locally, such as contract labor and certain maintenance activities.

Take pharmaceuticals, for example. Dow products make tablets easier to swallow and help control the rate of drug release. Not to mention that packaging made of our products keeps the medicines whole and hygienic while prolonging the shelf life of these valuable products. So, Dow products add value both for the consumer and for our customers, the drug manufacturers.

We are improving the essentials of life and doing so within a Sustainable Development framework. Our "disruptive technologies"—advances that improve the quality of life while replacing earlier technologies—illustrate the long-term potential for sustainable chemistry research and development. For example, the development of soy-based polyols could significantly reduce dependence on finite resources by switching to a renewable raw material. In addition, traditional Dow products like STYROFOAM insulation and lightweight plastic materials for automotive applications provide a cost-effective solution for consumers and enable downstream cost and energy savings.

Dow's local purchasing department works closely with local suppliers to educate them about our strategic purchasing requirements and to help them understand the needs and the potential actions for their businesses, which will help them to be globally competitive.

In order to better understand our local economic "footprint," we regularly review data on these topics:

- Salaries paid (payroll) and number of employees by global region;
- Taxes paid to all taxing authorities;
- Purchasing (global and by region);
- Sales and production in OECD (Organisation for Economic Co-operation and Development) countries and non-OECD countries.

Please refer to page 22 at the end of this section to see how we have performed in these areas.

Financial Results of the Triple Bottom Line

In 2003, we increased our earnings, improved our cash flow, and reduced net debt. We are very pleased with this result, which was achieved despite an unprecedented \$2.7 billion increase in feedstock and energy costs, industry overcapacity, and a fragile economy.

Last year the entire Dow organization was asked to focus on improving our financial, as well as safety, results, regardless of how difficult industry conditions might be. Dow people answered both calls. Regarding Dow's financial performance:

- Earnings increased from \$0.34 per share in 2002 to \$1.38 per share in 2003, excluding all special items.
- Our free cash flow (cash from operations minus capital expenditures and dividends paid to stockholders) for 2003 was a positive \$1.45 billion, a turnaround of \$2.2 billion from 2002—all beyond our turnaround target of \$1 billion.

- Dow's stock rose 40 percent during the year. As measured by total shareholder return, Dow has outperformed the Standard & Poor's (S&P) 500 and the S&P Chemicals Index both in 2003 and over the past five years.

Dow's Four Key Financial Objectives

- Achieve 20 percent return on equity (ROE) across the cycle.
- Return at least three percent over the cost of capital across the cycle.
- Earn at least the cost of capital at the trough in the business cycle.
- Achieve annual growth of 10 percent in earnings per share across the cycle.

Please refer to page 23 at the end of this section to see how we have performed against these objectives.

Building Our Financial Strength

The economic expansion now underway is gaining momentum, and in 2004 we have reason to expect an increase in volume and an improvement in the overall supply/demand balance. But feedstock costs remain stubbornly high and volatile. If the past three years have proven anything, it is that difficult conditions can have remarkable staying power, and we must prepare ourselves to do well despite them.

So, just as last year, we will continue to be frugal in our capital spending; and we will sustain the gains we have made on structural cost reduction. We will focus on our customers and on managing price and volume. We will continue to sell assets that are not a strategic fit and shut down plants that are not competitive. And, we will work safely.

Shareholders and Stakeholders

Since 1912, The Dow Chemical Company has paid its shareholders cash dividends each quarter and has either maintained or increased the quarterly dividend amount throughout that period. We believe that this kind of data, normally a highlight of financial reports, nevertheless has an important place in this Public Report.

We believe that the dividends are a key component of the Triple Bottom Line. Capital is, after all, the “fuel” for all that we do. So we must be zealous in pursuing the innovations and efficiencies that support the dividends that will attract capital when needed. However, it is the careful attention that is paid to all stakeholder interests that enhances the prospects for profitability. Today, more than even a few years ago, stock price is increasingly being influenced by a host of intangible factors: employee relations, environmental sensitivity, and product reliability among them. We have moved from the 20th century “linear” corporate model in which the shareholder was predominant to a 21st century “circular” model where the shareholder and other stakeholders are mutually dependent.

Despite these admittedly difficult times, we are learning to make sustainability a way of business at Dow. Our economic imperative is clear. But equally clear is our continued focus on environmental stewardship, workplace safety, and corporate responsibility. We simply do not view economic growth in isolation from social and environmental issues.

Six Sigma—The Way We Work to Improve Productivity, Cost Control, and Efficiency

Dow began its implementation of Six Sigma in 1999. In each subsequent year, Dow has continued its Six Sigma commitment with renewed vigor. Through our implementation of Six Sigma, Dow has gained increasing value while equipping employees with critical problem-solving skills and a mindset for reducing variation and defect.

Six Sigma is both a set of tools and a way of thinking. It leads to breakthrough improvement using the Measure-Analyze-Improve-Control (MAIC) process to improve existing products, work processes, and behaviors. Six Sigma also encompasses innovation, utilizing Design for Six Sigma (DFSS) methodology to develop new designs or redesigns that result in competitively advantaged products, services, processes, and systems.

Incorporating the breakthrough tools and thinking of Six Sigma in all that we do benefits each and every aspect of the Triple Bottom Line.

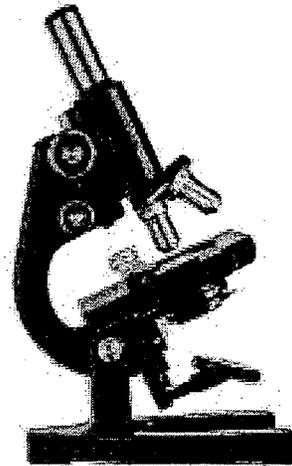
Since our implementation of Six Sigma as a Company-wide discipline, Six Sigma projects have contributed to our Company's economic results in the form of productivity gains, opportunity growth, and cost savings. At Dow, Six Sigma goes beyond dollars and manufacturing efficiency improvements. In 2003, the tools and methodology of Six Sigma were put to work on more than 300 projects related to Environment, Health, and Safety (EH&S) activities. These projects were primarily focused on 2005 EH&S goals and productivity targets. One Six Sigma project focused on improving water treatment at a major manufacturing complex. In the end, this project delivered effective, efficient wastewater treatment and managed to save Dow approximately \$3 million.

We're also applying our Six Sigma mindset to improve our social performance—because we view employee dissatisfaction and shortcomings in community relations as defects in our operations, the same as waste generation or shortfalls in plant productivity.

On Track for Long-Term Profitability

As mentioned earlier, 2003 was a year of substantial progress for our Company. But we are well aware that it can be considered a good year *only* when set against the backdrop of difficult industry conditions. The task now before us is to build on our progress and continue to improve our financial performance. Our ultimate objective remains what it has always been: to maximize long-term shareholder value.

So we are approaching 2004 in the same way we approached 2003—taking it one quarter at a time and continuing to improve earnings and increase our financial strength. We are confident that Dow people will once again rise to the occasion and meet our objectives.



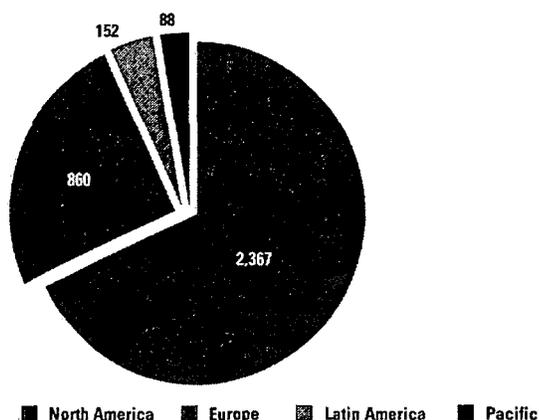
A Closer Look Creates Better Drugs

A major hurdle in new drug development is solubility—the drug's ability to dissolve in the body. If not soluble, a drug cannot be absorbed into the body. More than 30 percent of new drug breakthroughs have poor solubility. The DOWPHARMA team providing BioAqueous solubilization services is working with pharmaceutical companies to create more soluble versions of their new drugs. The team alters the shape, size, or surface area of the drug particles to improve solubility.

www.bioaqueous.com
www.dowpharma.com



Payroll 2003 (\$ millions)



Includes direct salaries, wages, allowances, and incentive compensation

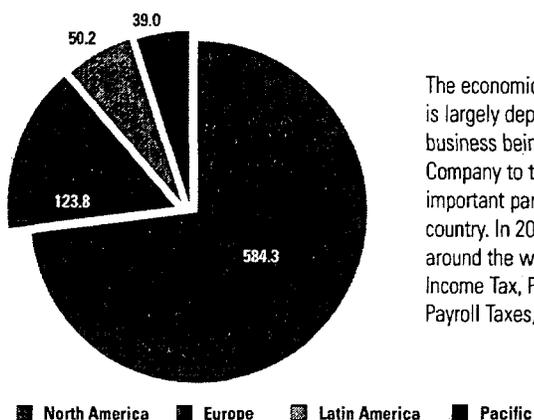
Sales & Production

Most of Dow's production and a significant amount of our sales are in 30 OECD† countries that make up most of the developed world. As Dow continues to pursue value growth guided by the increasing expectations of a global world, changes in the balance of OECD to non-OECD production and sales become one way to measure our success. After all, the major potential growth opportunities in the future are likely to be in non-OECD countries. We realize that pursuing growth in these countries is not a trivial task. It will require very different business models than those we are utilizing today.

	Production	Sales
OECD countries	89.9%	80.3%
Non-OECD countries	10.1%	19.7%

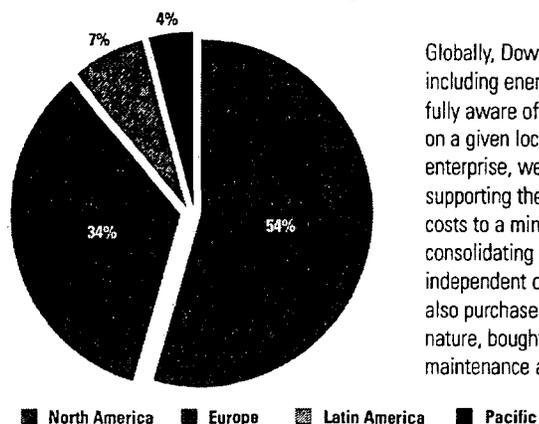
†Organisation of Economic Co-operation and Development

Taxes Paid 2003 (\$ millions)



The economic prosperity of a city, state, or nation is largely dependent on the amount, and type, of business being conducted there. Taxes paid by the Company to the various authorities are an important part of our economic "footprint" in a country. In 2003, the various Dow subsidiaries around the world paid \$797.3 million in Corporate Income Tax, Property Taxes, Employer's portion of Payroll Taxes, and various other non-income taxes.

Total Purchases 2003 (Percentage by Region)

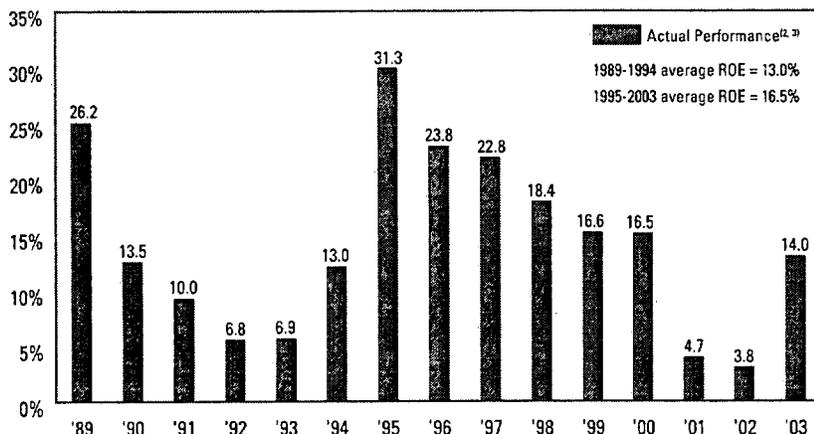


Globally, Dow spent \$30.5 billion in 2003 on purchases, including energy, feedstocks, and capital spending. We are fully aware of the impact many of our purchases can have on a given local economy; but, as a competitive, global enterprise, we have to find a responsible balance between supporting the local economy and actively managing our costs to a minimum. For certain products this means consolidating purchases and buying in great volume independent of the location of the supplier. However, we also purchase products and services that are, by their very nature, bought locally, such as contract labor and certain maintenance activities.

2002 purchases were "calculated" based on backing out Salaries & Wages and Depreciation from Dow's Income Statement, then allocating the "buy" based on Replacement Asset Base (RAB) percentages by area. 2003 purchases were extracted from the Vendor Invoicing and Purchasing database, providing a summary of all payments made by Dow via SAP, summarized by area.

Progress

Financial Objectives: Return on Equity¹



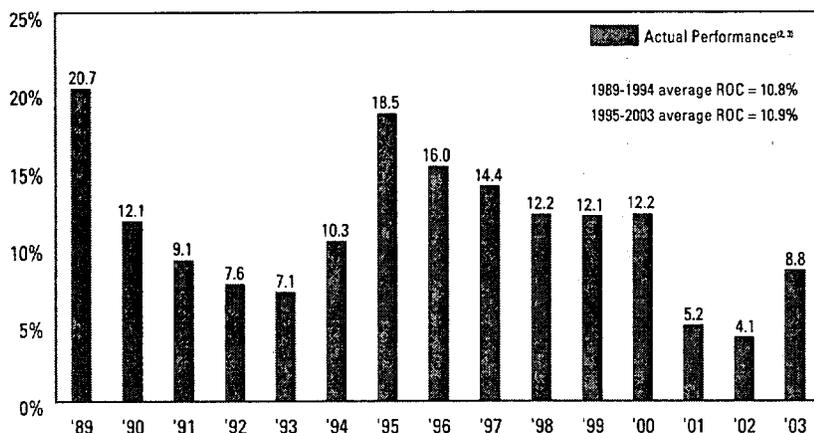
¹⁾ Excluding Union Carbide prior to 2001

²⁾ Adjusted Return on Equity and Return on Capital excluding certain items, adjusted to reflect pre-merger results for Dow for 1989–2000

³⁾ Adjusted Return on Equity and Return on Capital are not defined under accounting principles generally accepted in the United States ("GAAP"). For a reconciliation of the bases used to calculate these non-GAAP financial measures to bases that represent the most directly comparable GAAP financial measures, please see Dow's financial reports online at:

www.dow.com/financial/reports/index.htm

Financial Objectives: Return on Capital¹



Facts and Figures

Dollars in millions, except as noted

	2003	2002
Net Sales (dollars in billions)	32.6	27.6
Net Income (Loss) Available for Holders of Common Stock	1,730	(338)
Earnings (Loss) per Share—Diluted (in dollars)	1.87	(0.37)
Research and Development Expenses	981	1,066
Capital Expenditures	1,100	1,623
Return on Stockholders' Equity	18.9%	(4.4)%
Dividends Declared per Share (in dollars)	1.34	1.34

Progress



Environmental Stewardship

In 1996, Dow announced a series of ambitious goals to improve Environment, Health, and Safety performance. We did this because we value the safety of our people and neighbors. This section of the report will demonstrate our progress toward these goals. The graphs displayed are compelling, but we must all look beyond the numbers and recognize that behind each statistic there are people. In essence, since adopting these goals, 10,000 Dow employees and contractors

would otherwise have been injured if we had been content with "business as usual." These goals and their attendant improvements prevented these injuries.

Our "Vision of Zero" means we want no injuries, illnesses, accidents, or environmental harm to result from our enterprise. It is a lofty goal, but it is also the only acceptable Vision for us to work toward.

Dow's EH&S Policy:

At Dow, protecting people and the environment is part of everything we do and every decision we make. Each employee has a responsibility to ensure that our products and operations meet applicable government or Dow standards, whichever is more stringent.

Our goal is to eliminate all injuries, prevent adverse environmental and health impacts, reduce wastes and emissions, and promote resource conservation at every stage of the lifecycle of our products. We will report our progress and be responsive to the public.

For a complete online listing of Dow policies, see Dow's Code of Business Conduct.

www.dow.com/about/aboutdow/code_conduct/ethics_conduct.htm

Accountability for Progress

Our progress is based on two things:

- Implementation of a global management system and global standards providing standardized approaches shared among facilities
- Clear accountability

The entire Dow workforce is responsible for the achievement of our Environment, Health, and Safety (EH&S) 2005 goals. Each business, site, and function is directly accountable for its EH&S performance. A portion of many individuals' variable compensation is tied to progress on our EH&S goals. Clear accountability also includes accountability toward society. When the goals were launched in 1996, we committed to annual public progress reports.

Our Environmental Stewardship data takes into account divestitures, mergers, and acquisitions and reflects these activities.

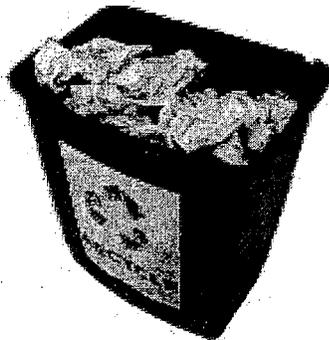
Business Case

Doing good for the environment is not just driven by moral considerations. It simply makes good business sense as well. The ability to integrate the principles of Sustainable Development might very well become a determining factor in the long-term survival of companies.

In 2002, we revisited the business case for meeting the EH&S 2005 goals that we had established, based on recent performance and expectations for future performance, costs, and benefits.

For our Resource Productivity Improvement goals (Energy, Waste, Wastewater, Overall Chemical Emissions, Priority Compounds, and Dioxins), we estimate that we will ultimately spend close to \$1 billion and achieve overall value of \$3–5 billion, largely dependent on the volatile price of energy and feedstocks.

Achieving significant improvements in overall energy use is especially important in the current environment of rapidly increasing feedstock and energy costs.



Waste Reduction Always Pays (WRAP)

In 1986, Dow launched the WRAP Award program to promote the three R's—reduction, reuse, and recycling. Today's WRAP Award program goes beyond the three R's to include reprocessing of waste into raw materials. This enables Dow to capture value while reducing waste. Since the program began, Dow has given the WRAP Award to 395 projects and their sponsors. Worldwide, the projects account for the reduction of 230,000 tons of waste, 13 million tons of wastewater, and eight trillion BTU's of energy. The value of all these projects totals roughly \$1 billion.

We also assessed the cost/benefit of achieving our EH&S 2005 Incidents goals (Process Safety, Personal Safety, Loss of Primary Containment, and Transportation). We estimate a total cost of \$95 million, and an overall value of \$130 million. The value was determined using a methodology adapted from the Total Cost Assessment methodology developed by the Center for Waste Reduction Technologies, a working group of the American Institute of Chemical Engineers.

The world is rapidly changing. Scarcity of resources, continuing population growth, and the influence of human activity on the future of the world are causes for concern. Society, which ultimately holds our license to operate and grow, expects industry to play its part in the resolution of these issues. In return, companies that take on this challenge can look forward to a better relationship with community neighbors, a boost in employee motivation, increased customer loyalty, reduced costs and liabilities, and a better corporate reputation—all of which have a direct or indirect influence on a company's financial results.

2005 Goals Update

In 1996, we publicly announced aggressive, voluntary, global EH&S Goals for the Year 2005. While we continue to make progress as compared against our baseline year, several of our goals will require additional attention and action. The data indicates that our performance is improving overall. We update our performance records annually or quarterly, depending on the goal.

Responsibility and Accountability

Our objectives...

- To be a responsible corporate citizen
- To be open and responsive to ideas and concerns
- To integrate environmental considerations into our business decisions
- To design or modify our products and processes to minimize their environmental, health, and safety impact
- To find solutions to challenges by working with key stakeholders to find practical solutions to challenges
- To manage our lands to protect and enhance wildlife and ecosystems

Global Progress on Responsible Care Codes of Management Practice

Dow is at "100 percent practice in place" for the original 106 management practices embodied in the six Responsible Care codes. This includes our 1999 To Do List commitment to heightened Product Stewardship communication in all Dow businesses. In addition, we are well on our way to implementing a new Security Code, introduced in 2002. Our globally integrated Operating Discipline Management System (ODMS) is particularly helpful with newly acquired sites and businesses where it helps us to improve the existing management practices, implement the security measures, and to integrate Responsible Care standards.

In 2003, Dow implemented programs that will enable us to conform to the American Chemistry Council's new Responsible Care expectations. These new expectations require having a Responsible Care Management System in place, having that system externally certified and reporting industry EH&S metrics.

Prevent Environment, Health & Safety Incidents

Our objectives...

- To value—above all things—the safety of our people and our communities
- To continuously improve our performance in protecting the environment, health, and safety of our workforce, neighbors, and the public
- To work with our distributors, customers, and suppliers to improve the way we handle, transport, and use our products

Dow's Vision for EH&S performance is zero:

- no injuries and illnesses
- no accidents
- no environmental harm

While this may not be very realistic from a mathematical perspective, it's the only option in terms of employee health and safety. Without our "Vision of Zero," it means we will tolerate injuries and illness among our workforce and environmental impact. We won't, and we'll continue our aggressive goals.

Because of that aggressiveness, last year we had the best safety performance ever in the history of our Company. Our annual combined Dow employee and contractor injury and illness recordable rate was an all time low of 0.58. That's a 19 percent improvement over the prior year and a 77 percent improvement from our 1994 baseline performance. We're improving results through behavior-based programs, including peer observation, intervention programs, pre-task hazard analysis, and root-cause investigations. We've also been successful at reducing the severity of the few injuries that did occur last year. All categories of incident classification set record lows and last year there were no fatalities.

Useful information on EH&S-related issues can be obtained from:

International Council of Chemical Associations www.icca-chem.org 

World Business Council for Sustainable Development www.wbcsd.ch 

European Chemical Industry Council (CEFIC) www.cefic.be 

American Chemistry Council www.americanchemistry.com 

Canadian Chemical Producers' Association www.ccpa.ca 

Last year, Dow signed an alliance with the U.S. Occupational Safety & Health Administration (OSHA). Dow was the first company in the chemical industry and first Fortune 100 company to forge an alliance with OSHA. The alliance focuses on Dow's technical knowledge and guidance on Process Safety Management and Ergonomics. OSHA uses alliances to collaborate with organizations committed to safety to communicate best practice knowledge to workplaces throughout the U.S. to prevent injuries and illnesses.

Other measures of a company's EH&S performance include the amount of capital expenditures for EH&S projects as well as the amount of government penalties incurred:

- Even with Dow's commitment to reduce capital spending in 2003 by \$500 million, the percentage of spending on EH&S projects actually increased last year. Please refer to page 41 at the end of this section for EH&S capital spending in 2003.
- Measurements for government reportables, notices of violation and compliance orders, and fines and penalties are truly lagging indicators of performance. Simply put, they are not an accurate measurement of current performance but are typically

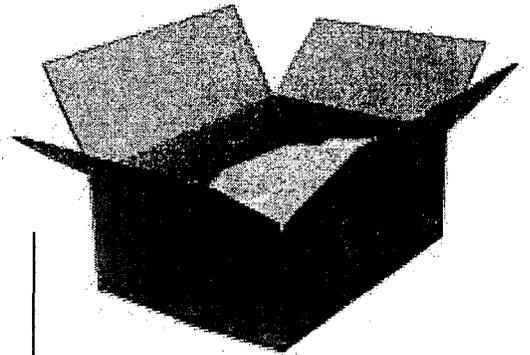
one to two years behind because of the various stages in the regulatory process. Despite the timeframe involved, our current performance in these areas is not up to the standards that we have set for ourselves. These numbers should be declining, and they are not. We are not content to accrue government penalties as a way to run our business. Information about how we plan to improve our performance is detailed on page 44.

Goals to Reduce EH&S Incidents

Our objective is to significantly improve Dow's performance (from a 1994 base) by reducing:

- Injuries and illnesses per 200,000 workhours by 90 percent
- Loss of primary containment incidents (leaks, breaks and spills) by 90 percent
- Transportation incidents per 10,000 shipments by 90 percent
- Process safety incidents (fires, explosions, and significant chemical releases) by 90 percent
- Motor vehicle incidents per one million miles by 50 percent
- Repeat incidents with Dow product at customer facilities by 50 percent (in this case, from 2001 levels)

Please refer to the pages 39–40 at the end of this section to see how we have performed against these objectives.



A Softer Touch

New SYNERGY RCA soft touch foam is strong, resilient, and soft—making it ideal for shipping delicate auto parts. But SYNERGY RCA foam does not just protect parts during shipment, it also helps protect the environment. The foam is recyclable, which reduces landfill waste and saves disposal expense. The process used to produce SYNERGY RCA foam is CFC and HCFC-free. In addition, the accelerated curing system reduces the amount of blowing agents released from the foam.

SYNERGY RCA soft touch foam is one example of how Dow products support the Environmental Stewardship aspect of the Triple Bottom Line.

www.dowsynergy.com





These measurements, however, are all strongly impacted by loss of primary containment (LOPC) performance. As we've made great strides recently in our LOPC performance, we expect that these lagging indicators will generate an improvement on these measurements on the near horizon. Therefore the acceleration of improvement in LOPC performance will improve these lagging indicators but not necessarily concurrent with the same timeframe.

Increase Resource Productivity

Our objectives...

- To enhance resource productivity to reduce risk, minimize Dow's impact on the environment and health, and increase global competitiveness through greater efficiency
- To prevent pollution in our processes
- To transfer and use the best available technology throughout the Dow world to build the most environmentally sound and safe facilities

Energy Efficiency and Conservation Efforts

High energy prices and energy price volatility—coupled with the environmental impact of energy production and consumption—make energy use a critical issue for Dow. Implementing an aggressive energy efficiency and conservation effort is an important part of Dow's plan to address this critical issue.

Business and Site energy efficiency teams have been established throughout the Company to focus both up and down as well as across the product chain. As a result of focused business and site efforts, over 700 Six Sigma projects have been chartered in the past four years to address all aspects of energy production, use, efficiency, and cost reduction.

Below are a few of the many projects that made significant contributions in 2003:

- Two older and less energy efficient ethylene crackers were shut down at Seadrift and Texas City, Texas (U.S.). A portion of the production from these units was shifted to newer, more efficient facilities resulting in 15–20 percent less energy consumed for this incremental volume.
- Dow Central Germany's Boehlen site reduced the import of natural gas by 25 percent through efficiency improvement and energy optimization projects. This saved the site five million Euros.
- The Plaquemine, Louisiana (U.S.), EO/EG plant was able to save \$7.5 million in energy costs through a comprehensive variable cost reduction program.
- Implementation of new seawater pump operation procedures at the Terneuzen, Netherlands, site resulted in savings of over 4,000 megawatt hours of electricity.
- The MDI plant in Stade, Germany, successfully completed a project to burn hydrogen instead of natural gas for a furnace. This resulted in a reduction of natural gas purchases worth over 1.6 million Euros.
- The Chlor-Alkali, EDC/VCM, and Ethylene plants at the Fort Saskatchewan, Alberta, Canada, site focused on reducing electrical energy consumed by motors. The combined effort resulted in yearly savings of almost 12,000 megawatt hours.
- A simple, yet elegant change in the process control strategy and operating procedures eliminated wasted steam in the Polycarbonate plant in Stade, Germany. The project resulted in a 20 percent reduction in total steam consumption.
- Implementation of a new boiler steam dispatch protocol at the Freeport, Texas (U.S.), site resulted in natural gas savings of over 800 million BTU's per day.
- A benchmarking study conducted by Polyolefins and Elastomers at Tarragona, Spain, resulted in a site utility optimization program that saved \$625,000 in the cost of steam, compressed air, and nitrogen.
- Polypropylene operations at Freeport, Texas (U.S.), saved \$865,000 on energy cost through process design upgrades, improvement of operating practices, and product mix rationalization.

**Goals for Emissions,
Waste, and Energy**

Our objective is to reduce air and water emissions for our global operations by reducing:

- Priority compounds by 75 percent
- Dioxin emissions by 90 percent
- Chemical emissions by 50 percent
- Waste and wastewater generated per pound of production by 50 percent
- Energy use per pound of production by 20 percent

Priority compounds include persistent, bioaccumulative, and toxic (PBT) compounds, known human carcinogens, selected ozone depleting substances, and high volume toxic compounds:

- PBTs: Hexachlorobenzene, mercury compounds
- Known Carcinogens: Benzene, Vinyl Chloride, Nickel Compounds, Chromium Compounds, Arsenic Compounds, Asbestos
- Selected Ozone Depletors: Carbon tetrachloride, 1,1,1-trichloroethane, CFC-11, CFC-12, CFC-113, CFC-114, CFC-115, CFC-123, CFC-500, CFC-502, CFC-1301, H2402
- High Volume Toxics: Propylene Oxide, 1,2 Dichloropropane, 1,2 Dichloroethane (EDC), 1,3 Butadiene, Chloroform, Epichlorohydrin, Ethylene Oxide, Formaldehyde, Acrylonitrile

Please refer to pages 41–43 at the end of this section to see how we have performed against these objectives.

Global Challenges

Among the many challenges facing the world today are those related to environment, health, and safety. For example: the availability of fresh water, the management of chemicals (including testing), climate change, dioxin emissions, and the development of promising, new technologies such as biotechnology. Resolving these issues is a shared responsibility that we take very seriously. Their resolution can often be done most effectively through the formation of broad-based alliances between industry and societal institutions such as government, professional societies, and non-governmental groups.

Unfortunately, the chemical industry is often singled out as the source of the problem, whereas in reality our products are a valuable part of the solution. Examples that illustrate this point are the plastics that allow car manufacturers to build lighter cars that use less energy and emit fewer pollutants, the reverse osmosis filters that enable water companies to secure safe drinking water for millions of people, and the disinfectants that kill human pathogens. The following is a summary of our positions and approaches to resolve nine key issues that we face.

Longer Lasting Roofs

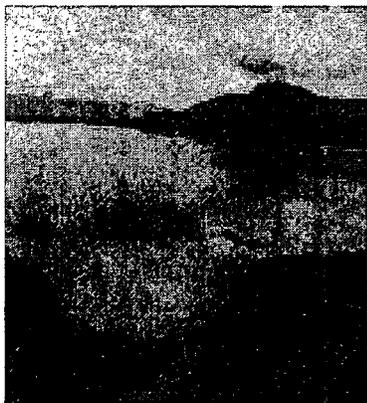
A Protected Membrane Roof (PMR) system using STYROFOAM insulation shields and protects a roof's waterproof membrane unlike a traditional roof system that does not cover the membrane. On a PMR roof, the membrane is placed beneath STYROFOAM insulation. The PMR roof protects the membrane against the most common causes of failure—sunlight, extreme heat, extreme cold, weather, and foot traffic. Traditional roofs are typically replaced every seven to 10 years. PMR roofs have lasted over 30 years. The cost savings to building owners are obvious. However, the benefits do not end there.

PMR Roofs are “Greener” Roofs

Currently, three to four percent of all waste in U.S. landfills comes from old roofs. By more than tripling the time a roof lasts, landfill space is conserved. In addition, STYROFOAM insulation resists water so well it can be reused if the roof is ever replaced, which saves even more landfill space.

PMR roofs help the environment in another way. Ever notice how large cities tend to be hotter than surrounding areas? This is because the many buildings and paved surfaces create an effect called a “heat island.” PMR roofs stay cooler than black membrane surfaced roofs, helping to reduce this heat island effect.

www.styrofoam.com 



Managing Water Resources

Pick up a paper or turn on the television and you're sure to see something about water. Usually, this precious material becomes newsworthy because there is too little, in the wrong place, or it is of poor quality. Globally, people are challenged to manage water more effectively. Our efforts are delivering significant results to Dow and its Stakeholders.

In 2003, Dow sites and businesses reduced water needs by nearly 20 million metric tons (5.28 billion gallons) and delivered value of \$15 million to Dow through better resource management. A few examples of contributing projects are:

- Through the combined efforts of many businesses at our Midland, Michigan (U.S.), site, demand has been reduced by almost 7.56 million metric tons (two billion gallons) of water annually—enough to supply 30,000 U.S. households.
- In Guaruja, Brazil, optimization of tank operations reduced water usage by 10%. This is equivalent to 2,000 metric tons of water saved.
- More efficient tank scrubbers in Plaquemine, Louisiana (U.S.), reduced water needs by 1,000 gallons per minute.

Fresh Water Use

Increasing global demand for fresh water obliges corporations to create sustainable solutions and ensure long-term access for all. If nothing is done, the strain on this limited resource will continue to increase as more people have access to basic essential services and as the global population grows. To contribute to water conservation, Dow is taking an integrated approach. By engaging outside organizations such as academia and regulatory agencies, we will all better understand the challenge, work toward solutions, and develop new business opportunities that are environmentally beneficial and economically sustainable.

Dow's work on the water issue is to ensure adequate supplies of fresh water for manufacturing while reducing demand through new technologies, conservation, and recycling. In 2003, Dow processed approximately 410 million metric tons (286 billion gallons) of fresh water. Dow reduced its cumulative use of water by almost 40 million metric tons (10.56 billion gallons) over the past two years. Dow remains committed to managing water as a valued resource and will continue to aggressively implement strategies and technologies to further reduce demand.

Chemicals Management

The products of chemistry provide undeniable and significant benefits to society. However, some also possess inherent hazards that must be identified and responsibly managed. Over time, knowledge about the basic characteristics of the chemicals has grown, primarily as a result of continuous studies and the development of refined testing methodologies. Control measures have been introduced to reduce the most serious risks of chemical exposure. Dow has traditionally been keenly engaged in this area, which is now broadly defined as chemicals management.

In the period 2000 to 2004, we are actively participating in three voluntary international initiatives aimed at improving the quality and availability of health and environmental information on High-Production-Volume (HPV) chemicals. The initiatives were developed as a joint effort among governments, the chemical industry, and environmental groups. They focus on filling information gaps by completing appropriate testing, and making a summary of the test findings available to the public. Governments in Europe and North America are driving development of new policies for the introduction of new chemicals and the continued scrutiny of chemicals already established in commerce. The chemical industry has, as part of the Responsible Care initiative, committed to improving the public availability of information about these chemicals.

Dow's involvement in these efforts is primarily delivered through the chemical industry trade associations in Europe, Canada, and the United States. We have volunteered to provide information consistent with the HPV criteria for over 180 chemicals; Dow is the sole volunteer for 33 chemicals (refer to page 45). We are on track to meet our testing commitments.

At the same time, we are trying to assess the impact of the evolving European Commission's Chemicals Management Policy, including the "REACH" protocol, which was introduced in 2001 and is expected to be in place in 2006. REACH would require the registration, evaluation, and authorization for some 30,000 chemicals currently on the market, as well as for those to be introduced in the future. The burden would fall principally on manufacturers, but downstream users also have obligations under the proposed system. Increased regulatory scrutiny of chemicals is also underway in Canada, the United States, and in some Asia Pacific nations.

We favor a scientifically justified, risk-based, and globally consistent system of regulating chemicals. We are, therefore, working through trade associations in each geographic region to deliver a unified, scientifically based, advocacy position to support our point of view.

Dow has contributed to the development of the International Coalition of Chemical Associations' Global Chemicals Management Policy, which includes an objective to:

"Provide the information and data (a knowledge base) for assessing health, safety, and environmental effects of chemicals and their intended uses. This would be sufficient to: consistently prioritize chemicals to determine which should be focused on first; promote and contribute to the understanding of health, safety, and environmentally related scientific issues on chemicals; and promote further minimization in the use of animals in testing."

This policy has been used to establish metrics that the American Chemistry Council (ACC) will use to measure company performance as part of its Responsible Care commitment. The ACC product-related metrics include demonstration that a company has a risk characterization process and provides a summary of that process to the public. Also, ACC requires that the company is applying its risk characterization process and sharing information in an easily accessible way with the public. Dow intends to provide access to our risk characterization process through www.dow.com, where we will be continuing to make product risk characterization documents available.

www.dow.com 

Dow is also participating in the U.S. Environmental Protection Agency's (EPA) Voluntary Children's Chemical Evaluation Program (VCCEP). VCCEP was initiated in 2001 as a pilot program to evaluate a tiered approach to assessing the risk that chemicals might pose to children's health. Dow has committed either alone or as part of an industry consortia to assist the EPA in the evaluation of seven chemicals. During 2003, detailed risk assessments for two of those chemicals, vinylidene chloride and acetone, were submitted to the VCCEP peer-consultation process. For further information go to:

www.tera.org/peer/MeetingReports.html

Risk assessments on the remaining five chemicals will be prepared and submitted to fulfill Dow's commitments.

Animal Testing

One of the more divisive aspects of chemicals management is the issue of animal testing. This government required testing, primarily with mice, rats, and rabbits, has long played an important role in major scientific breakthroughs, ranging from nutrition improvements to new medicines.

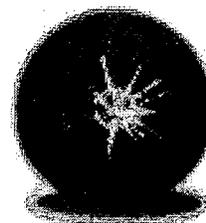
Nevertheless, we seek to develop alternative tests that don't involve animals but are acceptable to regulatory agencies, and we follow a self-imposed regimen of using a minimal, and decreasing, number of animals. We also provide humane handling, care, and treatment for all the animals used in our testing laboratories. This practice is audited and validated by the Association for Assessment and Accreditation of Laboratory Animal Care. When selecting a contract research organization, an evaluation of its animal welfare practices is also part of our decision-making process.

Climate Change

2003 saw additional progress in the implementation of the Climate Change Strategy adopted in 2001. Internal mechanisms and expertise continued to develop, as did evidence that climate change is becoming an integral part of business decision-making. Specific progress in 2003 included:

Technology

Another milestone was achieved with the announcement in May of a collaboration with General Motors (GM) on what is the largest hydrogen fuel cell deal to-date.



World's Largest Fuel Cell Project

Dow and General Motors (GM) Corporation are inaugurating the world's largest fuel cell project to-date for power generation. The project is based at Dow's Freeport, Texas, site, where hydrogen is created as a co-product. GM's fuel cells will convert hydrogen to electricity. When complete, the fuel cells will provide a portion of the power used at the plant.

Hydrogen fuel cells offer a cleaner, more efficient option for power generation than coal, natural gas, or other fossil fuels. Both greenhouse gas and air pollution are reduced. Fuel cells could also reduce need for foreign oil and provide an option to costly natural gas.

If the project proceeds as planned, up to 400 fuel cell units could be producing up to 35 megawatts of power at Freeport. That is enough energy to power 25,000 homes for a year. And, it is more than 15 times greater in scale than any other fuel cell system to date. Although the fuel cells will provide only two percent of the total power the Texas plant uses, the project is a first step in developing fuel cells into a major power source. Dow and GM are discussing future use of fuel cells at other Dow sites in both the U.S. and Europe.

www.dowfuelcell.com

Business Integration

In 2003, Dow established an Emissions Strategy Board to allow for better alignment of emissions objectives, synchronization of efforts, and optimization of resource use across the Company. The new Board will also provide the foundation for future business opportunities such as trading of greenhouse gas credits, regulatory interaction, and emission-related investment opportunities.

New Products

WOODSTALK fiberboard building material product was certified as a "Climate Cool Product" by The Climate Neutral Business Network. As mentioned in our 2002 report, WOODSTALK building material is a fiberboard material made from wheat straw and a formaldehyde-free resin. Traditionally, wheat straw was burned in the field after wheat was harvested. But instead of burning, the straw is gathered and manufactured into a material similar to particleboard. Like particleboard, it can be used in building construction and it has superior properties for cabinet or furniture manufacturing. But WOODSTALK building material is not just carbon neutral. It actually reduces the amount of greenhouse gases introduced into the atmosphere and preserves trees that would otherwise be cut down for lumber.

Greenhouse gas emissions are reduced significantly and the reductions are real and permanent. Because of WOODSTALK building material, 240,000 tons of carbon dioxide (CO₂) is not released into the atmosphere as a result of yearly wheat straw burning. Additionally, another 250,000 tons of CO₂ per year are saved due to forest sequestration. The trees not harvested as building materials remain in the ground, absorbing CO₂. This savings is conservatively estimated as the same as removing 54,000 cars from the road every year. WOODSTALK building material is a demonstration that Dow products and technology provide significant solutions to the climate change challenge.

www.dowwoodstalk.com

Stakeholder Involvement

In 2003, Dow continued to publicly describe its climate change efforts, conduct dialogue with a variety of stakeholder groups, and submitted information about its climate change activities to socially responsible investor groups. For example, in November 2003, The Carbon Disclosure Project, a group of 87 institutional investors with assets of over \$9 trillion under their management, published a report which said,

"Dow Chemical, in particular, stands out as a sector leader. Dow is managing the issue via a four-pronged strategy which covers technology, business integration, new products, and stakeholder involvement. Implementation is spearheaded by a multidisciplinary Climate Change Opportunity Management Team."

www.cdproject.net

While we are working to improve our greenhouse gas emissions (GHG) data collection, and have done our utmost to ensure the quality of the data, we acknowledge that there may be inaccuracies as a result of limited availability of some historical data.

As we refine our reporting tools, we will update the emissions data and be transparent about our assumptions and guidelines. Also, we are working with external stakeholders to bring our GHG data in line with generally accepted reporting protocols.

Please refer to page 45 at the end of this section to see our progress toward reducing greenhouse gases.

Dioxin

The term “dioxin” refers to a family of chemical compounds that are unintentional by-products of certain industrial, non-industrial, and natural processes, often involving combustion. The concern about dioxin is that it persists in the environment and can accumulate in the body through the consumption of some foods containing fat.

It is well documented that dioxin levels in the environment have been steadily declining for the past 30 years. People today are exposed to less dioxin than at any time in the last several decades. In particular, industrial emissions have been reduced dramatically through regulation and voluntary actions. According to the U.S. EPA's Inventory of Sources of Dioxin in the U.S., the chlorine industry's total releases to the environment represented only three percent of total projected dioxin emissions from quantified sources for 2002 through 2004.

Today, the U.S. EPA believes uncontrolled burning of residential waste (backyard barrel burning), agricultural burning, and landfill fires are the largest sources of new dioxin, accounting for more than 50 percent of all current releases to the environment.

Dow plays an active role in the global reduction of dioxin emissions. In 1994, we set a 2005 Environment, Health, and Safety goal to reduce global air and water emissions of dioxin by 90 percent. This goal is being achieved through a comprehensive strategy of process improvement and technological innovation (refer to chart on page 42). Our reduction efforts are focused on lowering emissions at the sources where they are generated. We are optimizing our incinerators, using improved technology and operational excellence.

By year-end 2003, our emissions had been reduced by more than 80 percent, which means that we have made significant progress toward meeting our voluntary dioxin air and water emission reduction goal for the year 2005.

You can learn more about our global and regional efforts to reduce dioxin emissions at our web site.

www.dow.com/environment/dioxin

Biotechnology

Biotechnology holds vast promise for meeting some of the world's most pressing needs. At the same time, important questions are being asked about this family of technologies as part of a broad public dialogue that includes individuals, organizations, companies, academia, and governments.

We understand that these questions and concerns need to be addressed both in the context of science and in light of biotechnology's unique philosophical and ethical implications. To this end, Dow is engaged in dialogue with external stakeholders. We value these relationships for the perspective they contribute, the guidance they offer, and the opportunity they present for understanding societal concerns. In consultation with external stakeholder groups, we developed and implemented The Dow Chemical Company Guiding Principles for Biotechnology to further direct our approach and actions. The Guiding Principles can be found on our web site.

www.dowpublicreport.com

At the same time, we are committed and prepared to develop biotechnology-based capabilities and biotechnology-enabled businesses in a scientifically sound and responsible manner. We align our activities with Responsible Care as well as Dow's Values, Code of Business Conduct, and Sustainable Development Principles. We are hopeful that by considering biotechnology in an open, informed, and transparent process, and combined with scientific understanding, stakeholders can approach common ground, and this new set of technological tools can deliver on its promise.

Energy Diversity

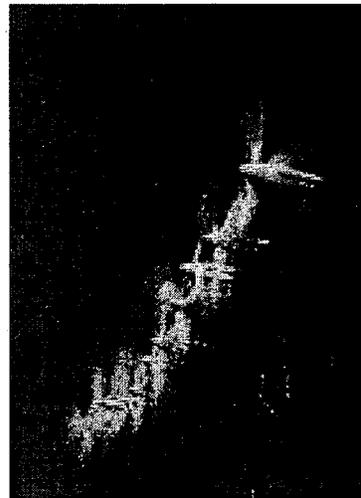
Chemical manufacturing is an energy-intensive business. The cost of energy is a fundamental factor in the profitability of chemical companies, and the industry has historically been driven to find new and less expensive sources of energy to meet its needs. But today, the challenge of producing or acquiring affordable energy for our production facilities has become particularly daunting. This is especially true in light of our desire to utilize the “cleanest” possible energy resources from an environmental perspective.

In the current business climate, the high cost of energy and potential shortages of energy supply—coupled with the environmental impact of energy production and consumption—make development of a sustainable energy plan a business imperative. Aggressive, proactive energy conservation and development actions are called for as part of that plan.

Our recent history suggests that we will meet the challenge. Between 1990 and 1994, we reduced our energy use by 20 percent. We are currently on pace to meet our goal of reducing the amount of energy we use per pound of product by two percent per year from 1995 to 2005—in 2003 alone, we had a 2.9 percent improvement. You will find examples of several recent energy conservation successes on page 29 of this report.

We are also actively investigating new energy resources that reduce our dependence on limited, uncertain, or unsustainable sources of supply.

- In March 2003, Dow joined The World Resources Institute’s Green Power Market Development Group. The alliance creates new markets for renewable energy.
- Since 1994, nine new cogeneration facilities supplying power to Dow sites have saved over 23 trillion BTU’s (6,700 gigawatts) of energy annually. Additional new facilities are expected to increase the savings to almost 47 trillion BTU’s (13,200 gigawatts) per year by the end of 2005.



Promoting Green Power

In March 2003, Dow joined The World Resources Institute’s Green Power Market Development Group. The alliance creates new markets for renewable energy. The ultimate goal is to expand the green power options so that companies can reduce their global impact.

Dow has a history of using more efficient power sources in its manufacturing. In fact, “Dow was an early champion of cogeneration of steam and electricity,” said Peter Molinaro, leader of Dow’s Global Climate Change Team. Being involved in the Green Power Market Development Group is one more way Dow lives its commitment to find, develop, and increase use of renewable energy.

www.thegreenpowergroup.org

Asbestos

The Dow Chemical Company and Union Carbide Corporation (UCC) continue defending asbestos lawsuits. These lawsuits have arisen even though both companies complied with government regulations and industry standards that were in effect for regulating the safe use and handling of asbestos. Particularly noteworthy is the sheer volume of personal injury claims (experts estimate between 80 percent and 90 percent) filed by plaintiffs who have no current health effects. As a result, the court system is clogged, significant resources must be devoted to defending against these claims, and the claims of those people who have contracted specific asbestos-related diseases due to exposure are not being met fairly or in a timely manner.

The runaway asbestos litigation in the U.S. is having a huge economic impact on companies and individuals. Most of the major manufacturers of asbestos-containing products—to date, nearly 70 companies—are in bankruptcy. A recent study co-authored by Nobel prize-winning economist Joseph Stiglitz said U.S.

workers have borne up to \$3 billion of the costs of soaring asbestos claims that pushed their employers into bankruptcy. The asbestos bankruptcies have led to a loss of as many as 60,000 jobs and the costs imposed on these displaced workers amount to between \$1.4 billion and \$3 billion in present value, or roughly \$25,000 to \$50,000 per displaced worker. These bankruptcies also increase the focus on solvent, but more peripheral, companies that would otherwise not bear a significant portion of the litigation burden.

We believe that federal legislation is needed to ensure justice for all those concerned. A bill establishing a privately funded trust is presently pending in the Senate, and the Company has urged Congress to act on this measure in 2004.

Bhopal

The tragedy that occurred in Bhopal more than 19 years ago should never be forgotten. Industry, including Dow, has learned from such events and we try to do all we can to assure that similar incidents never happen again.

After the Bhopal tragedy, several provisions were made by agreements between Union Carbide Corporation, Union Carbide India Limited and the government of India, under the supervision (and with the approval) of the Indian Supreme Court, for the current and future health needs of the community, including opening of a new \$90 million hospital, health insurance and a settlement fund, of

which \$333 million remains after virtually all claims have been processed, as a result of accrued interest over the years. Substantial environmental remediation occurred at the site after closure of the plant in 1984. The Indian state government of Madhya Pradesh unilaterally revoked the lease under which the company then called Eveready Industries India Ltd. (owned by MacLeod Russell since 1994) operated the plant and took exclusive possession of the plant site in 1998, stating that it would assume responsibility for the remaining cleanup of the site. At that time, government-sponsored studies showed no adverse impact from the plant site to the community's groundwater.

We respect that, for some people, responsibility for Bhopal continues to be an unresolved issue. This doesn't change the facts that the Government of India, through the Settlement agreement, has full authority and responsibility over issues arising from the tragedy and that, upon acquiring Union Carbide, Dow inherited no responsibility. Still, some people would have us take action to resolve their concerns. We do not believe such action would be appropriate or consistent with our obligation to protect our shareholders' interests.

www.bhopal.com 

Recognition

We target our EH&S goals and practice our Sustainable Development mindset to achieve business excellence. Recognition from government agencies, other experts, and our peers help to confirm that we are focusing on the right things.

While we will never be without our critics, our commitment to dialogue and transparency serves us well in continuing our progress.

During 2003, Dow and its affiliates received the following EH&S awards:

Responsible Care Sustained Excellence Award

In 2003, the American Chemistry Council awarded Dow the Responsible Care Sustained Excellence Award for the second year in a row. Given annually, the award recognizes companies that have demonstrated excellent safety records over the past three years. To be eligible for the award, a company must perform in the top 10 percent of its peers and be fully implementing the Responsible Care Employee Health and Safety Code at all of its sites.

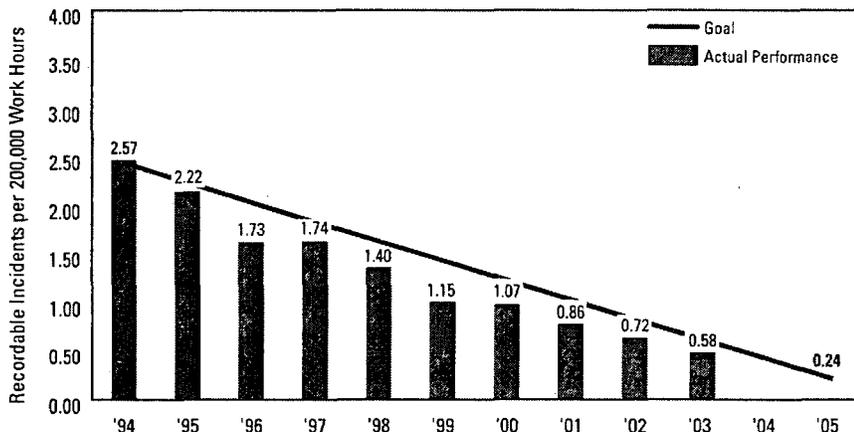
OSHA Star of Excellence

The U.S. Occupational, Safety, and Health Administration (OSHA) recognized Dow "as one of the safest workplaces in the country." Seven of Dow's manufacturing sites have been certified or recertified as OSHA Voluntary Protection Program Star worksites. These sites—located in Russellville, Arkansas; Dalton, Georgia; Plaquemine, Louisiana; Ludington, Michigan; Greensboro, North Carolina; La Porte, Texas; and Freeport, Texas—were awarded the Star of Excellence, given only to sites that have achieved a safety performance 90 percent better than the national average within their industry during the past 12 months. Dow has a goal of 0.24 injuries or illnesses (per 200,000 work hours) for the entire organization, which is a 90 percent reduction from its 1994 rate of 2.57.

Cleaning Production Award

The Dow Brazil Guarujá site has received the "Cleaning Production Award" from the State Environmental Agency of São Paulo (CETESB), as a result of an initiative regarding elimination of liquid effluents through a recycle methodology that took place in the Latex Plant. The removal of all hydrocarbon air emissions was accomplished by sending it to be burnt inside the existing boiler. Besides the production improvement, this new manner allows Dow Brazil a reduction of more than 5.5 thousand gallons per year of fresh water and enables additional steam production without fuel oil consumption.

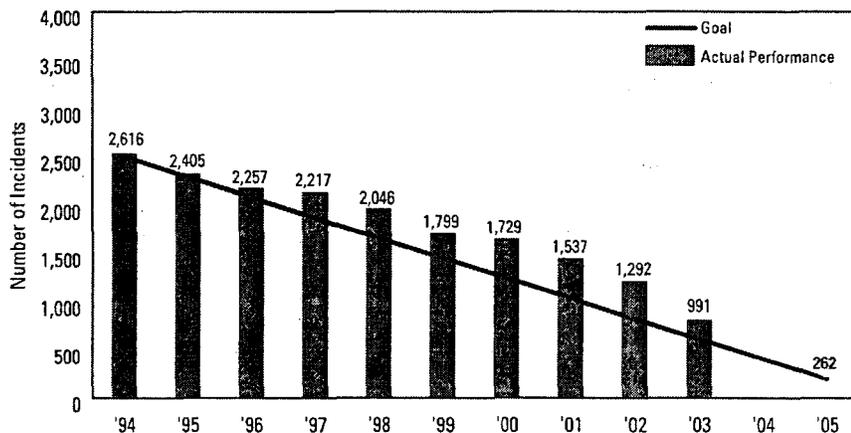
**Injury and Illness Rate, Dow Employees and Contractors—
Goal: 90% Reduction**



In 2003, we realized a 19 percent improvement in our safety performance—including both Dow employees and contractors. We ended the year with our best-ever performance of a 0.58 recordable injury/illness rate, representing a 77 percent improvement since 1994. And over 70 percent of our facilities had no incidents at all.

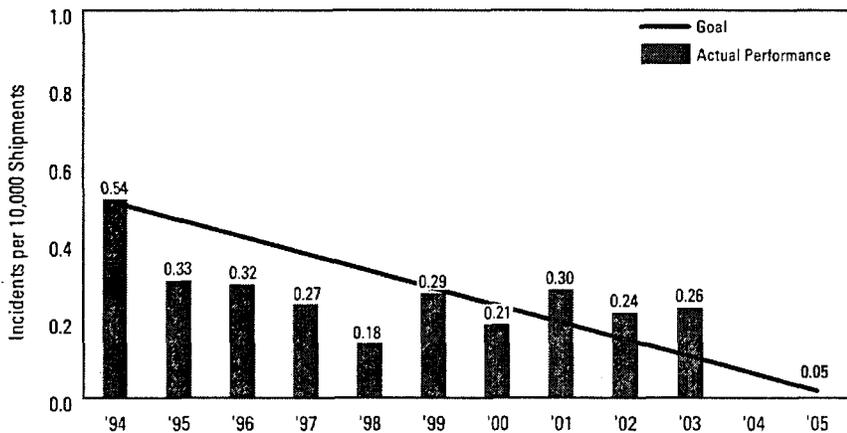
But it's not about numbers: it's about people. In January 2004, we achieved a significant milestone—10,000 people were NOT hurt as a result of our performance improvement since 1994. In other words, had we remained at our 1994 performance levels, that many more people would have been hurt.

Leaks, Breaks, and Spills—Goal: 90% Reduction



Continuing our focus on effective implementation of our LOPC (loss of primary containment) Reduction Initiative, we achieved a 23 percent reduction in leaks, breaks, and spills in 2003, our largest annual improvement ever. This measure includes loss of containment of materials, whether lost to the environment or captured in engineered containment systems. The goal focuses us on operational excellence—keeping materials where they are intended to be.

Transportation Incidents—Goal: 90% Reduction

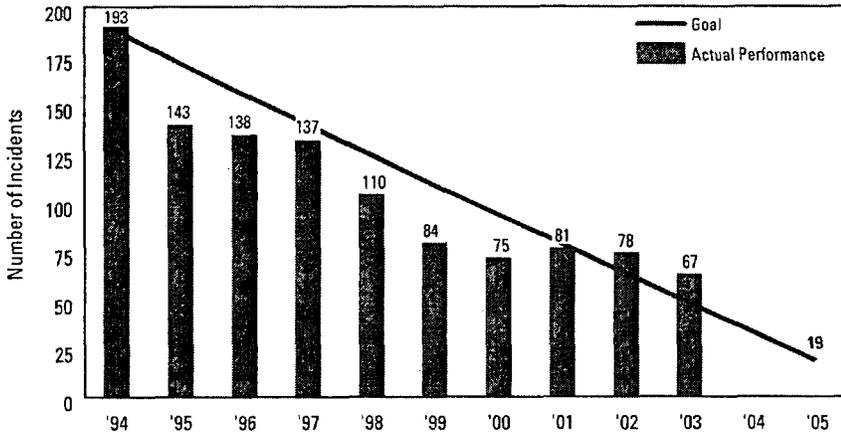


As part of this goal, we measure any incident during transportation of our products, whether or not any material was released. We continue to be challenged in making significant improvement. Our key focus is working with our contractor firms to promote best practices associated with behavior-based safety performance.

We also measure incidents involving the loss of hazardous material during transportation. We have achieved significant improvement—90 percent since 1994. We had four incidents in 2003.

Progress

Process Safety Incidents—Goal: 90% Reduction

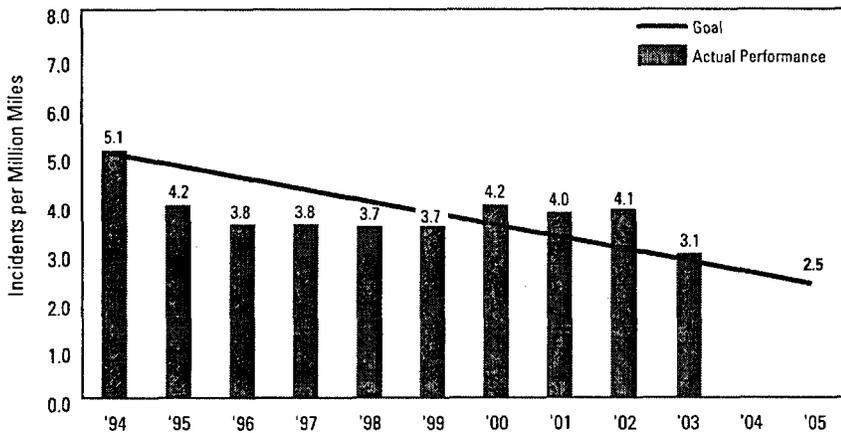


This goal tracks:

- Fires
- Explosions
- Chemical releases involving chemical processing equipment if they have resulted in a release above a defined threshold, a serious injury or fatality, or damages greater than \$25,000

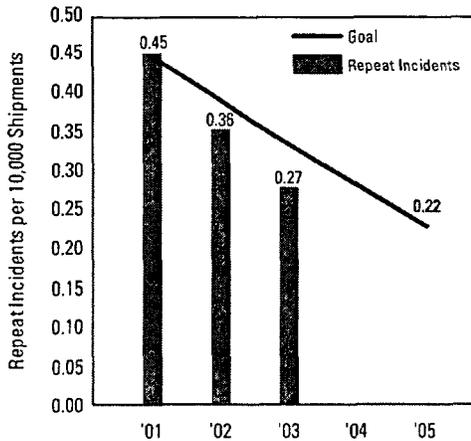
In 2003, we realized a 14 percent reduction in such incidents as compared to 2002, and since 1994, we have had a 65 percent reduction in these types of events.

Motor Vehicle Incident Rate—Goal: 50% Reduction



The motor vehicle measure is the number of vehicle accidents per million miles driven. These will range from minor fender benders that exceed a threshold dollar damage limit, to more serious accidents involving injuries. In 2003, we achieved our best ever performance in motor vehicle accidents, with a rate of 3.1. We are focusing on target groups such as Sales & Marketing, the use of Six Sigma methodology, and leveraging best practices to move us closer to achieving the 2005 goal.

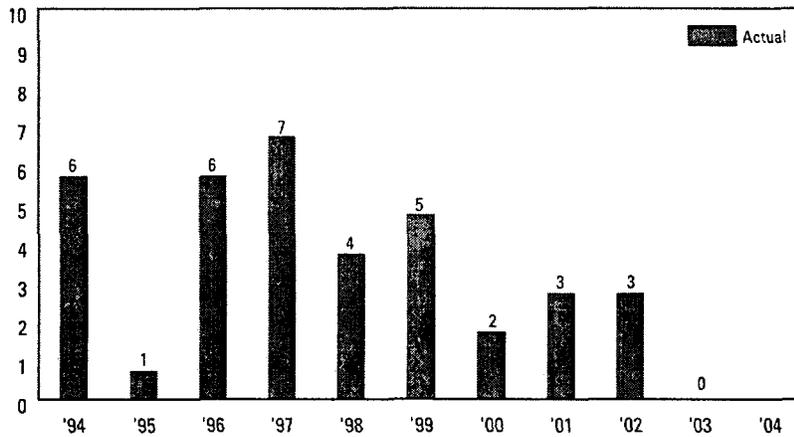
Repeat Incidents at Customer Facilities—Goal: 50% Reduction



This measure is the number of repeat incidents at our customer facilities per 10,000 shipments. The objective is to learn from the mistakes and assure actions are identified and implemented so that a repeat incident is prevented. The baseline and 2005 target were established in 2001, with the goal being a 50 percent reduction by the end of 2005. Since 2001, we have improved performance by 40 percent, well on our way to achieving the 2005 goal.

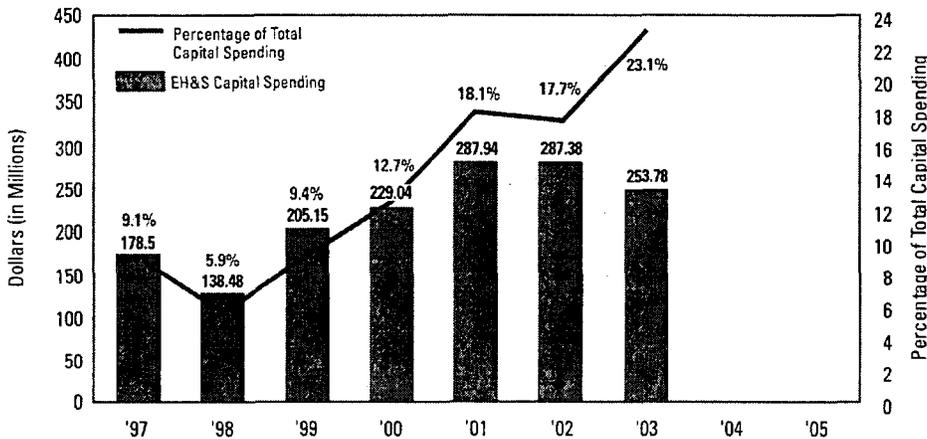
Progress

Fatalities—Dow Employees and Contractors



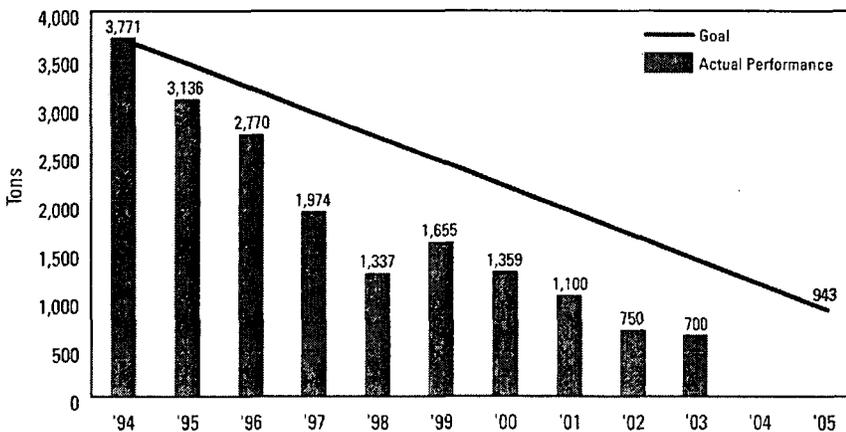
We had no employee or contractor fatalities in 2003. We continue to focus on safety, reporting and addressing the minor incidents to help assure we avoid the serious ones. In 2003, greater than 80 percent of employees' visits to Dow medical were either first aid or precautionary visits. Our goal is for every worker at Dow to go home safely every day.

EH&S Capital Spending—Percentage of Total Capital Spending



Another measure of a company's EH&S performance is by examining the amount of capital expenditures for EH&S projects relative to total capital expenditures. Even with Dow's commitment to reduce capital spending in 2003 by \$500 million, the percentage of spending on EH&S projects actually increased last year. And, though our action plan called for us to reduce costs, we will not compromise the reliability, safety, and security of our plants or the people who work there. Capital projects last year focused on air, water, safety, loss prevention and security enhancements.

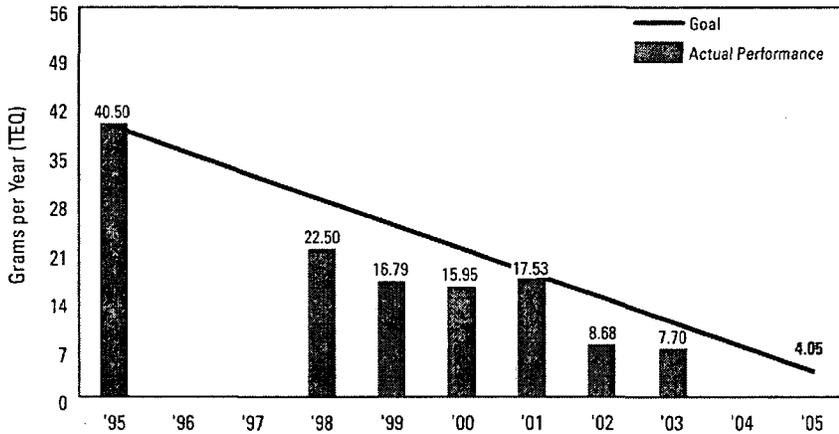
Emissions of Priority Compounds—Goal: 75% Reduction



We have reduced our emissions of priority compounds by 81 percent since 1994. Even though we have already achieved our goal, we are committed to continue our efforts to meet the challenge of maintaining our emission reductions while increasing production.

Progress

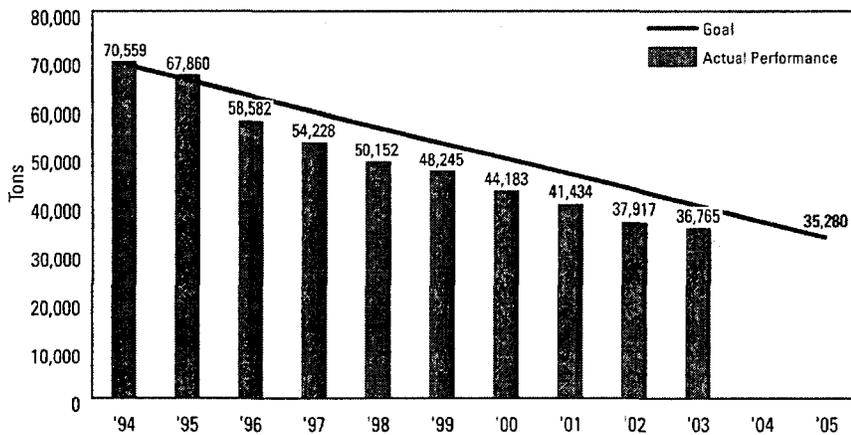
Dioxin Emissions to Air and Water—Goal: 90% Reduction



In 2003, Dow made significant progress on our dioxin reduction goal with total dioxin air and water emissions at less than eight grams globally. We are well on our way to achieving our objective, with over 80 percent of our targeted goal accomplished.

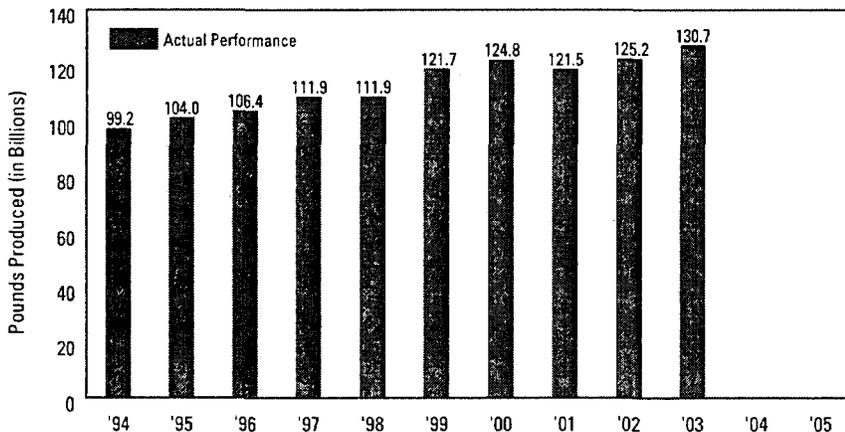
Note: In 1996 and 1997, no data are shown in the chart. This is due to the fact that Dow used monitoring data generated from 1995 through 1997 to document and establish its 1995 air and water emissions baseline.

Chemical Emissions—Goal: 50% Reduction



We are continuing to exceed our goal for reducing our chemical emissions and have achieved an overall reduction of 48 percent since 1994. We have achieved these reductions while increasing production by 32 percent during the same time period. This means that we not only reduced our existing emissions, but have implemented technology that allowed production growth without increasing emissions.

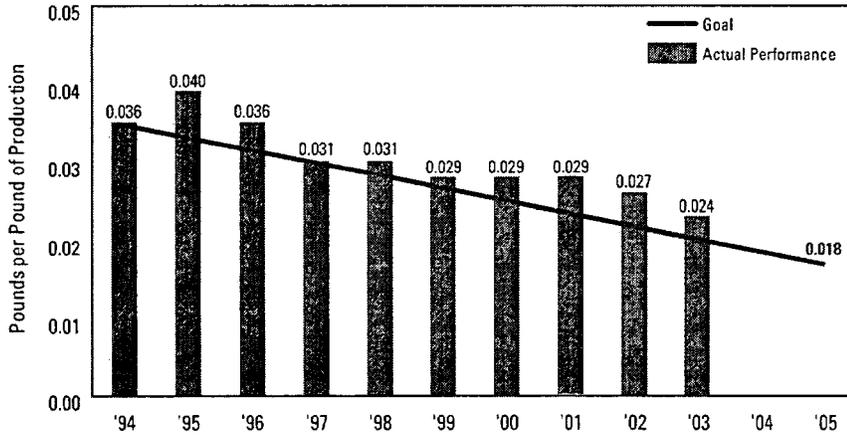
Global Production



Dow's global production increased 4.4 percent during 2003 for an overall growth of 32 percent since 1994. Our historic production data takes into account any divestitures, mergers, and acquisitions and may change to reflect those activities. Our energy use, waste, and wastewater goals are calculated as a percentage of global production.

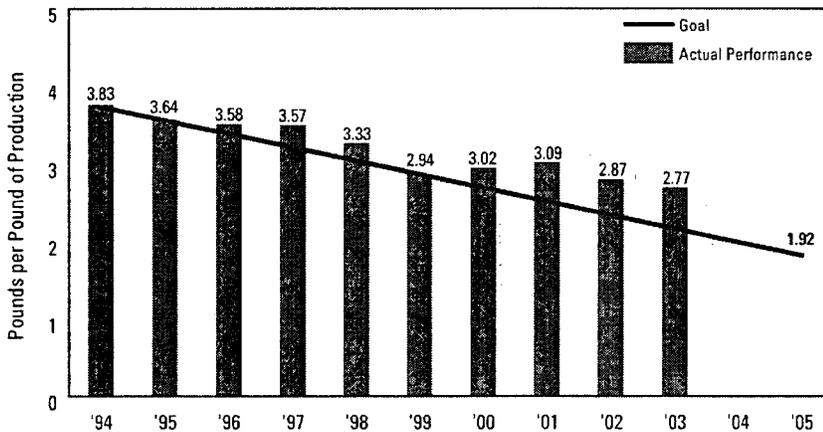
Progress

Waste—Goal: 50% Reduction per Pound of Production



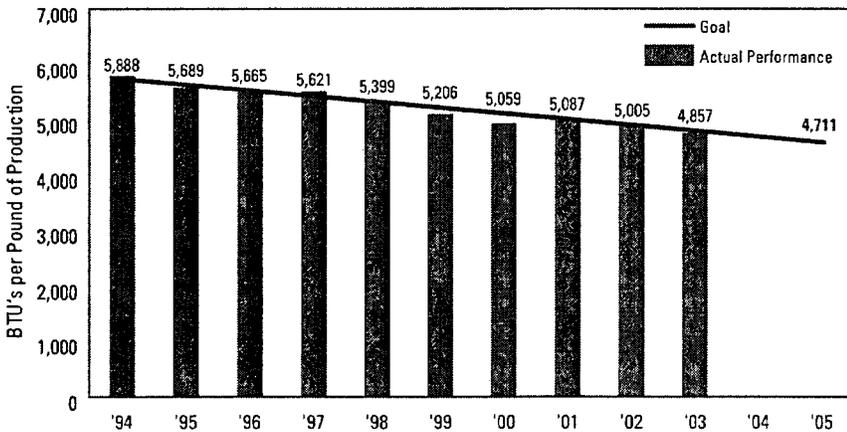
Wastes are materials that receive treatment. Our current focus is to find by-product synergies that allow waste to be used or recycled as useful products or raw materials. In addition, our Company-sponsored Waste Reduction Always Pays (WRAP) program contributed to over 500 million pounds in waste reduction since it was started. We are slightly above our target for this particular goal, but we are continuing to make good progress in reducing waste at the source or finding ways to recycle or reuse it.

Wastewater—Goal: 50% Reduction per Pound of Production



Wastewater is aqueous streams that receive treatment before discharge. Most of our process wastewater is treated in our facilities with only seven percent treated off-site. Our primary objective is to eliminate wastewater at the source, but we have also focused on activities to recycle wastewater when feasible. We are currently above our goal line for wastewater reductions, but are committed to continue our source reduction and recycle efforts to reduce fresh water consumption. These activities also support our commitment to work jointly with the public to share and better utilize our water resources.

Energy Use—Goal: 20% Reduction per Pound of Production

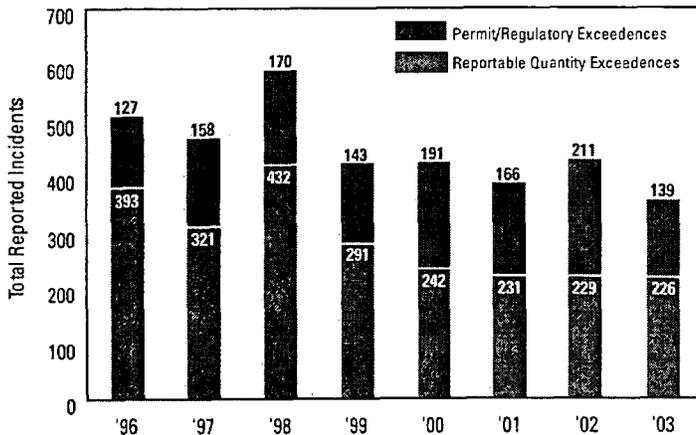


Our energy focus is on energy intensity—reducing the amount of energy needed to produce a pound of product by two percent per year from 1995–2005. This is in addition to a 20 percent improvement from 1990–1994.

There was an improvement in energy intensity of approximately 2.9 percent in 2003 compared to 2002. Improved operating rates and the contribution of over 200 Six Sigma energy efficiency projects in 2003 were major factors in the improvement. Overall energy intensity has improved 17 percent since 1994.

Progress

Government Reportables

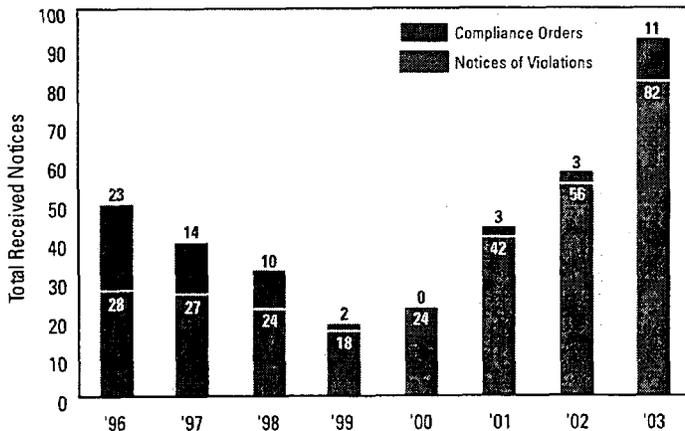


Government reportables are those incidents that are reported to government agencies, both voluntarily and required. They represent either spills or releases that exceed reportable quantities established by the government, or incidents that exceed our permit level.

In 2003, we reported a total of 226 reportable quantity exceedences and 139 permit/regulatory exceedences worldwide.

Government reportables are primarily triggered by loss of primary containment (LOPC) incidents and permit exceedences. As we have been successful at reducing our overall LOPC numbers, we are optimistic that an LOPC reduction initiative at just a few of our facilities will turn this performance around. Our approach to improvement includes not only reliance upon the LOPC initiative at targeted sites, but continued focus on assuring permit requirements are institutionalized in our management system and effective implementation of our improvement tools in that system.

Notices of Violation and Compliance Orders



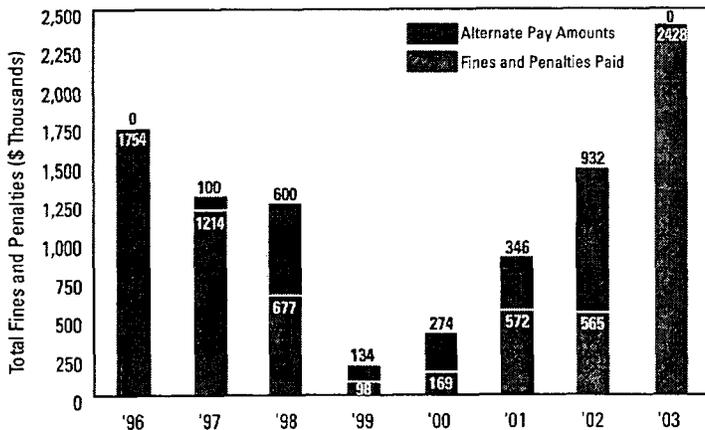
The number of notices of violation increased from 56 to 82 in 2003. The majority of these violations occurred within our North American operations. There is an overlap between government reportables and notices of violation (NOV's) and compliance orders. Government reportables typically use a self-reporting mechanism to commence their enforcement actions.

Compliance orders are issued by the government setting out the conditions a facility must meet to continue operation. In 2003, we had eight more compliance orders than in 2002.

NOV's also are primarily triggered by LOPC's. To improve this performance, we again are relying upon our LOPC reduction initiative applied at specific sites, which are currently experiencing the most difficulty in this area.

The use of NOV's and compliance orders are a reflection not only of our performance, but the enforcement culture of the governmental entities in authority.

Fines and Penalties

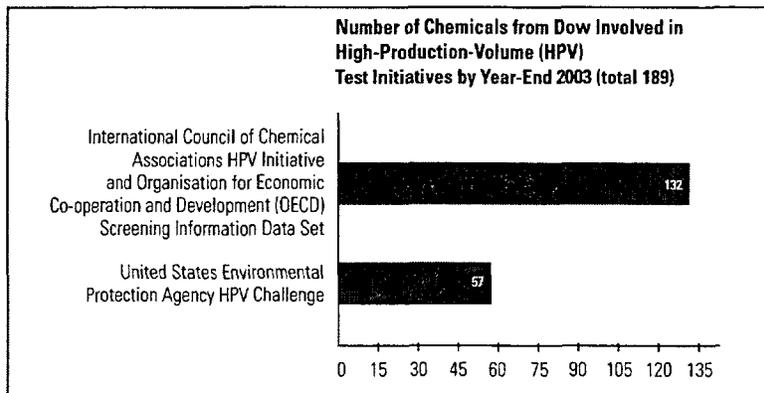


Fines and penalties are tracked globally and are recorded in the year they are paid. In lieu of paying a fine or penalty, alternate pay amounts usually encompass projects benefiting the environment or local community, such as pollution prevention or remediation programs, public awareness, education activities, or wetland conservation activities. Fines and penalties are troubling not only because they indicate government-mandated performance, but also because they require cash outlays at the same time we are so focused on cost containment within the Company.

In 2003, Dow paid \$2,428,070 in fines and penalties. One North American facility accounted for 92 percent of the fines. Because fines and penalties are again a lagging indicator, we expect that our recent improvement in LOPC performance will begin to reflect the progress that we have made.

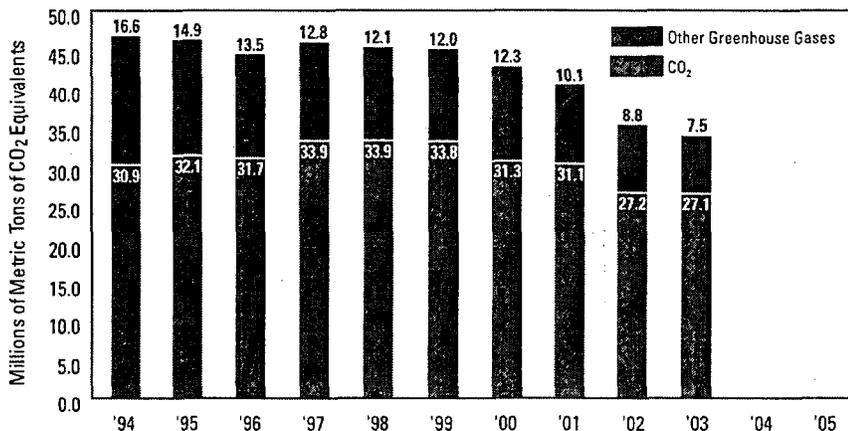
Progress

High-Production-Volume Test Initiatives



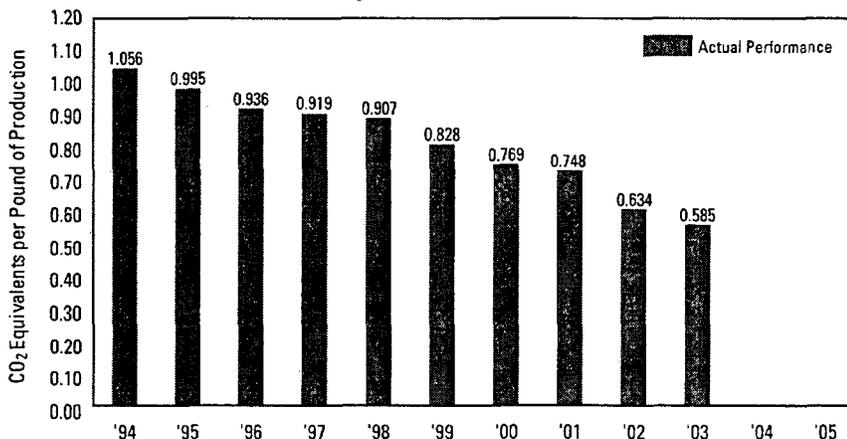
Dow actively participates in three international initiatives aimed at improving the quantity and availability of health and environmental information on High-Production-Volume (HPV) chemicals, contributing existing data as well as generating new test data, when appropriate. Improving public access to knowledge about these chemicals is a shared responsibility of the chemical industry. Dow is the sole volunteer for 33 of the chemicals and via participation in consortia is a cosponsor for the remainder. The time frame for these programs is 2000–2004. These numbers may change as a result of various business activities, including possible future business acquisitions or divestitures. We are currently on track to meet our commitments.

Greenhouse Gas Emissions



Carbon dioxide (CO₂) makes up the majority of our greenhouse gas (GHG) emissions. While production increased by 32 percent since 1994, our total direct emissions of GHG from our operations, measured in CO₂ equivalents, have been successfully reduced by 27 percent. We have achieved this by improving energy efficiency and conversion to more climate-friendly technologies. We remain committed to reduce our impact on GHG emissions.

Greenhouse Gas Intensity



Dow's principal means of measuring progress on climate change is by improving greenhouse gas intensity—a measurement of direct GHG emissions per unit of production. While Dow has not yet set a specific numeric GHG reduction goal, our program to reduce the amount of energy used per unit of production by two percent per year from 1995 to 2005 continues to drive improvements in GHG intensity. An eight percent reduction of emission intensity was achieved in 2003 versus 2002, resulting in an overall reduction of 45 percent since the 1994 base year. We have achieved this through improvements in energy efficiency, and implementation of climate friendly technologies.

Progress



Corporate Social Responsibility

Our commitment to social responsibility extends around the globe—first, to Dow employees and our neighbors in the communities where we operate. As they have a direct relationship with our Company, it stands to reason that they are the priority focus of our social responsibility policy and practice.

Dow employees—and the knowledge they possess—comprise one of our Company's most valuable assets. Our employees make invention and innovation possible, which is to say they breathe life into our Company, continuously renewing our science and technology. To

perform effectively, Dow employees need to know what to do, they need to know how to do it, and they have to want to do it. That is why Dow's "People Strategy" is so important. This strategy addresses all facets of our relationship with our employees. It helps us to attract and retain outstanding professionals, provide them with continuous learning, encourage performance excellence, achieve diversity, and develop leaders at all levels.



¿Como estas?

Dow has always had a tradition of helping employees learn other languages when it is important for their jobs; whether it is helping new employees who are not native English speakers to learn English or helping expatriate employees and their families to learn local languages so that they can better integrate with their new neighbors. Now, Dow is helping to provide free Spanish classes for employees in Michigan, Louisiana, and New Jersey. Dow's Hispanic-Latin Network (HLN) sponsors the classes. The HLN hopes classes will help strengthen ties between native and non-native Spanish speakers both at Dow and in communities around Dow sites.

Classes are free to participants and the teachers are Dow employees who are Spanish native speakers and volunteer their time to prepare and teach. A total of eight classes were conducted in 2003. The 170 students have been from the U.S., Europe, and Asia and include employees from all functions and job levels.

Maintaining strong relationships with our communities is also a priority and is covered by Dow social responsibility policies. Dow communities tend to be smaller in size and our corporate presence is often very significant. We interact closely with local businesses, governments, community groups, and individuals both collectively as Dow and individually as members of the community.

To ensure that our local operations reflect our global commitment to the Triple Bottom Line, we pursue community sustainability at each of our operating sites. There is no universal prescription to achieve the sustainability "ideal" in every community. However, by maintaining ongoing dialogue with community members, we are learning how we can best contribute to improved quality-of-life in each community where we operate.

People Strategy

Over the past few years, the Dow management team underscored the critical importance of managing the Company's "human capital"—Dow people's knowledge—by introducing a comprehensive "People Strategy." Virtually every aspect of how Dow affects the employee's work experience has been reexamined and, where necessary, restructured. This includes Dow's ability to attract and retain outstanding professionals, provide them with continuous learning, encourage performance excellence, achieve diversity, and develop leaders at all levels.

The strategy uses valuable input from the regularly conducted Global Employee Opinion and Action Survey (GEOAS), an instrument that is also used for tracking progress in this vital area. The confidential survey encourages employees to give candid responses in three basic categories:

Alignment—Do you know how your work fits into Dow's overall Mission? Do you know what to do?

Enablement—Do you have the competencies, freedom, and resources to get your work done? Do you know how to do it?

Motivation—Do you want to do it?

While no specific individuals are identified, the survey data is used by the leadership teams of every business and function to manage their employees and improve employee satisfaction.

Please refer to page 58 at the end of this section to see GEOAS results.

In 2003, as part of our commitment to employee development, Dow employees completed more than 300,000 hours of Human Resource Development (HRD) classroom training involving general core competencies and about 400,000 other courses via web-based learning. In addition, there is a significant amount of specific expertise training (such as manufacturing and operations training) that is not currently included in these figures.

We also strive to have a workforce that reflects our global marketplace and culture, where different backgrounds, personal styles, and viewpoints are considered competitive assets. The number of female managers increased to 16 percent from 15 percent in 2002, and up from 11 percent in 1998.

Please refer to pages 57–58 at the end of this section to view our 2003 workplace and training statistics.

Employee Health Programs and Services

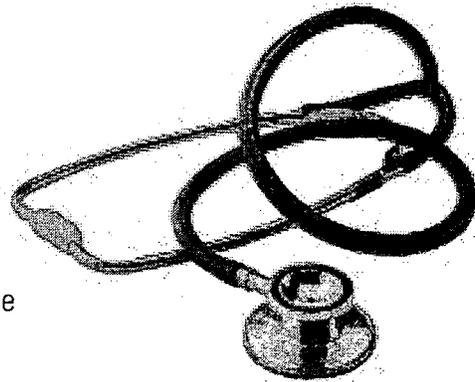
Dow continues to take a broad approach to employee health focusing on five different aspects related to an understanding of health.

- **Physical** health involves exercise, proper nutrition, rest, and relaxation.
- **Social** health is about meaningful relationships, working effectively with others, and feeling good about social networks.
- **Inspirational** health or spiritual health influences us to behave with passion, empathy, humility, and leads to empowerment.
- **Intellectual** health refers to both acquiring knowledge and using that knowledge to improve the quality of life.
- **Emotional** health addresses the pressures in a person's life, how one reacts to those pressures, and the ability to relax.

These five aspects of health are distinct but integrated. In the same way that health means different things to different people, these different aspects will have varying degrees of impact and significance for individual employees. Dow's focus on all five aspects is known as Total Health. The Total Health approach recognizes that any strategy for dealing with employee health issues must take all five aspects into account, as employees are the primary source of most competitive advantage.

Employee Assistance Plans

Dow recognizes that taking care of business means taking care of the needs and well-being of the individuals who make up our organization. The Employee Assistance Program (EAP) is a global model that provides a comprehensive approach to address both human and organizational needs. Dow's EAP provides professional, confidential services for all employees and family members. EAP services include assessment, short-term counseling, referrals, and consultation. EAP covers a variety of problems that may affect employee well-being, such as emotional disorders, alcohol and drug abuse, marital, family and adolescent problems, and financial crises.



Walk-A-Weigh

In terms of physical health, Dow used a walking program to stimulate employees and family members around the world to improve their fitness and reach a healthier weight. The program was offered in 23 countries and nine languages and had over 5,000 participants. Using online registration and communications, Walk-A-Weigh featured a nautical theme to emphasize the importance of physical activity and weight management, and taught skills and techniques to improve both. Of the people who reported their program results, over two-thirds were more active at the end of the program and had lost a combined 4,300 kilograms or 9,460 pounds in 2003.



Better Cancer Treatment

ChelaMed radiopharmaceutical services from DOWPHARMA help drug companies develop better diagnosis and treatment methods for cancer patients. Custom-made radiopharmaceutical agents travel through the body and target the organ, tissue, or tumor that doctors wish to look at or treat. For diagnosis, a special camera is used to detect a mild agent as it lights up a problem area. For treatment, a stronger agent can be carried directly to the cancer site, generally with fewer side effects compared with other types of treatment.

To date, we have worked with Memorial Sloan-Kettering Cancer Center, Barnes Jewish Hospital, and others to develop radiopharmaceuticals. The team is now working with drug development companies on new treatments for a variety of cancers. For example, in 2003, we began working with Avidex Limited on a new treatment for lung and bladder cancer.

www.chelamed.com

External Recognition

During 2003 Dow received the following external awards and recognition for employee health programs and services:

Bronze H.E.A.L.T.H. Award— Singapore

In Singapore, Dow Chemical Pacific (Singapore) Pte Ltd. received a bronze H.E.A.L.T.H. (Helping Employees Achieve Life-Time Health) Award from the Singapore Government. The Singapore H.E.A.L.T.H. Award is an annual program organized by the Health Promotion Board to give national recognition to organizations with commendable workplace health promotion activities. Awarded by the Ministry of Health, the award is a national barometer of companies that organize programs to address the physical, emotional, and mental well-being of their employees. This is the fifth consecutive year that Dow Singapore has won a H.E.A.L.T.H. Award. In 1999 and 2003, it won the bronze award; and in 2000, 2001, and 2002, it won the silver award.

Five Stars Companies (by COFIC)—Brazil

For the third year, Dow Brazil Northeast sites were awarded as Five Stars Companies by COFIC for their occupational health and health promotion programs. Participating for the first time, Aratu's CELLOSIZE site was awarded with Four Stars. This award is promoted by Camaçari Industrial Committee to recognize industrial chemical plants that have outstanding programs in the area of EH&S.

Gold Well Workplace— West Virginia Operations (U.S.)

The West Virginia Operations (WVO) of Union Carbide Corporation was granted Gold Well Workplace status by the Wellness Council of America and the West Virginia Wellness Council. The award was presented in October at the annual West Virginia Governor's Conference on Worksite Wellness. There were only six recipients of the Gold Award in West Virginia and the smoking cessation program at WVO also merited a Certificate of Recognition.

Sarnia-Lambton Healthy Workplace Award—Sarnia, Canada

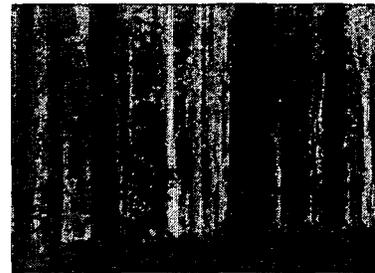
On October 28, Dow Chemical Canada Inc. (Dow Canada) was awarded the Sarnia-Lambton Healthy Workplace Award, Gold Prize Large Workplace Category for the third consecutive year. This award was established to recognize workplaces in Lambton County that strive to improve the well-being of their employees. Dow Canada was recognized for making workplace wellness a priority for over 25 years, making workplace health a part of the culture, and using a comprehensive approach that includes awareness raising and skill building activities. In addition, Dow Canada's program was praised for demonstrating excellence in leadership, planning, people focus, and evaluation and using programming to address the physical environment, the psychosocial environment, and personal health practices. Another highlight was that Dow Canada's health promotion program is not only supported by management but operates within a management system, thus recognizing the importance of creating positive role models for their employees.

ACOEM Health Achievement Award in Occupational Medicine

Dr. Catherine M. Baase, Dow's Global Director of Health Services, received the 2003 Health Achievement Award in Occupational Medicine awarded by the American College of Occupational and Environmental Medicine (ACOEM). The award recognizes an ACOEM member for unique contributions in occupational and environmental medicine. Dr. Baase was honored for conducting research and developing programs on health and human productivity at Dow, and for her achievements as a member of ACOEM's Special Committee on Health and Productivity. ACOEM is an international medical society of more than 6,000 occupational and environmental physicians and health professionals.

American Board of Occupational Health Nurses Employer Recognition Award

Recognizing Dow's ongoing commitment to providing opportunities for personal and professional growth, the American Board of Occupational Health Nurses (ABOHN) bestowed its Employer Recognition Award to the Company. The Award underscores the value that Dow places upon certification in occupational health nursing. The Board took note of the enhanced job responsibilities, project management assignments, external association support, and certification encouragement in making its decision.



**THERMAX
Helps Use the Sun
for Cooking**

In 2003, Dow donated enough of its THERMAX insulating foam to the Solar Oven Society to build 6,000 solar ovens. THERMAX insulating foam is generally used to keep warm or cool air inside buildings. But THERMAX insulating foam works so well that it can also be used in small ovens that need only heat from the sun for cooking meals. With a solar oven, people in developing countries can cook, bake, or boil water. Without a solar oven, these people would have to use fires to prepare meals.

The United Nations estimates there are 2.5 billion people who use fires to cook. These same people have to spend as many as 40 hours a week to gather firewood. If there is no wood, they have to spend money to buy fuel. Sometimes, they spend as much money on fuel as they do for their food. Plus, fires present many hazards. Smoke from fires is bad for the lungs of the people who must use them. Smoke and other gases from fires contribute to climate change. A solar oven helps prevent these problems and helps deliver healthier meals and safer water.

This is an example of an existing Dow product in a sustainable application.

www.styrofoam.com
www.solarovens.org

Global People Policies

One of the more difficult dilemmas facing global companies is the task of attempting to “level the playing field” for all employees regardless of local economic conditions, traditions, and cultural biases. Dow has taken a proactive approach to this challenge by adopting and implementing a set of 13 global people policies. The latest addition is the new Labor/Human Rights Policy Statement, which affirms our belief that “respect for the dignity, rights, and ambitions of all people is a cornerstone of business excellence in the 21st century.” The policy statement also specifies that Dow “recognizes and respects all labor and employment laws—including those respecting freedom of association, privacy, and equal employment opportunity—wherever it operates.” Additionally in 2003, we developed a separate standard on child labor and updated our Code of Business Conduct to reflect the various changes in policies over the last several years. The Code of Business Conduct applies to all employees, officers, and directors.

Sound Corporate Governance at Dow

Dow has endorsed sound corporate governance practices for many years. But what does this mean to our stockholders and other constituents?

Good governance practices instill confidence in the Company and provide assurance that its financial statements are reliable, that transactions have been conducted without conflicts of interest, and that disclosures provide appropriate transparency. Good governance depends upon the quality and independence of Directors who fully meet their responsibilities to the Company’s stockholders. Directors come well-prepared to the Board and Board Committee meetings and participate in an active and constructive way, with no reluctance to ask the tough questions.

The two other key players in good governance at Dow are the independent auditors and the Company’s management. Both of these groups have responsibilities that are met with competence and integrity.

These are the fundamentals of corporate governance at Dow. While recent regulatory initiatives such as the Sarbanes-Oxley Act of 2002 and CEO/CFO certifications of financial statements have added new procedures, the basic underlying approach to doing business in an honest and straightforward way remains the same.

In 2003, the Board elected Harold T. Shapiro as Presiding Director, instituted new Corporate Governance Guidelines, adopted and disclosed Committee Charters for each standing Board Committee, launched a corporate governance web site with a link to email the Board, and decided to recommend to stockholders that the Company return to annual election of all Directors.

Ethics and Compliance

In July 2003, Dow updated its Code of Business Conduct (the "Code"). It was adopted by the Board of Directors, translated into 14 languages and published on our web site at:

www.dow.com/about/aboutdow/code_conduct/ethics_conduct.htm

The Code not only explains Dow's policies on complying with the law and what we expect of our employees, officers, and directors, but also now includes question-and-answer sections that use everyday scenarios to help further clarify the intent of the policies.

Dow's Office of Global Ethics and Compliance and regional and subsidiary Ethics and Compliance Committees oversee the implementation of the Company's ethics and compliance program. In 2003, Dow expanded its ethics training effort to ensure all employees globally understand their obligations under the Code. The training is available in 14 languages and will continue through 2004 until all employees have been trained.

Dow continues to encourage employees and others to report suspected violations of the Code and, in 2003, Dow enhanced and standardized its global internal process for reviewing and investigating such reports.

To make a report, employees or others can contact the Office of Global Ethics and Compliance or call the Dow EthicsLine, a globally accessible toll-free help line available 24 hours a day, seven days a week. The Dow EthicsLine is operated by an independent company and staffed by trained communications specialists whose only interest is listening to and reporting questions or concerns. Callers may contact the Dow EthicsLine, anonymously if they prefer, to ask questions and receive information, to seek guidance on a particular situation, or to report suspected violations of law or the Code.



Clean Mangrove Program

The objective of this program is to protect the existing mangrove area inside the Dow property in Guarujá, Brazil. This is a long-term initiative focusing on promoting the awareness of the neighboring communities and minimizing the impact of urban occupation without harming this ecosystem.

The project has as its base the vision that Sustainable Development and the preservation of natural resources are conjunct responsibilities of all the segments of society. Therefore the "Projeto Mangue Limpo" (Clean Mangrove Project) has the objective of conserving the area as a natural resource and the continued commitment with environmental protection.

This initiative is developed along with a partnership with a local university and Guarujá CAP.

Community Relations

In 2003, we continued our highly successful community relations programs. We did this by working on community sustainability at our operating sites around the world. As we try to further understand our role in 21st century society, we've conducted additional research on community leaders' priorities in improving the quality of life in their areas. Typical community priorities are: education, employment, energy, environment, and health.

We've also found that other quality-of-life priorities are highlighted, including community development, public safety, and cultural and recreational resources. These topics are increasingly being discussed in the meetings between site leaders and the Community Advisory Panels (CAPs). There are CAPs in place at 36 of our manufacturing sites around the world. These regular meetings provide local Dow leaders with vital feedback about the opinions of our neighbors during the development phase of local policies. In 2003, a global process was initiated to reinvest in our CAPs by capturing relevant experience and developing recommendations for change aimed at increasing effectiveness.

Favorability Scores

In previous Public Reports, we have reported on surveys we regularly conduct to assess how we are perceived in the communities in which we operate. For each location, we set challenging targets based on the size of the site and our relative impact on that community. For example, in our major locations we want at least 80 percent of the residents to agree that Dow is a good neighbor and a valuable member of the community. In the last six years, 38 surveys have been conducted in Dow communities, all showing very good results.

Except for a few locations, perception surveys were suspended globally in 2003 as a temporary measure to improve our cash flow. However, we continue to apply what we have learned in past surveys, working with community leaders to participate in and fund projects that improve community quality of life. A limited number of surveys will be completed in 2004.

Please refer to page 59 at the end of this section to view the public favorability scores for Dow sites.

Being Heard by Policy Makers

The United States is the only country in which corporations, labor unions, and other interest groups may legally participate in the political process through financial contributions. Dow and its employees play a relatively small but very important role in various advocacy programs.



Treated Water Sustains A Better Life

Dow science helped turn the drought stricken village of Poleiros, Brazil, into an oasis. Using FILMTEC reverse osmosis membranes, the village purifies brackish well water making it fit to drink and to irrigate crops.

But the story does not stop there. Mineralized water is left over after the treatment process. The people have found a way to use this water to create a new source of food and income. In one of the most arid parts of Brazil, they have begun shrimp and fish farming for food and profit.

The rest of the wastewater is used to farm coconuts, avocados, mangos, passion fruit, and atriplex from Australia. Atriplex produces a food crop rich in vitamin A. People, goats, chickens, even fish and shrimp all benefit from atriplex cultivation.

www.filmtec.com 

Dow employees are empowered to participate in the political process through voluntary membership in company-sponsored political action committees in addition to grassroots advocacy initiatives. In 2003, Dow contributed \$133,750 in support of state candidates, and employee PACs contributed \$62,750 to state and federal candidates.

Contributions

Dow's Corporate Contributions Committee implemented a global plan that not only ties contributions made to non-profit organizations more closely to Dow's Mission, it also strengthens existing networks and processes relating to how and where we give money. The plan, using a Sustainable Development framework, was developed in response to what the Committee felt are "stretched" expectations of global companies to be more accountable for improving quality of life where they have a presence, while, at the same time, assuring business success. Five geographic contributions committees now oversee Dow's global plan to significantly improve global reach, spending oversight, employee involvement in decision-making, and public awareness.

Unfortunately, because of our need for financial frugality in 2003, we felt that we had to reduce donation funding to a "maintain" level. This required working closely with non-profits on timing of payments. Rather than across-the-board decreases, spending was maintained at 2002 levels for those non-profits that demonstrated excellence in meeting community needs. The reductions were accomplished by not making new commitments and not extending or replacing commitments that were completed. Emphasis on personal outreach and alliances with community groups has helped stretch scarce funding. By the end of the year, all commitments were met. We did not extend any commitments as we had in 2002.

Please refer to page 58 at the end of this section to view donations per region.

An internal Company audit identified the need for a number of improvements relating to how we process and report donations spending. As an example, for the first time, donations were tracked in an accounting system using the Triple Bottom Line this year. We also made good progress in meeting our goal to give fewer donations but in larger amounts.

Here are some examples of Dow donations in 2003:

Canada

- Recognizing the City of Fort Saskatchewan's 100th Anniversary and Dow's 40-year history in the community, the Company has donated \$670,000 and enough STYROFOAM insulation to help build a community recreation and cultural center. The facility will be named the Dow Centennial Center when it opens in 2004.
- As part of Dow's commitment to Sustainable Development, the Company supports Ducks Unlimited's mission to protect and preserve habitat and build awareness and understanding of the importance of wetlands to biodiversity. Dow will contribute \$500,000 (Canadian) over three years (2003–2005). To date, two wetland projects have been identified—the Stewart property near Sarnia and the West River's Edge urban wetland in Fort Saskatchewan. Additional projects are currently being evaluated using selection criteria developed jointly by Dow and Ducks Unlimited, reflecting a partnership approach to environmental protection and conservation.



Partners for Science

Science grades are on the rise in Alberta Canada's Elk Island School Districts thanks to the Dow-funded Partners for Science program's hands-on learning approach. After a study of 10 years' worth of data, Elk Island confirmed a direct link between the learning method and superior academic performance in science. Under the program, students' overall test scores are consistently higher than the provincial norm.

Partners for Science has students enthusiastic about science. Teachers welcome the kit-based resources. Parents love the good report cards. Even the Alberta Legislature formally recognized the program in April 2003. The success of the elementary school program has led Dow to pledge an additional \$390,000 to launch a junior high school version.

Europe

- Working with a network of regional universities, Dow initiated a research and education program centered around sustainable transformation management in central Germany. The program includes application of the concepts of Sustainable Development. Dow is supporting professorships focused on sustainability and global ethics and sustainability and global politics. This program benefits the academic community as well as society at large through a better understanding of the importance of balancing the economic, environmental, and social elements of Sustainable Development. The project also benefits the new member states of the European Union through the sharing of Dow's experiences in central Germany.
- In collaboration with the Korea Chemicals Management Association and the Korea Responsible Care Council, the Company has established the Dow Academy of Sustainable Development. The Academy sponsors a series of seminars promoting the integration of the Triple Bottom Line into the business practices of small- and medium-size companies in Korea. Customers and potential customers are among the targeted participants in the program.

Pacific

- Working with the Dow Liquid Separations Business and a local science institute, Dow has donated water purification systems to several hospitals in Vietnam to provide a reliable source of clean water.

Latin America

- Dow employees are volunteering to improve the quality of education programs offered at a school near our Cartagena, Colombia, plant site. Areas for improvement are: communication, conflict resolution, leadership, money management, and job search. The Company has made improvements in the school infrastructure such as playgrounds, floors, and roofs, and has donated computers to start an information systems center.

- “Trained For Life” is a unique education program for 9–12 year olds that uses motivational learning tools in such areas as self-esteem, teamwork, conflict resolution, staying in school, and environmental caring. The program reaches 1100 children at 10 schools close to our Bahia Blanca, Argentina, site. At the end of the program, parents are invited to share the experiences of the students. Dow has donated a 300-book library to each of the 10 schools.

United States

- A competitive community grant program designed to address specific community needs, solve problems, and improve quality of life for residents of communities surrounding our Plaquemine, Louisiana, site has helped a large percentage of the population. The program emphasizes community relationship building and interaction, particularly involving Dow volunteers. Project examples include home repair for the disadvantaged, restoring wildlife or recreation areas, park or waterway cleanup, community health projects, and expanding educational and workforce development programs for local students.

- Dow has committed \$5 million to Habitat for Humanity in donated STYROFOAM brand insulation through 2005. Also, we are halfway through our four-year \$2 million foundation commitment to build Habitat homes at our site communities around the world. These builds involve hundreds of employee volunteers.

- Our total corporate gift to United Way in 2003 was \$1.8 million spread among our communities. Employee giving was \$4.1 million. Dow was the recipient of the United Way Summit Award in 2003 for excellence in corporate giving programs.

Volunteerism

Dow maintains a tradition of not only investing in our communities, but also of encouraging our employees to make personal investments of their time in the civic and charitable organizations of their choice. We do that by providing support for employees who volunteer their time and talent to help their communities. Although Dow does not systematically track volunteer hours, we continue to take great pride in the enthusiasm and commitment of our employees who volunteer largely on personal time.



In May 2003, Dow employees enthusiastically helped clean the bird reserve ‘de Hooge Platen’ in The Netherlands.

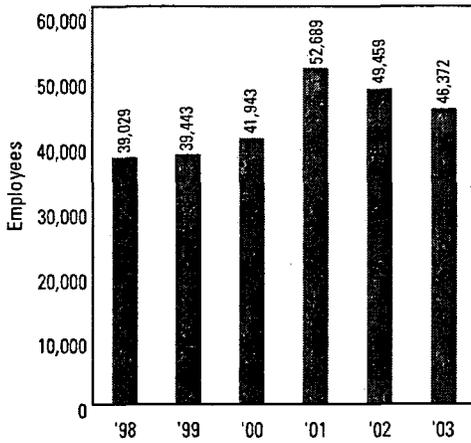
Employees Clean Up Bird Reserve

Dow employees from our Terneuzen, The Netherlands, site routinely help with the periodic clean up of a nearby nature reserve—‘de Hooge Platen.’ The large sandbank is known for its rare birds. For a whole day the employees work to improve the daily living of the bird colony. This activity is in line with Dow’s Vision for Environmental Stewardship.

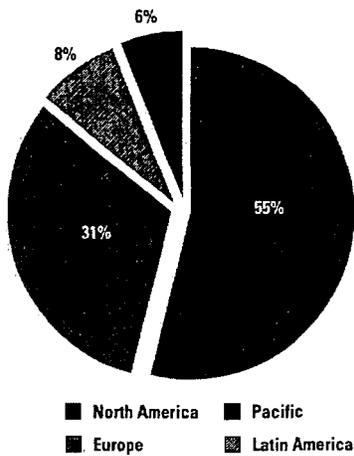
www.dowterneuzen.com



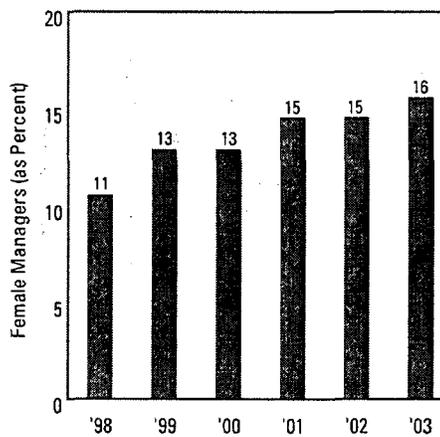
Number of Employees



Employees per Region



Percentage of Female Managers



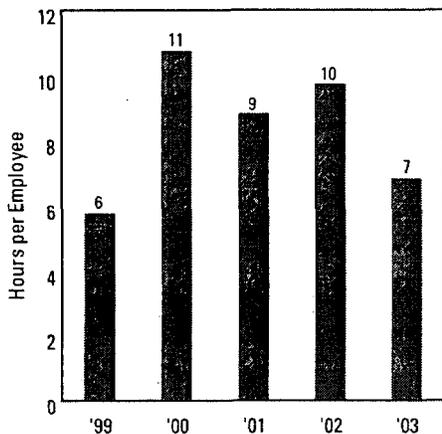
Age and Gender for all Employees

Age Category	Gender	1998	1999	2000	2001	2002	2003
<35	Female	9%	9%	8%	8%	8%	7%
	Male	14%	14%	14%	16%	16%	14%
35-50	Female	12%	12%	13%	12%	12%	13%
	Male	46%	45%	44%	44%	43%	43%
>51	Female	3%	3%	4%	3%	4%	4%
	Male	16%	17%	18%	17%	17%	19%
Total	Female	24%	24%	24%	24%	24%	24%
	Male	76%	76%	76%	76%	76%	76%

Note: Gender percentages are based on available gender numbers. Not all employees are identified by gender, as a result of local laws and regulations.

Progress

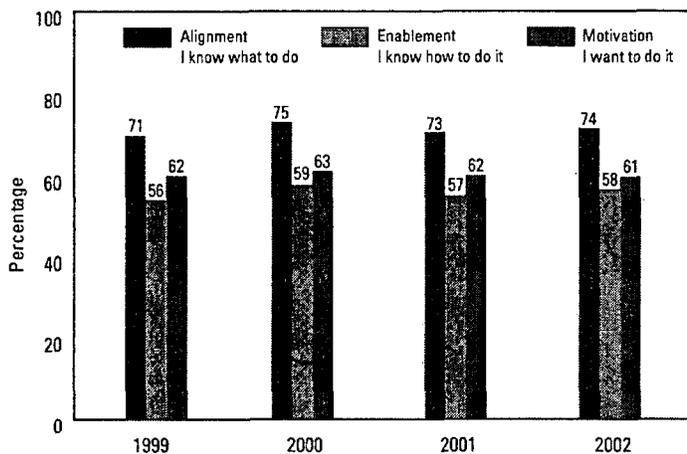
Continuous Learning—Training Hours



- While maintaining a significant level of employee training, we have been able to reduce the hourly costs of this training through increased use of web-based learning tools and our dedicated Intranet training site learn@dow.now.
- Average hours: Total hours divided by number of employees.
- Human Resource Development (HRD) classroom training only. Technical training, Leadership Development Network training, and the training of Dow AgroSciences employees are not included.
- 2001 number based on fourth quarter average number of employees due to integration of UCC employees into HRD Training during the year.

Training Costs per Hour				
	2000	2001	2002	2003
\$/Employee	\$61.00	\$37.00	\$32.00	\$24.00

Empowerment



The Global Employee Opinion and Action Survey (GEOAS) is used to track progress toward empowerment. The survey is built around three categories—alignment, enablement, and motivation, and the data is reported as percent favorable responses. In 2002, through a Six Sigma redesign project, the GEOAS was changed to an every-other-year event. The survey was conducted in 2002 and will be repeated again in 2004.

Progress

Donations per Region (\$ Thousands)

	1996	1997	1998	1999	2000	2001	2002	2003
North America	15,346	19,524	17,203	17,433	19,178	24,705	20,210	14,875
Europe	964	1,307	972	994	1,069	1,774	1,287	1,260
Pacific	229	456	240	191	349	373	546	518
Latin America/Mexico	297	704	298	297	337	372	318	212
Total Global Spending	16,836	21,991	18,713	18,915	20,933	27,224	22,361	16,865

Dow's corporate giving program is rooted in over 100 years of history. Our founder, Herbert H. Dow, regularly made personal contributions to people in need. Sharing the success of the Company has become a tradition. Global contributions funding was reduced to \$16.9 million in 2003 versus \$22.4 million in 2002 due to a company-wide effort to reduce cost.

Public Favorability Scores for Dow Sites

Plant Site	Goal ¹	1998	1999	2000	2001	2002	2003
Altona, Australia	60		63				
Aratu, Brazil	60				71		
Bahia Blanca, Argentina	60			48			
Dow Olefinverbund GmbH, Germany	80		54				77
Cartagena, Colombia	60				67		
Charleston (WV), USA	80				79	84	
Charleston (WV) ² , USA	80			77			
Drusenheim, France	60					69	
Fort Saskatchewan, Canada	80		81		81		84
Freeport (TX), USA	80		80		79		81
Guaruja, Brazil	60				75		
Jundiai, Brazil	60				89		
King's Lynn, UK	60			79		74	
Midland (MI), USA	80		83		80		
Plaquemine (LA), USA	80		81			78	
Prentiss, Canada	60						69
Rheinmünster, Germany	60					74	
San Lorenzo, Argentina	60			63			
Sarnia, Canada	60		74		72		71
Seadrift (TX), USA	80				73		
Stade, Germany	80					77	
Taft (LA), USA	80				68		
Tarragona, Spain	60		57				
Terneuzen, The Netherlands	80	83		86		86	
Texas City (TX), USA	80				67		

¹ Favorability goals are based on an evaluation of the individual site's business importance and impact on the local community.

² This survey around the Charleston, West Virginia, location was done before the merger transaction involving The Dow Chemical Company and Union Carbide Corporation.

Progress

The type and extent of external assurance for our Public Report is an issue with which we continue to explore and experiment. We believe that some form of third party assurance is becoming more and more a critical factor in successful Sustainable Development reporting, as evidenced by the prominence given to this topic by external rating agencies. However, the nature and extent of various assurance mechanisms, and their costs and benefits, continue to be debated and discussed with various stakeholders, and Dow is committed to participating in this dialogue.

We believe our past process has served us and our various stakeholders well. While not an explicit "audit" as some might desire, we have chosen to use various existing governance structures in our Company, and a limited number of external experts, to review our report and provide comments. In other words, we sought—and will continue to seek—counsel on achieving transparency in terms of scope of report content, materiality of that content, and effectiveness of the public dialogue that is helping us to attain more useful and accepted Sustainable Development reporting mechanisms.

Where appropriate, we have incorporated their comments and suggestions. In cases where this was not possible, the comments and the reasoning behind them were documented for use in planning the next edition of our public report.

Globalization and increased access to information via the internet have helped expand the scope and direction of these reports. For this year, we have attempted to publish a report "in accordance with" the Global Reporting Initiative (GRI) 2002 Guidelines.

In future years, we will continue to explore various mechanisms for providing additional assurance as desired by our stakeholders and, as always, look for your comments to guide our exploration.

Corporate Environmental Advisory Council

All members of our Corporate Environmental Advisory Council (CEAC) had the opportunity to provide comments to Dow on drafts of our 2003 Public Report. As one might expect from such a diverse group, we received a diverse set of responses, including...

"The Company's continued commitment to undertaking voluntary reporting and moving slowly, but steadily towards a Triple Bottom Line report deserves our admiration and applause. The Report contains many state-of-the-art elements—most notably its reporting of greenhouse

gases and its adoption of the GRI Guidelines. It is, deservedly, amongst the better (though not the best) of those reports produced by the larger companies. But, there is still a very long way to go before the Report satisfies the Company's own claims for "transparency and accountability". The Company must directly address issues of completeness and accountability in its reporting. The Report needs to address, especially, the essential conflict arising from, on the one hand, being a massive, quoted multinational company in pursuit of profit in an economically hostile world and, on the other, the demands for: a shrinking ecological footprint, the highest standards of morality, and the protection and respect for the vulnerable and the dispossessed. Capitalism has shown itself to be a highly capable system in many ways—it is, however, unable to deliver these essentials to human progress without considerable control from society."

Rob Gray, Professor and Director
Center for Social and Environmental Accounting
Research
Glasgow University

"Dow deserves great credit for putting its cards on the table and describing the key elements that define its sustainability journey. Dow continues to set the bar for the systematic engagement of stakeholders about pressing strategy questions.

In this draft report, Dow has defined key principles and developed a framework and processes for reaching out. Substantively, the major challenge for Dow clearly lies in achieving the true integration of Sustainable Development considerations into product development and manufacturing, sales, and marketing (product stewardship). In areas like new product development, green chemistry, climate, energy, and water, Dow is asking the right questions and has the opportunity to educate us all on the challenges of truly integrating sustainability into its operations. (Six Sigma is a good example.) Dow needs to be as direct as possible in describing these challenges, because the journey is not easy and others will benefit from Dow's insights.

Sustainable Development strategy is clearly a 'work in progress.' Nonetheless, Dow is to be commended for its forthright efforts to improve and to continue to invite both constructive challenge and public support when appropriate as it proceeds on this difficult and important path."

F. Henry Habicht, II
CEO of Global Environment & Technology
Foundation

"The 2003 Public Report is an honest representation of what Dow has achieved during its 10 years of deliberate effort to improve the sustainability of its operations. It shows impressive progress in some of the areas chosen for attention and measurement, and tendencies to stagnation in the advance in other areas. Importantly, the Report demonstrates that it helps to focus corporate attention on selected issues.

The weakness of the Report is, of course, those areas not yet chosen for special attention and follow up. Even if some of those areas are speculative and hard to measure, the Report would have gained from including a section listing the major, not yet addressed sustainability challenges seen by Dow management.

I expect that Dow's new set of sustainability goals, advertised for the 10-year period starting 2006, will contain a broader scope of measures and inspire progress in new areas where Dow has undesirable impact."

Jorgen Randers, PhD
Professor of Policy Analysis
Norwegian School of Management

"At a most fundamental level, it is reassuring to an outsider that Dow sees a direct link between its Corporate Mission of 'improving life' and the principles of sustainability. This is the best guarantee of continued and proactive corporate commitment to these principles.

Plentiful case studies demonstrate that Dow not only tries to 'walk the talk,' but also succeeds in exciting ways. Dow's efforts to follow GRI reporting guidelines are laudable, and I am impressed that Dow is already reporting on 77 out of 92 criteria. The best news of all is evidence of improved systems thinking. For an innovative chemical company whose products and processes join so many of the earth's systems, this is the most important intellectual virtue to have.

I disagree with the claim that almost all the challenges and dilemmas Dow faces today are legacy issues. In particular, I find the discussion of dioxin disappointing. The goal of reducing dioxin emissions from global operations by 90 percent is definitely commendable and progress towards this goal worth reporting. However, the truth is that the chlorine chemistry industry, although directly responsible for only three percent of emissions from quantified sources, stands indirectly at the cradle of a percentage (who knows how large) of the emissions from uncontrolled burning, which the EPA lists as the greatest concern. These statistics encourage myopic blindness if not accompanied by information reporting goals and progress towards reducing dioxin formation in end-of-life incineration."

L. Mariette Hovy-van Wensveen, PhD
Associate Professor Emerita, Department of
Theological Studies
Loyola Marymount University

Community Advisory Panels

Dow is committed to maintaining an open dialogue with representatives of the local communities where we operate. The vital feedback Community Advisory Panel (CAP) members provide continues to guide us in our reporting activities at both the corporate and local levels. We place importance on sharing information openly with the public, and will again this year publish both the Dow Global Public Report 2003, as well as 21 local reports for 2003, online at

www.dowpublicreport.com

The Public Interest Committee, Board of Directors, The Dow Chemical Company

We believe the 2003 Dow Global Public Report demonstrates the strong commitment of the Dow Board of Directors and Company Management to respond to the concerns of its stakeholders through transparent and responsible corporate conduct. This 2003 Report reflects the close relationship between our sustainability goals—economic, environmental, and social—and the other business interests of the Company.

Increased awareness has changed public expectations about the roles and responsibilities of corporations within society. The legitimacy of our enterprise is dependent on public trust. This Report demonstrates how our conduct is in keeping with societal expectations for socially responsible behavior.

We are pleased that this Report contains news of significant gains in many areas, as Dow continued to work diligently to achieve its 2005 goals in the face of challenging business conditions. But we consider it just as important that the Report also discusses those areas where Dow progress has fallen short of our goals. Dow as a company holds itself to high standards of business conduct. As a consequence, our goals are ambitious and encourage us to stretch to achieve them.

For the first time, Dow has sought to be “in accordance with” the guidelines set forth by the Global Reporting Initiative (GRI). We believe this is further evidence of Dow’s commitment to perform against accepted ways of reporting the Triple Bottom Line of Sustainable Development: Economic Prosperity, Environmental Stewardship, and Corporate Social Responsibility.

The Board of Directors remains committed to Dow’s ongoing pursuit of sustainability and continued open reporting of the Company’s progress. We hope you will find this report of interest.

Public Interest Committee of the Board
of Directors

J. C. Danforth, Chair; J. M. Cook; P. G. Stern;
J. M. Fettig; J. M. Ringler; K. R. McKennon;
W. S. Stavropoulos
—April 2004

www.dowgovernance.com

Global Reporting Initiative

While we have been supportive of the Global Reporting Initiative since its inception, we have now progressed further to achieve the “in accordance with” conditions set out in the 2002 GRI Guidelines:

1. Report on the numbered elements in Sections 1 to 3 of Part C of the GRI Guidelines.
2. Include a GRI Content Index as specified in Section 4 of Part C of the GRI Guidelines.
3. Respond to each core indicator in Section 5 of the GRI Guidelines by either (a) reporting on the indicator or (b) explaining the reason for the omission of each indicator.
4. Ensure that the report is consistent with the principles in Part B of the Guidelines.
5. Include the following statement signed by the Board or CEO:
“This report has been prepared in accordance with the 2002 GRI Guidelines. It represents a balanced and reasonable presentation of our organization’s economic, environmental, and social performance.”

The 2003 Dow Chemical Company Global Reporting Initiative Report—which provides both a reference to the GRI indicator covered in the GRI report and the specific Public Report web site reference as well—is available from our Public Report web site.

www.dowpublicreport.com 

A gap analysis of the GRI Report for this year indicated that Dow was reporting on 77 of the 92 various criteria. We reported partial information on another six of the criteria, and have not reported any data on nine of the criteria. Of the 15 where there is currently only partial or no data, we are already working on five of these for next year's report—and we will evaluate the cost/benefit of the remaining indicators during the balance of 2004.

Ongoing Validation

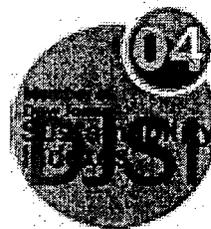
Ongoing validation and feedback of our overall efforts to manage and report on the Triple Bottom Line performance of Sustainable Development continued in 2003.

Independent Ratings

The number of various rating agencies grew again in 2003 and we expect continued progress in the various methodologies for assessing performance.

In the spirit of transparency, we are providing the actual assessments of Dow from a few of the more well-known rating agencies. In some cases, we provided only the executive summary, as the detailed questions are considered proprietary by some of these institutions. This poses an interesting dilemma for the various rating agencies. The credibility of the rating organizations is highly dependent on the transparency to all of their respective processes, yet many consider this a part of their protected intellectual capital. It is not clear how this will be resolved in the future, but Dow believes that the fundamental principle of transparency will have to apply for these agencies, as well as the companies they are evaluating. Following are summaries of their reports, the full content of which can be viewed at

www.dowpublicreport.com 



Once again, The Dow Chemical Company was included in the Dow Jones Sustainability Index (DJSI) as one of the top chemical companies in terms of overall corporate sustainability performance. Despite being in the top 10 percent, our overall position fell in 2003, although the difference between the top score and Dow is less than seven percentage points. The differences in 2003 are primarily based on poor economic performance, and a Media and Stakeholder Assessment (MSA) of various "legacy" issues by the research arm of the DJSI—Sustainable Asset Management (SAM). As a result of the assessment, Dow met with the analysts from SAM to dialogue and learn more about how Dow performed relative to the leaders and the chemical industry average.

BUSINESS *in the*

COMMUNITY



Innovest

Strategic Value Advisors

In 2003, Innovest conducted its first “Intangible Value Assessment” for The Dow Chemical Company. Areas evaluated included sustainable governance, human capital, stakeholder capital, products and services, and emerging markets. Overall, Dow was awarded a “AA” rating, ranking third in the chemical industry.

In a separate assessment of overall environmental performance, Dow was downgraded on January 26, 2004, from a “AA” rating, to a “BB” rating—moving from eighth out of 30 competitors to 45th out of 69 competitors. The primary reason for the significant downgrading is due to the perception of increased risk (versus actual legal or market risk) to the Company of various legacy issues. Dow believes this downgrading is unwarranted, and has spent considerable time with the analyst at Innovest regarding the specifics of its assessment—providing additional dialogue, documents, and facts on some of the issues of concern.

Established in 2002, The Corporate Responsibility Index is a business management tool, developed to support companies in improving their impact on society and the environment. It enables them to assess the extent to which their strategy is translated into responsible practice throughout the organization, in managing four key areas—Community, Environment, Marketplace, and Workplace.

In 2003, Dow received an overall Index Score of 90.64 percent—placing it once again in the top 20 percent of all companies that provided information for the index. Overall performance for all companies reporting increased, with the average moving from 72 percent to 79 percent. Dow received top marks for overall corporate strategy, and performance and impact—relative to other companies within the chemical sector and overall. Areas for improvement based on this assessment include: more robust programs for assessment of suppliers and customers (note: this is a new task item for Dow in 2004!), linkage of performance on social dimensions with top management and board members, and pursuit of third party validation mechanisms for performance and reporting.

Awards

Dow also benefits from validation of a different sort. From time to time, independent organizations bestow awards based on our Triple Bottom Line efforts. In 2003, Dow had the honor of receiving the following awards and recognition:

Dow Selected World Technology Corporate Award Winner

Dow is the 2003 winner in the corporate category of the World Technology Awards. The World Technology Network presented the award for Dow's innovative contributions to advanced materials technology and the positive impact the new technologies have had on society. This award honors individuals and corporations who are innovators and those "doing the work of the greatest likely long-term significance," according to James P. Clark, founder and Chairman of the World Technology Network.

Dow Receives Outstanding Corporate Innovator Award

The Dow Polyolefins and Elastomers Business Group received the 2003 "Outstanding Corporate Innovator Award" from the Product Development & Management Association (PDMA). This was the first time in its 27-year history that the PDMA selected a chemical manufacturing company for the association's most prestigious honor. "The Outstanding Corporate Innovator Award" is designed to showcase those organizations that are the most successful in developing new products as well as an enterprise-wide commitment to innovation.

Dow XLA Fiber Wins R&D MAGAZINE "R&D 100" Technology Award

Dow XLA elastic fiber, the new Freedom Fiber from Dow fiber solutions, won the *R&D MAGAZINE* prestigious 2003 "R&D 100" technology award. This award is given to the most technologically significant products introduced into the marketplace over the past year. Recipients are selected by an independent judging panel consisting of professional consultants, university faculty and industrial researchers, as well as the editors of *R&D MAGAZINE*.



U.S. EPA Recognizes Dow for Saving Energy

Turning a computer monitor off saves energy and money. A function that will turn 50,000 computer monitors off saves more! Each new Dow computer has a setting that turns the monitor off when it is idle. Dow saved so much power this way, the U.S. Environmental Protection Agency (EPA) named Dow a "2003 Energy Star® Million Monitor Drive Contributor."

The monitor shut-down function helped Dow save \$2.5 million in energy costs in 2003. Dow also reduced the amount of carbon dioxide equal to taking 6,395 cars off the road.

This was one of many efforts during 2003 that showed how Dow is working to save energy, money, and the environment.

www.energystar.gov



**Dow Receives ASTD 2003
"BEST" Award**

Dow received the 2003 BEST Award from the American Society for Training & Development (ASTD) in Washington, D.C. on October 29. Emily DeRocco, Assistant Secretary for the Employment and Training Administration of the U.S. Department of Labor, presented the award.

The ASTD BEST Awards recognize organizations that demonstrated enterprise-wide success as a result of employee learning and development. Ranked eighth, Dow is among 23 organizations from the United States, Canada, Hong Kong, and India receiving an ASTD BEST Award.

**Dow Brazil Wins Sesi Quality
in the Work Award**

In Brazil, two units received the Sesi Quality in the Work Award: Aratu and Pindamonhangaba. The award is given to companies whose policies improve the quality of life, productivity, and offer social benefits to employees.

**Dow Among Argentina's
Most Admired**

CLARION, Argentina's largest newspaper, listed Dow as one of the country's most admired companies. Dow was ranked number 41 out of 100 and number one in the chemical manufacturing sector. Dow was the company with the most improved ranking in 2003, moving up from number 74 in 2002.

**2003 Lantern Award presented
to Dow in Louisiana**

Dow's Louisiana (U.S.) sites were awarded the 2003 Lantern Award. The Louisiana Economic Development and the Louisiana Industrial Development Executives Association presented the award to Dow for "outstanding contributions to the Louisiana economy and responsible stewardship within the community."

Outstanding Corporate Directors

Dow's Directors are often recognized for achievements in their respective areas of expertise as well as in corporate governance, all of these skills collectively contributing to a stronger Board.

During 2003, two of Dow's outside directors were recognized for their leadership by *Director's Alert* magazine. J. Michael Cook, former chairman and CEO of Deloitte & Touche LLP, and John C. Danforth, partner of Bryan Cave LLP and former U.S. Senator, were named "Outstanding Directors in Corporate

America" by the publishers and editors of *DIRECTOR'S ALERT* magazine. *DIRECTOR'S ALERT* launched the program in 1998 to honor outstanding independent corporate directors. Mr. Cook was praised by his peers for "bringing new levels of sophistication, rigor, and energy to audit committee work," and Mr. Danforth was extolled for his "integrity and tough standards to enhance social responsibility."

Barbara Hackman Franklin, president and CEO of Barbara Franklin Enterprises and former U.S. Secretary of Commerce, is the fourth current Dow director to receive this Outstanding Director in Corporate America award and will be honored in mid-2004. Harold Shapiro, president emeritus and professor of economics and public affairs, Princeton University, was so honored in 1999. Dr. Shapiro and Ms. Franklin, a board member of the National Association of Corporate Directors (NACD), both served on the NACD Blue Ribbon Commission on Executive Compensation and the Role of the Compensation Committee. Ms. Franklin acted as co-chair.

What Do *You* Think?

We want our communications to be a two-way dialogue with our stakeholders around the world. With that goal in mind, could we ask you to take a few minutes and share your thoughts and opinions with us? Just visit our web site and let us know "What Do *You* Think?" about our Sustainable Development report and practices by completing our brief, online survey.

www.dowpublicreport.com/survey 

The forward-looking statements contained in this document involve risks and uncertainties that may affect the Company's operations, markets, products, services, prices, and other factors as discussed in filings with the U.S. Securities and Exchange Commission. These risks and uncertainties include, but are not limited to, economic, competitive, legal, governmental, and technological factors. Accordingly, there is no assurance that the Company's expectations will be realized. The Company assumes no obligation to provide revisions to any forward-looking statements should circumstances change, except as otherwise required by securities and other applicable laws. In addition, this document may reference non-GAAP financial measures. Where available, a reconciliation to the most directly comparable GAAP financial measures and other associated disclosures are provided on the Internet at www.dow.com in the Financial Reports page of the Investor Relations section.

The following trademarks of The Dow Chemical Company appear in this report:

BIOBALANCE
DOW XLA
Freedom Fiber
Saran
STYROFOAM
SYNERGY

The following service marks of The Dow Chemical Company appear in this report:

BioAqueous
ChelaMed
DOWPHARMA

The following trademark of Dow AgroSciences LLC appears in this report:
NATREON

The following trademark of Dow BioProducts Ltd. appears in this report:
WOODSTALK

The following trademark of a subsidiary of The Dow Chemical Company appears in the report:
CELLOSIZ

The following trademark of FilmTec Corporation appears in this report:
FILMTEC

The following service mark of American Chemistry Council appears in this report:
Responsible Care

The following is a trademark of U.S. Environmental Protection Agency:
Energy Star

The following is a trademark of World Business Council for Sustainable Development and University of Cambridge Programme for Industry:
Chronos

This report and regular updates on our performance are available at www.dowpublicreport.com 

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Living.
Improved daily.



Living.
Improved daily.

The Dow Chemical Company 2003 Global Reporting Initiative Report

This is the first year that The Dow Chemical Company (TDCC) has compiled a report in the format recognized by the Global Reporting Initiative (GRI). It is designed as a supplement to our Dow Public Report for 2003, not as a stand-alone piece. TDCC is supportive of the GRI and has used the latest guidelines available (GRI 2002 Guidelines) in the preparation of this report.

Much of the information contained in the GRI report is extracted the Dow Public Report and from several other publicly available documents, including:

- TDCC 2003 Annual Report to Shareholders
<http://www.dow.com/financial/reports/index.htm>
- TDCC Code of Business Conduct (revised in 2003)
<http://www.dow.com/about/aboutdow/ethics.htm>
- TDCC Annual Report on Form 10-K filing for the year ended December 31, 2003
http://63.236.106.222/ireye/ir_site.zhtml?ticker=DOW&script=1901
- TDCC 2004 Annual Meeting Proxy Statement
<http://www.dow.com/financial/reports/index.htm>

We believe we have made significant progress in many, but not all, of the relevant GRI indicators. There are some areas where we do not have data to report, or have not consolidated the information at the corporate level and these are clearly indicated in the report. These represent areas for improvement in future reports.

1.1 SD Vision and Strategy

The articulation of TDCC's Vision and strategy with respect to Sustainable Development is no different than the Mission of the Company as a whole: *"To constantly improve what is essential to human progress by mastering science and technology"*

Our approach can be articulated by describing: *what we make, what we take, where we live, and who we are:*

What We Make (a sense of purpose)

Dow is a major contributor to global prosperity and improved quality of life both as an employer and as a provider of critical materials and products for global commerce and

economic development. The Dow Chemical Company is a leading global science and technology company provides innovative chemical, plastic, and agricultural products and services to many essential consumer markets and serves customers in more than 180 countries around the world. The Company's approximately 46,000 employees share this:

To constantly improve what is essential to human progress by mastering science and technology.

What We Take (a sense of stewardship)

The major building blocks of the bulk of the products that Dow makes are derived from oil and natural gas. Dow is committed to use science and technology to make an increasingly stronger global economic contribution with a steadily smaller environmental footprint. This includes development and utilization of alternative sources of renewable, well-managed energy and feedstocks, as we report in various sections of this report.

Where We Live (a sense of place)

Dow's rich history has its roots in the small communities where our Company originated and continues to operate today. Very often, our manufacturing sites are large entities in relatively small communities. This makes us a very visible neighbor and source of economic activity. Less visible, but just as important is the impact our communities have on our corporate culture. In many ways, our values and Vision as a company are a reflection of our relationships with our neighbors. While the location of our future sites may change, our local communities will continue to shape and influence us as a business and as a corporate citizen.

Who We Are (a sense of self)

Attracting, developing, motivating, and retaining outstanding people is, of course, the key to mastering science and technology. These are the people who will discover and deliver the new Dow products that will significantly improve everyday living. Dow's enduring culture of innovation and dialogue originated with our founder, Herbert H. Dow, who asked his employees, "If you can't do it better, why do it?" and who exemplified some 100 years ago a commitment to his community as well as to his company.

Sustainability-A Natural Next Step

The integration of Sustainable Development principles into our business, function, site, and people strategies is a natural next step for us as a company. As the definition of the Triple Bottom Line suggests-Dow will serve society and create shareholder value through economic prosperity, environmental stewardship, and corporate social responsibility.

Why? Because we believe that these commitments help our employees achieve, our customers succeed, our shareholders prosper, and our communities thrive.

1.2 CEO / Management Letter

2003 Demonstrates the Strength of Dow's Commitment to The Triple Bottom Line of Sustainability

2003 was a year of substantial progress for Dow. In the face of very difficult conditions, including an unprecedented \$2.7 billion increase in feedstock and energy costs, industry overcapacity, and a fragile economy, we increased earnings, improved cash flow, and reduced net debt. Just as important, we continued our focus on the other areas of Sustainable Development, delivering all-time best performance records in environment, health, and safety.

Early in 2003, we pledged that the entire Dow organization would focus on improving both our financial and safety results, regardless of how difficult industry conditions might be.

Dow people answered the call. 2003 earnings were \$1.87 per share, including a tax benefit of \$0.49 per share, compared with a loss of \$0.37 per share in 2002, which included a net charge of \$0.71 per share for restructuring and other items. Excluding all of the special items, earnings increased from \$0.34 per share in 2002 to \$1.38 per share in 2003.

We also made substantial progress toward improving our cash flow. In 2002, free cash flow (cash from operations minus capital expenditures and dividends paid to stockholders) was a negative \$732 million. In 2003, it was a positive \$1.45 billion, a turnaround of \$2.2 billion—well beyond our turnaround target of \$1 billion. We also improved our financial ratios, including a reduction in our net debt to total capital ratio from 56 percent to 50 percent.

Meanwhile, Dow's stock rose 40 percent during the year. As measured by total shareholder return, Dow has outperformed the Standard & Poor's (S&P 500) and the S&P Chemicals Index both in 2003 and over the past five years.

Governance

The Company continues its focus on sound corporate governance.

In 2003, the Board of Directors elected its first Presiding Director, Harold T. Shapiro, instituted and disclosed new Corporate Governance Guidelines, and launched a corporate governance web site with a link to contact the Directors by email. Committee charters were adopted for each standing Board Committee and are posted on the governance web site. At the 2004 Annual Meeting, stockholders will be asked to approve a return to annual election of all Directors to allow for greater accountability. The Board has also adopted an updated Code of Conduct to reinforce the importance of ethical business practices worldwide.

In November, as part of its succession planning responsibilities, the Board named Andrew N. Liveris as President and Chief Operating Officer. Andrew, an Australian with a 27-year Dow career, brings a wealth of experience to his new role, including many years working in Dow's Asian operations and as head of Performance Chemicals. He is leading our effort to further improve the Company's productivity and to accelerate implementation of the Company's strategy. We have also now formed the Office of the Chief Executive, a group of senior managers that oversees the Company's strategic priorities.

Two new Directors were added in 2003: Jeff M. Fetting, President and Chief Executive Officer of Whirlpool Corporation, and Keith R. McKennon, retired Chairman and Chief Executive Officer of PacifiCorp and former Dow Director. They bring valuable experience and insight to our Board.

Environment, Health, and Safety

Of all of our accomplishments, our environmental, health, and safety results were probably what gave Dow people the most satisfaction. These represent our concern for one another and for the communities where we work and live.

We improved our injury and illness rate by 19 percent in 2003, and there were no injuries in more than 70 percent of our plants. Overall, we have reduced our injury and illness rate by 77 percent from 1994 when we set our ambitious 2005 Environmental, Health, and Safety Goals. We also posted a 23 percent yearly reduction in leaks, breaks, and spills; a 63 percent improvement from 1994.

Our recognition of the strong interrelationship between economic prosperity, environmental stewardship, and corporate social responsibility, and our ongoing commitment to improving our performance in all three areas have enabled us to proactively strengthen our Company instead of operating in a weak or reactive mode.

Energy Management

One example of Dow leadership was in the area of energy use. The chemical industry has been hit hard by increases in energy costs and, in some cases, by shortfalls in the supply of oil and gas. Take away the huge impact of energy costs on Dow in 2002 and 2003, and our financial results would have been much better.

In the long run, we need to take a more strategic look at energy use and exert greater control over our energy supply. In 2003, we took initial steps to do just that. We announced our collaboration with General Motors Corporation (GM) in the world's largest application to date of hydrogen fuel cells in a new power generation project in Freeport, Texas. It is the first time a carmaker has used its fuel cell technology to provide electricity and heat for buildings and manufacturing inside a chemical plant. Dow will ultimately use about 400 GM fuel cells to generate 35 megawatts of electricity. This represents two percent of the total electricity used by Dow in Freeport and is roughly the equivalent power used by 25,000 average homes for a year. This is a big step for evaluating fuel cell technology and a significant step on the road to the hydrogen economy.

Dow sees fuel cells as one potential solution to the environmental challenges associated with being an energy-intensive company. Through our commitment to the principles of Sustainable Development, Dow continues to explore and invest in alternative energy solutions.

Other Examples

While energy use is one area where our Company is benefiting from the sustainability mindset we have embraced, we would like to draw your attention to some of our other innovative solutions to global Sustainability issues, such as:

- Dow's innovative and life-saving pharmaceutical products for cancer, allergy treatment, glaucoma, kidney failure, and heart disease are only a few drugs the Company currently manufactures.
- Dow's ion exchange resins, used to purify water around the world for drinking water, power plants, wastewater treatment, and to manufacture pharmaceuticals.
- A new soybean-based technology is meeting market demands for a sustainable resource for the production of high-performance carpet backings. BIOBALANCE* polymers replace a portion of the system required to make polyurethane carpet backings.
- In 1986, Dow introduced the Waste Reduction Always Pays (WRAP) Award program. Since the inception of WRAP, Dow has recognized 395 projects and presented their sponsors with "WRAP Awards." Globally, the projects have accounted for the reduction of 230,000 tons of waste, 133 million tons of wastewater, and eight trillion BTU's of energy. The estimated value of all of these projects is about \$1 billion.

You'll find many other examples in this 2003 Public Report.

Debates and Dilemmas

Despite making what we believe is good progress on the multiple dimensions of Sustainable Development; we still have a number of challenges and dilemmas—almost all of which are issues from our past. We cover those that are of most interest to the widest set of stakeholders in this report. We also realize that our position on a few of these issues is in conflict with some stakeholders—we continue to look for ways to resolve these issues.

Next Generation Goal Setting Process—Stakeholder Engagement

As we approach the end of our 10-year commitment to Environmental, Health, and Safety Goals, we have initiated a process to develop a second set of progressive, long-term, stretch goals using the Triple Bottom Line framework. We started this process in 2003, with a significant amount of both internal and external stakeholder dialogues focused on an understanding what are the critical expectations of our Company—and we will continue this process in 2004.

Global Reporting Initiative

Globalization and increased access to information via the Internet have helped expand the scope and direction of these reports. The Global Reporting Initiative (GRI) is a multi-stakeholder process and independent institution. Its mission is to develop and disseminate globally applicable Sustainability Reporting Guidelines. Dow is supportive of the mission of the GRI, and for the 2003 Report, we have included a downloadable GRI report addressing specific elements of the GRI Guidelines. This report has been prepared in accordance with the 2002 GRI Guidelines. It represents a balanced and reasonable presentation of our organization's economic, environmental, and social performance—yet we still consider it a "work in progress."

The progress reflected in this Report provides a clear indication of the importance we continue to place on the Triple Bottom Line. Sustainable Development—and our integrated efforts to improve our economic, environmental, and social performance—are making Dow a stronger company as well as a better neighbor. Now more than ever, we consider Sustainable Development a business priority in the 21st century.

William S. Stavropoulos
Chairman and Chief Executive Officer

Andrew N. Liveris
President and Chief Operating Officer

Lawrence J. Washington
Corporate Vice President, Environment, Health and Safety, Human Resources and Public Affairs

February 11, 2004

2.0 Profile

2.1 Name or reporting organization

The Dow Chemical Company

2.2 Major products, services, brands

Dow is a leading science and technology company that provides innovative chemical, plastic and agricultural products and services to many essential consumer markets. In 2003, Dow had annual sales of approximately \$33 billion and employed approximately 46,000 people. The Company serves customers in 183 countries and a wide range of markets that are vital to human progress, including food, transportation, health and medicine, personal and home care, and building and construction, among others. The Company has 180 manufacturing sites in 37 countries and supplies more than 3,500 products grouped within the operating segments listed on the following pages. The Corporate Profile is an integral part of Note T to the Consolidated Financial Statements.

Dow conducts its worldwide operations through global businesses, which are aggregated into reportable operating segments based on the nature of the products and production processes, end-use markets, channels of distribution, and regulatory environment. The reportable operating segments are: Performance Plastics, Performance Chemicals, Agricultural Sciences, Plastics, Chemicals, and Hydrocarbons and Energy. The Corporate Profile included below lists the operating segments.

PERFORMANCE PLASTICS

Applications: automotive interiors, exteriors, chassis/power train and body engineered systems • building and construction, thermal and acoustic insulation, roofing • communications technology, telecommunication cables, electrical and electronic connectors • footwear • home and office furnishings: kitchen appliances, power tools, floor care products, mattresses, carpeting, flooring, furniture padding, office furniture • information technology equipment and consumer electronics • packaging, food and beverage containers, protective packaging • sports and recreation equipment • wire and cable insulation and jacketing materials for power utility and telecommunications

PERFORMANCE CHEMICALS

Applications: agricultural and pharmaceutical products and processing • building materials • chemical processing and intermediates • food processing and ingredients • household products • paints, coatings, inks, adhesives, lubricants • personal care products • pulp and paper manufacturing, coated paper and paperboard • textiles and carpet • water purification

AGRICULTURAL SCIENCES

Applications: control of weeds, insects and diseases in plants • pest management • seeds • traits (genes) for crops and agriculture

Dow AgroSciences business is a global leader in providing pest management, agricultural and crop biotechnology products. The business develops, manufactures and markets products for crop production; weed, insect and plant disease management; and industrial and commercial pest management. Dow AgroSciences is building a leading plant genetics and biotechnology business in crop seeds and traits for seeds.

PLASTICS

Applications: adhesives • appliances and appliance housings • agricultural films • automotive parts and trim • beverage bottles • bins, crates, pails and pallets • building and construction • coatings • consumer and durable goods • consumer electronics • disposable diaper liners • fibers and non-wovens • films, bags and packaging for food and consumer products • hoses and tubing • household and industrial bottles • house wares • hygiene and medical films • industrial and consumer films and foams • information technology • oil tanks and road equipment • plastic pipe • toys, playground equipment and recreational products • wire and cable compounds

CHEMICALS

Applications: agricultural products • alumina • automotive antifreeze, coolant systems • carpet and textiles • chemical processing • dry cleaning • dust control • household cleaners and plastic products • inks • metal cleaning • packaging, food and beverage containers, protective packaging • paints, coatings and adhesives • personal care products • petroleum refining • pharmaceuticals • plastic pipe • pulp and paper manufacturing • snow and ice control • soaps and detergents • water treatment

HYDROCARBONS AND ENERGY

Applications: polymer and chemical production and power

Hydrocarbons and Energy business encompasses the procurement of fuels, natural gas liquids and crude oil-based raw materials, as well as the supply of monomers, power and steam for use in Dow's global operations. Dow is the

world leader in the production of olefins and styrene.

Products: Benzene; Butadiene; Butylene; Cumene; Ethylene; Propylene; Styrene; Power, steam and other utilities

New Business Growth includes: Advanced Electronic Materials, Industrial Biotechnology, Pharmaceutical Technologies, and the Growth Center that works on new developments with a focus on identifying and pursuing commercial opportunities.

Number of Products

Dow manufactures and supplies more than 3,500 products and services, and no single one accounted for more than 5 percent of the Company's consolidated sales in 2003.

2.3 Operational structure

The ultimate authority to manage the business of The Dow Chemical Company rests with the Board of Directors. The role of the Board is to effectively govern the affairs of the Company for the benefit of its stockholders and, to the extent appropriate under Delaware corporation law, other constituencies including employees, customers, suppliers and communities in which it does business. Among other duties, the Board appoints the Company's officers, assigns to them responsibilities for management of the Company's operations, and reviews their performance.

Presiding Director

At its meeting in February 2003, the independent Directors on the Board, who comprise a majority of the members, unanimously elected Harold T. Shapiro to the newly-created position of independent Presiding Director. Among other responsibilities, the Presiding Director has been asked to lead executive sessions of the Board. He will also work with the Chairman to set the Board agenda and determine the appropriate materials to be provided to the Directors.

Board Committees

Board committees perform many important functions. The responsibilities of each committee are stated in the Bylaws and in their respective committee charters. The Board, upon the recommendation of the Committee on Directors and Governance, elects members to each committee and has the authority to change committee memberships and the responsibilities of any committee.

2.4 Description of major divisions, operating companies, subsidiaries, and joint ventures

In addition to the structure mentioned in 2.2:

Principal Partly Owned Companies

Dow's principal, non-consolidated affiliates at December 31, 2003, including direct or indirect

ownership interest for each, are listed below:

- Dow Corning Corporation—50 percent—manufacturer of silicone and silicone products. See Item 3. Legal Proceedings and Note J to the Consolidated Financial Statements.
- DuPont Dow Elastomers L.L.C.—50 percent—manufactures and markets Thermoset and thermoplastic elastomer products.
- EQUATE Petrochemical Company K.S.C.—45 percent—a Kuwait-based company that manufactures ethylene, polyethylene and ethylene glycol.
- The OPTIMAL Group [consisting of OPTIMAL Olefins (Malaysia) Sdn Bhd—24 percent; OPTIMAL Glycols (Malaysia) Sdn Bhd—50 percent; OPTIMAL Chemicals (Malaysia) Sdn Bhd—50 percent]—Malaysian companies operating an ethane/propane cracker, an ethylene glycol facility and a production facility for ethylene and propylene derivatives within a world-scale, integrated chemical complex located in Kerteh, Terengganu, Malaysia. Manufacturing began in 2002.
- The Siam Group—49 percent [consisting of Pacific Plastics (Thailand) Limited; Siam Polyethylene Company Limited; Siam Polystyrene Company Limited; Siam Styrene Monomer Co., Ltd.; Siam Synthetic Latex Company Limited]—Thailand-based companies that manufacture styrene, polyethylene, polystyrene, polyurethanes and latex.
- UOP LLC—50 percent—a U.S. company that supplies process technology, catalysts, molecular sieves and adsorbents to the petroleum refining, petrochemical and gas-processing industries worldwide.

2.5 Countries of operation

The Company operates 180 manufacturing sites in 37 countries. Properties of Dow include facilities, which, in the opinion of management, are suitable and adequate for the manufacture and distribution of Dow's products. During 2003, the Company's chemicals and plastics production facilities and plants operated at approximately 82 percent of capacity. The Company's major production sites are as follows:

<i>United States:</i>	Plaquemine, Louisiana; Taft, Louisiana; Midland, Michigan; Freeport, Texas; Seadrift, Texas; Texas City, Texas; South Charleston, West Virginia.
<i>Canada:</i>	Fort Saskatchewan, Alberta; Prentiss, Alberta; Sarnia, Ontario.
<i>Germany:</i>	Boehlen; Leuna; Rheinmuenster; Schkopau; Stade.
<i>France:</i>	Drusenheim.
<i>The Netherlands:</i>	Terneuzen.
<i>Spain:</i>	Tarragona.
<i>Argentina:</i>	Bahia Blanca.
<i>Brazil:</i>	Aratu.

Including the major production sites, the Company has plants and holdings in the following geographic areas:

<i>United States:</i>	59 manufacturing locations in 19 states.
<i>Canada:</i>	8 manufacturing locations in 4 provinces.
<i>Europe:</i>	60 manufacturing locations in 19 countries.
<i>Latin America:</i>	27 manufacturing locations in 5 countries.
<i>Pacific:</i>	26 manufacturing locations in 11 countries.

Please see our website at <http://www.dow.com/facilities/index.htm> for more information on our sites.

2.6 Nature of ownership

TDCC is a publicly traded company.

There were 936,175,652 shares of TDCC common stock outstanding as of March 31, 2004.

2.7 Nature of markets served

Like all great companies, Dow's growth, and the success it yields, is measured not only by our products and services, but also the distinctive contribution we make to society. In our case, this contribution comes to life in the vital consumer markets we serve. These include: food, building maintenance and construction, transportation, furniture and furnishings, paper and publishing, home care and improvement, personal and household care, health and medicine, water purification, and electronics and entertainment.

Sales by end-use:

Food/ Food Packaging	21%
Personal/ Household Care	15%
Building Maintenance/ Construction	10%
Automotive/ Transportation	10%
Home Care/ Improvement	9%
Paper/ Publishing	6%
Furniture/ Furnishings	4%
Electronics/ Entertainment	5%
Health	4%
Water Purification	3%
Hydrocarbons and Energy	11%
Miscellaneous	2%

2.8 Scale of reporting organization (year-end 2003 data)

Number of employees – 46, 372

Products/ Services offered – Over 3500 products and over 120 billion pounds

Net Sales – \$32,632 Million

Total Capitalization

Total Assets \$41,891 Million

Total Debt \$13,109 Million

Stockholders' Equity \$ 9,175 Million

2.9 List of stakeholders

At Dow, we consider the following as our major stakeholders:

Customers

Shareholders

Employees

Communities where we operate

2.10 Contact person for the report

Scott D. Noesen

Director of Sustainable Development

2030 Dow Center

Midland, Mi. 48674

e-mail: sdnoesen@dow.com

2.11 Reporting Period

Based on 2003 Corporate Data

2.12 Date of most recent previous report

This is the first GRI “in accordance with” report for The Dow Chemical Company

2.13 Boundaries of the report

The financial data provided in this report includes the assets, liabilities, revenues, and expenses of all majority-owned subsidiaries over which the Company exercises control and, when applicable, entities for which the Company has a controlling financial interest. See 2.15 for treatment of joint ventures/ nonconsolidated affiliates.

2.14 Significant changes in size and structure

In January 2003, following two years of disappointing results, the Company announced an action plan ("2003 Action Plan") with the express goal of improving the earnings and financial strength of Dow. To accomplish this, all corporate initiatives that were not considered business critical were postponed or cancelled, so all employees could be engaged and focused on four objectives:

- To manage the price of Dow's products without sacrificing volume
- To reduce structural costs by \$400 million and capital expenditures by \$400 million
- To shut down under-utilized and non-competitive assets
- To accelerate changes in Dow's portfolio, including the sale of non-strategic assets

In response to the 2003 Action Plan, sales in 2003 increased 18 percent to \$33 billion, establishing a new sales record for the Company. 2003 was the first year since the last industry peak in 1995 that the margin between selling prices and the cost of feedstocks improved. Price/volume management continues to be a difficult challenge for Dow. While Dow's overall operating rate improved from 78 percent in 2002 to 82 percent in 2003, industry operating rates remain relatively low and some key products are still in oversupply.

Due to the focus on costs, the Company reduced its structural costs in 2003 by more than \$600 million (including reductions in materials and supplies, purchased services, travel and labor costs), exceeding the goal set in the 2003 Action Plan by more than \$200 million. This reduction was accomplished by controlling discretionary spending throughout the organization, through the application of Six Sigma methodology (a disciplined approach to achieving performance excellence) and through the reduction of approximately 3,600 employees. Reflecting the success of Dow's efforts to reduce costs, selling, general and administrative expenses were down 13 percent in 2003 from 2002.

Dow's purchased feedstock and energy costs (which are largely based on derivatives of oil and natural gas) rose 33 percent in 2003, an increase of \$2.7 billion. These costs represented 36 percent of the Company's total production costs and operating expenses in 2003. Because these costs are substantial, Dow has taken a number of steps over the years to help mitigate the impact of high and volatile feedstock costs:

- Conservation—Since the early 1990s, the Company has added nine new co-generation facilities and improved overall manufacturing efficiency.
- Global sourcing—The Company's global network of manufacturing plants allows it to supply export markets from lower cost sites.
- Feedstock flexibility—Dow's manufacturing flexibility allows it to optimize feedstock mix, reducing exposure to higher cost feedstocks.
- Hedging—The Company uses both financial and physical hedging to reduce the negative effect of feedstock price volatility.

Capital expenditures in 2003 were \$1.1 billion, down more than \$500 million from 2002, exceeding the Company's goal set in the 2003 Action Plan by more than \$100 million. This was accomplished without sacrificing the efficiency, safety and environmental performance of Dow's manufacturing facilities. As discussed in Environmental Matters, the Company's key environmental measures continued to improve in 2003, with 70 percent of Dow's manufacturing

plants reporting no injuries during the year.

In 2003, the Company reviewed its assets to identify under-utilized and non-competitive assets. As a result, Dow shut down two Union Carbide ethylene plants in Texas, as well as 14 small facilities in North America, Europe and Latin America during the year. Also during 2003, the Company sold assets identified as non-strategic, including the oryzalin herbicide business, the methyl glucoside and lanolin derivatives businesses, and Union Carbide's joint venture interest in Sunrise Chemical LLC.

2.15 Basis for economic reporting on joint ventures

Investments in nonconsolidated affiliates (20-50% owned companies, joint ventures, and partnerships) are accounted for on the equity basis. Additional details can be found in Note G to the Consolidated Financial Statements in the Company's Annual Report on Form 10-K for the year ended December 31, 2003.

http://63.236.106.222/ireye/ir_site.zhtml?ticker=DOW&script=1901

2.16 Explanation of nature and effect of any restatements of information provided in earlier reports

Not Applicable – this is the first GRI “in accordance with” report

2.17 Decision not to apply GRI principles or protocols in the preparation of the report

None

2.18 Definitions

None at this time

2.19 Significant changes in measurement methods

Not Applicable – this is the first GRI “in accordance with” report

2.20 Policies and internal practices to enhance and provide assurance about the accuracy, completeness, and reliability of the report

The type and extent of external assurance for our Public Report is an issue that we continue to explore and experiment with. We believe that some form of third party assurance is becoming more and more a critical factor in successful Sustainable Development reporting, as evidenced by the prominence of this topic on various external rating agencies. However, the nature and extent of various assurance mechanisms, and their costs/ benefits, continues to be debated and discussed with various stakeholders, and Dow is committed to participating in this dialogue.

We believe our past process has served us and our various stakeholders well. While not an explicit “audit” as some might desire, we have chosen to use various existing governance structures in our Company, and a limited amount of external experts to review our report and

provide comments. In other words, we sought-and will continue to seek-counsel on achieving transparency in terms of scope of report content, materiality of that content, and effectiveness of the public dialogue that is helping us to attain more useful and accepted Sustainable Development reporting mechanisms.

Where possible, we have incorporated their comments and suggestions. In cases where this was not possible, the comments and the reasoning behind them were documented for use in planning the next edition of our public report.

2.21 Policies and current practice with regard to providing independent assurance for the full report

Globalization and increased access to information via the Internet have helped expand the scope and direction of these reports. For this year, we have attempted to achieve “in accordance with” conditions for the Global Reporting Initiative (GRI) 2002 Guidelines. Included in the public report are:

- 1) A separate GRI report addressing specific elements of the GRI guidelines
- 2) A GRI Content Index
- 3) A signed statement from the CEO, COO, and VP of EH&S, Human Resources, and Public Affairs

In future years, we will continue to explore various mechanisms for providing additional assurance as desired by our stakeholders and as always, look for external comments to guide our exploration.

2.22 Access to additional information

See references to Annual Report, Public Report, Proxy Statement, and Form 10-K below:

<http://www.dow.com/financial/reports/index.htm>

<http://www.dowpublicreport.com>

http://63.236.106.222/ireye/ir_site.zhtml?ticker=DOW&script=1901

3.0 Governance Structure and Management System

3.1 Governance Structure

Detailed information about the overall governance structure of TDCC can be found at:

<http://www.dow.com/corpgov/index.htm>

3.2 Percentage of the Board of Directors that are independent

Almost two-thirds of the Board of Directors (9 out of 15) are considered independent to the Company.

3.3 Process for determining expertise board members need

The Committee on Directors and Governance (the "Committee") will continue its long-standing practice of accepting stockholders' suggestions of candidates to consider as potential Board members, as part of the Committee's periodic review of the size and composition of the Board and its committees. Such recommendations may be sent to the Committee through the Corporate Secretary.*

Under the Company's Bylaws, stockholders wishing to formally nominate a person for election as a Director at the next Annual Meeting must notify the Office of the Corporate Secretary* between November 26, 2004, and January 25, 2005. Such notices must comply with the provisions set forth in the Bylaws. A copy of the Bylaws may be found on the Company's website at www.DowGovernance.com. Alternatively they will be sent without charge to any stockholder who requests them in writing. Such requests should be addressed to the Corporate Secretary.*

* The address is: Office of the Corporate Secretary, The Dow Chemical Company, 2030 Dow Center, Midland, MI 48674.

Committee and Function	Chairman and Members	Meetings in 2003
<p>Committee on Directors and Governance Responsible for the selection, qualification and compensation of Board members and candidates. Acts as a nominating committee for Director candidates and Board committee membership. Assists the Board with oversight of other corporate governance matters.</p>	<p>J. Michael Cook, Chairman J. K. Barton J. C. Danforth W. D. Davis J. M. Fettig</p>	<p>6</p>

3.4 Board level processes for overseeing economic, environmental, and social risk and opportunities

The committees responsible for economic environmental and social risk include the Finance Committee, the EH&S Committee and the Public Interest Committee of the Board:

Committee and Function	Chairman and Members	Meetings in 2003
Finance Committee Oversees the Company's financial activities. Has authority and oversight responsibility to establish investment policy for the Dow employees' pension plans.	J. P. Reinhard, Chairman A. J. Carbone W. S. Stavropoulos K. R. McKennon A. N. Liveris J. M. Ringler	6
Environment, Health and Safety Committee Assesses the Company's environment, health and safety policies and performance.	J. K. Barton, Chairman A. A. Allemang A. J. Carbone W. D. Davis B. H. Franklin A. N. Liveris J. P. Reinhard H. T. Shapiro	3
Public Interest Committee Oversees matters impacting corporate social responsibility and the Company's public reputation. The committee's focus includes philanthropic contributions, community programs, diversity and inclusion, public policy management, international codes of business conduct, and corporate reputation management.	J. C. Danforth, Chairman J. M. Cook P. G. Stern J. M. Fettig J. M. Ringler K. R. McKennon W. S. Stavropoulos	3

3.5 Linkage between executive compensation and organizations financial and non-financial goals

Compensation for Senior Executives has three major components: base salary, annual performance award and long-term incentives - each component has a different structure and purpose. However, in general, the Compensation Committee has structured the compensation of Senior Executives so that at target levels of total direct compensation, at least 75 percent is variable and dependent upon performance. This is a significantly higher percentage of compensation at risk than for other levels of employees.

Base salaries for all Dow employees, including the Company's Senior Executives, are usually determined upon an evaluation of their responsibilities, an assessment of their performance, and market comparisons from regularly scheduled compensation surveys. Average salaries for each employee group are managed to be within the median range of the comparison group to facilitate Dow's ability to attract and retain a highly qualified workforce.

Annual performance awards are a component of pay of all employees. Performance award payouts are determined for Senior Executives by the Committee each year in February. Performance for the prior year is compared to previously established Company, business unit and individual goals.

In 2003, long-term incentive compensation ("LTI") for Senior Executives and a broad range of other employees consisted of grants of market-priced stock options and Performance Shares, granted under the 1988 Award and Option Plan, which was approved by Dow stockholders in 1988, 1997 and 2002. The Committee determined individual LTI compensation awards for 2003 after evaluating the contribution of each Senior Executive to the Company's long-term performance and competitive market practices.

3.6 Organization structure responsible for oversight, implementation and audit of economic, environmental, social and related policies

The committee responsible for this activity is the Audit Committee of the Board:

Committee and Function	Chairman and Members	Meetings in 2003
Audit Committee Monitors the integrity of the financial statements of the Company and the qualifications, independence and performance of the independent auditors. Additionally, has oversight responsibility for the performance of the Company's internal audit function and compliance with legal and regulatory requirements.	P. G. Stern, Chairman J. M. Cook H. T. Shapiro J. C. Danforth J. M. Fettig B. H. Franklin K. R. McKennon	6

The highest level of management below the board of directors directly responsible for setting and implementing environmental and social policies is the Vice President of EH&S, Public Affairs, and Human Resources – who reports directly to the Chief Operating Officer of the Company. Ultimately, the Office of the Chief Executive (CEO, COO, Executive VP of Operations, Executive VP and Chief Financial Officer) has overall management responsibility for all policies of TDCC.

3.7 Mission and Values Statement, Codes of Business Conduct

Mission: To constantly improve what is essential to human progress by mastering science and technology.

The Mission Statement can be broken into three components:

- Constantly Improve - This concept is bedrock to Dow's culture and has been since H.H. Dow first said, "If you can't do it better, why do it?" It underscores our drive to become an ever better and bigger company.

- Essential to Human Progress - The products we make find their way into products that provide people the world over with improved lifestyles. All of us at Dow must understand and take pride in this. We must also use this concept to further connect Dow with the external markets we serve. When we think in terms of the markets we serve, we become more outside-in focused and we can better seek growth opportunities.

- Mastering Science and Technology - We must put our science and technology to work to create solutions for our customers and for society.

Our Mission will be accomplished by living according to values that speak to the economic, social, and environmental responsibilities of business and society.

- Integrity - We believe our promise is our most vital product – our word is our bond. The relationships that are critical to our success depend entirely on maintaining the highest ethical and moral standards around the world. As a vital measure of integrity, we will ensure the health and safety of our communities, and protect the environment in all we do.

- Respect for People - We believe in the inherent worth of people and will honor our relationships with those who let us be part of this world:
We, the employees of Dow, are the engine of value creation; our imagination, determination, and dedication are essential to growth. We will work to celebrate and reward the unique backgrounds, viewpoints, skills, and talents of everyone at Dow. Respect for people is measured by how we treat each other, by the contributions that flow from our diversity, by the productivity of our relationships, and by a job well done, no matter what the job.

- Our communities are our neighbors; their acceptance of us is vital to our ability to operate.
- Our customers are our partners in creating value; their loyalty is our greatest reward.
- Our shareholders are the beneficiaries of our success; their on-going commitment to us is based on returning to them superior profits over time.
- Our respect for people also extends to the consumers whose lives we touch. We will strive to answer people's most vital needs: for food, water, shelter, transportation, communication, health and medicine.

- Unity - We are one company, one team. We believe that succeeding as one enterprise is as important as succeeding independently. Balancing empowerment and interdependence makes us strong. As one company, Dow's impact on the world is far greater than the impact of any one of its parts. We will work together, building relationships to create ever-greater value for the customers and consumers we serve.

- Outside-in Focus - We believe that growth comes from looking at opportunity through the eyes of customers and all those we serve. Taking an "outside-in" view ensures that our efforts are always relevant and that our unique talents are applied to "real world" opportunities. We will see through the eyes of those whose lives we affect, identifying unmet needs and

producing innovative and lasting solutions. We will bring to this task all of our experience and knowledge as the unique individuals we are.

- **Agility** - At Dow, we believe our future depends on speed and flexibility – mental, emotional and physical. Responding resourcefully to society's fast-changing needs is the only road to success. We will meet the forces of change with power and grace. We will make course corrections that demonstrate flexibility as well as courage, and that highlight our ability to keep ourselves aligned with a world in motion.

- **Innovation** - We believe that meaningful, productive change – solving problems – only comes by looking at challenges and opportunities from new angles and exercising our curiosity. In the name of innovation, we will make science a way of living. We will not only master the science of the physical world, but the science of the mind and heart. Our job is to unlock answers that make a fundamental difference to people's lives. We will use technology to help lead society forward. We will conceive, design, engineer, and execute solutions that remove barriers to human potential and productivity.

The Code of Business Conduct was revisited in 2003, and can be found at:

http://www.dow.com/about/aboutdow/code_conduct/ethics_conduct.htm

In 2003, online training for the Code of Business Conduct was developed and became a mandatory component of training for all employees of the Company.

Sustainable Development Guiding Principles

Fundamental to our success are the values we believe in and practice. Our Vision is to achieve financial, environmental, and social excellence in all parts of the world where we do business. We will make continuous progress toward our Vision by adhering to the following set of Sustainable Development Guiding Principles:

Measurement and Transparency

We will report our progress in an open and transparent manner.

Eco-Efficiency

We will create shareholder value by designing our products and operating our facilities to reduce material content, natural resource use, and energy requirements, while maximizing their service life through sound reuse and recycling activities.

Local Versus Dow Standards

Our products and operations will meet applicable government, or Dow environmental, health, and safety standards, whichever are more stringent.

Product Stewardship

We will endorse, fulfill and promote the Responsible Care® Guiding Principles and Codes of Management Practices worldwide and promote their application by sharing experiences and supporting the efforts of our suppliers and customers to understand and continuously improve the full life-cycle impacts of our products and services.

Stakeholder Partnerships and Dialogue

We will seek inputs and promote partnerships between industry, government, non-government organizations, communities and other key stakeholders to focus on responsible solutions to common problems and concerns.

Eco-System Integrity

We will understand and respect the limits to the regenerative capacity of eco-systems and protect valued areas of recognized ecological and cultural significance.

Employee and Public Outreach

We will enhance the human potential of our employees through education and training. We will contribute to the development of public policy, and to business, governmental and non-governmental initiatives, which lead to progress in Sustainable Development.

Equality and Quality of Life

We will create shareholder value through environmentally sustainable economic development, social equity and ethical behavior.

3.8 Mechanism for a shareholder to provide recommendations for direction to the board of directors

Shareholders may communicate directly with the full Board, the Presiding Director, the non-management Directors as a group, or with specified individual Directors by any one of several methods. These include mail addressed to The Dow Chemical Company, 2030 Dow Center, Midland, MI 48674, and by the "Contact Us" feature of Dow's corporate governance website at www.DowGovernance.com. The Presiding Director and other non-management Directors as a group may also be contacted by email addressed to PresidingDirector@Dow.com. Shareholders should specify the intended recipient(s) of the letter or electronic message. No message will be screened for omission unless it falls within a category (such as solicitation for goods or services) identified by the recipients for such handling.

3.9 Basis for identification and selection of major stakeholders

Our stakeholders are identified through Community Advisory Panels (CAP's), understanding of key customers and suppliers on a business-by-business basis and our customer loyalty surveys, employee communications panels (eCAP's), and through the help of our Corporate

Environmental Advisory Council (CEAC).

3.10 Approaches to stakeholder consultation

- Customer Loyalty Surveys -
<http://www.dow.com/publicreport/2003/responsibility/favor.htm>
- Community Advisory Panels -
<http://www.dow.com/publicreport/2003/assurance/cap.htm>
- Corporate Environmental Advisory Council -
<http://www.dow.com/publicreport/2003/assurance/ceac.htm>
- Global Employee Opinion Annual Surveys -
<http://www.dow.com/publicreport/2003/responsibility/empower.htm>
- Investor Relations presentations, web casts -
<http://www.dow.com/financial/present/index.htm>

Stakeholder Dialogue is also an element of the 12-Point Sustainable Development Operating Plan: Better understanding of diverse viewpoints through active stakeholder partnerships and dialogue. We have developed a Stakeholder Dialogue primer for use by all our employees on how to select and manage a variety of dialogue processes

3.11 Type of information generated by stakeholder consultations

Information generated is sometimes in the form of annual surveys (communities, customers, employees), and sometimes specific to a particular business or issue.

3.12 Use of information resulting from stakeholder engagements.

The data from the various surveys are used to set future targets relative to performance (such as an 80 percent approval rating in the communities we operate, or being in the top quartile for the various employee questions). In addition, the advice and counsel of the CEAC is used on a case-by-case basis, helping us to develop future robust sustainable strategies for implementation. The CEAC is not an approval body, nor do they want to be – they provide expertise, insight and advice on a wide range of Sustainable Development issues.

3.13 Explanation of the Precautionary Principle

Dow supports the Precautionary Principle as defined in Principle 15 of the Rio Declaration. Dow believes in exercising caution to reduce potential threats to human health and the environment. As a responsible corporate citizen, Dow must continue using a well-defined process for assessing and managing risks in the face of uncertainty. In fact, it is our belief that one of our strengths is exercising caution in our assessment and management of risks. Our approach has been instituted through our 25-year old Product Stewardship philosophy, and further through our Responsible Care commitment. This process applies to current products as

well as those being contemplated for development.

Dow views the Precautionary Principle as an application of the principles of risk assessment and risk management. Risk assessment includes hazard identification, characterization, exposure assessment and risk assessment. Risk management encompasses, as necessary, the identification, selection and implementation of alternative actions for addressing risk through the control of identified hazard(s) and/or exposure. The risk management process provides options from which several actions are selected to manage potential risks, in essence to utilize the Precautionary Principle. Individuals, corporations, stakeholders, the public, or governments may undertake risk management activities. Costs and benefits of action/inaction, as well as the risks of competing products or technologies must be considered. In effect, alternative actions being proposed should be subject to the same level of scrutiny.

3.14 Externally developed principles

The Dow Chemical Company is an active participant in the American Chemistry Council's Responsible Care® initiative. While initially developed in the US, Dow applies these principles globally.

Guiding Principles of Responsible Care®.

Our industry creates products and services that make life better for people around the world — both today and tomorrow. The benefits of our industry are accompanied by enduring commitments to Responsible Care® in the management of chemicals worldwide. We will make continuous progress toward the Vision of no accidents, injuries or harm to the environment and will publicly report our global health, safety and environmental performance. We will lead our companies in ethical ways that increasingly benefit society, the economy and the environment while adhering to the following principles:

- To seek and incorporate public input regarding our products and operations.
- To provide chemicals that can be manufactured transported, used and disposed of safely.
- To make health, safety, the environment and resource conservation critical considerations for all new and existing products and processes.
- To provide information on health or environmental risks and pursue protective measures for employees, the public and other key stakeholders.
- To work with customers, carriers, suppliers, distributors and contractors to foster the safe use, transport and disposal of chemicals.
- To operate our facilities in a manner that protects the environment and the health and safety of our employees and the public.
- To support education and research on the health, safety and environmental effects of our products and processes.
- To work with others to resolve problems associated with past handling and disposal practices.
- To lead in the development of responsible laws, regulations and standards that safeguards the community, workplace and environment.
- To practice Responsible Care® by encouraging and assisting others to adhere to these principles and practices.

In 2002, with consultation from outside stakeholders, Dow developed a specific set of **Biotechnology Principles**:

The Dow Chemical Company has adopted the following principles to guide its decision-making in applying biological knowledge and techniques to develop products and services for the benefit of our customers, shareholders, and society. We will pursue biotechnology in alignment with Responsible Care® and Dow's Values, Code of Business Conduct and Sustainable Development Principles. We recognize that the unique scientific, philosophical and ethical implications of biotechnology must be considered.

Guiding Principles

1. We will actively listen to and dialogue with stakeholders to understand their concerns and to help us progress responsibly.
2. We will inform the public about relevant benefits, risks, and potential implications of our biotechnology products and processes, and encourage others to do the same.
3. We will participate in outreach efforts and explore opportunities to make the benefits of biotechnology available to developing countries and will respect the rights of indigenous people to have access to local germplasm.
4. We will promote research on the potential benefits and safety of our biotechnology products and services for humans, animals, and the ecosystem.
5. We will support the development and implementation of internationally harmonized approaches to biotechnology safety analysis and promote the creation of a predictable and scientifically sound regulatory framework to reduce scientific uncertainty, manage potential risks, and assure public confidence.
6. We will apply our established corporate Environment, Health & Safety Risk Review Process, which includes a thorough consideration of the impact on humans, animals, the environment, and society, throughout the lifecycle of all our biotechnology products and services and will take appropriate corrective actions.
7. We will support the patentability of inventions as determined by the applicable laws of the countries in which we do business and will respect the intellectual property rights of others and not knowingly infringe upon valid patents.
8. We will support the conservation of biological diversity and the sustainable use of biological resources.
9. We will promote these principles throughout the industry and value chain.

©Responsible Care is a registered service mark of the American Chemistry Council

3.15 Principle memberships

Example of where Dow is an active member of trade and business associations:

American Chemistry Council (ACC)
European Chemical Industry Council (CEFIC)

Association of Plastics Manufacturers of Europe (APME)
Chlorine Chemistry Council (CCC)
World Business Council for Sustainable Development (WBCSD)
US Business Council for Sustainable Development (USBCSD)
World Environment Center (WEC)
Global Environmental Management Initiative (GEMI)

3.16 Policies or systems for managing upstream and downstream performance

Dow's EH&S Policy:

At Dow, protecting the people and the environment will be part of everything we do and every decision we make. Each employee has a responsibility in ensuring that our products and operations meet applicable government or Dow standards, whichever is more stringent.

Our goal is to eliminate all injuries, prevent adverse environmental and health impacts, reduce wastes and emissions and promote resource conservation at every stage of the life cycle of our products. We will report our progress and be responsive to the public.

-Revised April 1993

Sustainable Development Principle of Product Stewardship:

We will endorse, fulfill and promote the Responsible Care® Guiding Principles and Codes of Management Practices worldwide and promote their application by sharing experiences and supporting the efforts of our suppliers and customers to understand and continuously improve the full life-cycle impacts of our products and services.

In addition, our **Code of Business Conduct** has a number of policies where we expect our suppliers and contractors to embrace similar values and standards.

The full Code of Business Conduct is located online at:

http://www.dow.com/about/aboutdow/code_conduct/ethics_conduct.htm

3.17 Managing indirect impacts

The way indirect economic impacts are managed depends on the particular stakeholder group involved. Indirect economic impacts are managed dependent on the overall stakeholder. For our shareholders, we would interpret indirect economic impacts to include all those things that make up the difference between Dow's "book" value and our market capitalization. We believe that our Corporate Brand and Reputation are a large component of this element of indirect impact. (See: <http://www.dow.com/publicreport/2003/todo/ongoing.htm#brand>)

The impacts relative to our communities are assessed and measured through our Community Advisory Panels, and our Community Survey work.

(See: <http://www.dow.com/publicreport/2003/responsibility/favor.htm>)

The impacts relative to our employees are assessed and measured through our Global Employee Opinion Annual Survey.

(See: <http://www.dow.com/publicreport/2003/responsibility/empower.htm>)

Finally, the indirect impacts to customers are assessed and measured through our Customer Loyalty surveys (not available for publication).

3.18 Major changes during the reporting period regarding location of, or changes in, operations

See section 2.14

3.19 Programs and procedures pertaining to economic, environmental and social performance

In 2001, the Dow management team developed the 12-Point Sustainable Development Operating Plan (SDOP) as the actionable and measurable tool for implementation of the Triple Bottom Line in business, functional and site strategies. All of Dow's programs and initiatives relative to economic, environmental, or social performance are integrated into our overall work processes and organization via this plan. The strength of this plan lies in its ability to give direction to, align with, and integrate existing initiatives and future plans.

The choice of a painter's palette to depict our 12-point plan is significant. The plan provides the colors, but each Dow business decides what overall picture to paint, depending on where it is in the journey toward Sustainability.

To assure that the SDOP is effectively carried out; global implementation leaders have been assigned for each of the 12 elements. They serve as resources for our business, functional and site leadership to spearhead and follow through on Sustainable Development change efforts. In 2003, we made progress in further articulating details of each of the 12 points in our SDOP, and specifically, what should businesses, functions and sites know and do.

The 12 Points of the Sustainable Development Operating Plan are:

1. **People:** Implementation of a comprehensive People Strategy throughout the Company
2. **Brand:** Education and communication through a corporate reputation and branding strategy
3. **Transparency:** Transparency in our activities and performance
4. **Integration:** Integration of the Sustainable Development Guiding Principles into business, function, and site strategies
5. **Dialogue:** Better understanding of diverse viewpoints through active stakeholder partnerships and dialogue
6. **Advocacy:** Proactive management of emerging issues and trends consistent with the Sustainable Development Guiding Principles
7. **Citizenship:** The manner in which Dow will continue to meet societal needs and achieve value growth around the world, and be accountable for its actions
8. **Solutions Development:** Development and production of value-added, essential-to-life products that positively contribute to a sustainable society
9. **Community:** Improvement of societal value through corporate contributions, initiatives and activities, volunteerism and ecosystem enhancement projects
10. **Six Sigma:** Breakthrough improvements in Sustainability through the use of Six Sigma

methodology

11. **EH&S:** Continuous improvement of Environment, Health and Safety performance for 2005 and beyond

12. **Industry Alignment:** Living the Responsible Care® principles and promoting their implementation throughout the industry.

3.20 Status of certification programs

Dow's overall mechanism for standards development, application, and review is called the Operating Discipline Management System (ODMS). The following is an excerpt from a recently completed audit of our system relative to the standards for ISO 14001:

"In October 2002, Lloyd's Register Quality Assurance, Inc. (LRQA) carried out a review of Dow's Operating Discipline Management System (ODMS) documentation. The review compared the Environmental Management System components of the ODMS (based on Responsible Care) against the requirements of ISO 14001:1996. The ODMS documents reviewed consisted of the relevant sections of the Company's Level 1 (Requirements) and Level 2 (Processes) of the ODMS. It was concluded from the review that the ODMS manuals addressed or exceeded all the ISO 14001 requirements and provided the necessary direction for ISO 14001 conformance at the operational level."

Martin Brown
LRQA
Global Account Manager
March 19, 2003

4.0 GRI content index

Available at the end of this report in Appendix A

5.0 Performance Indicators

Economic Performance Indicators

EC1 Net sales

Net Sales (in US Millions)

1999 – \$26,131

2000 – \$29,798

2001 – \$28,075

2002 – \$27,609

2003 – \$32,632

EC2 Geographic breakdown of markets

With customers in more than 180 countries, approximately 45 percent of the Company's sales are in North America; 35 percent are in Europe and the remaining 20 percent are from sales to customers in Asia Pacific and Latin America. The Company employs approximately 46,000 people and has a broad, global reach with 180 manufacturing sites in 37 countries.

EC3 Cost of all goods, materials, services

Cost of sales (in US Millions)

1999 – \$20,422
2000 – \$24,310
2001 – \$23,892
2002 – \$23,780
2003 – \$28,177

EC4 Percentage of contracts that were paid in accordance with agreed terms

Information not collected or consolidated for the Company at this time.

EC5 Total payroll and benefits broken down by country or region

2003 payroll data by region (in US Millions):

North America	Europe	Pacific	Latin America	Total
\$2,367	\$860	\$152	\$88	\$3,467

EC6 Distribution to providers of capital

Total Debt at December 31 (in US Millions)	2003	2002
Notes payable	\$ 258	\$ 580
Long-term debt due within one year	1,088	797
Long-term debt	11,763	11,659
Gross debt	\$ 13,109	\$ 13,036
Cash and cash equivalents	\$ 2,392	\$ 1,484
Marketable securities and interest-bearing deposits	42	89
Net debt	\$ 10,675	\$ 11,463
Gross debt as a percent of total capitalization	55.4%	59.2%
Net debt as a percent of total capitalization	50.3%	56.0%

Additional information regarding capital distributions can be found in the Company's Annual Report on Form 10-K filing for the year ended December 31, 2003:

http://63.236.106.222/ireye/ir_site.zhtml?ticker=DOW&script=1901

EC7 Increase/decrease in retained earnings

In million, for the year ended December 31	2003	2002	2001
Retained Earnings			
Balance at beginning of year	\$ 9,520	\$ 11,112	\$ 12,675
Net income (loss)	1,730	(338)	(385)
Common stock dividends declared	(1,233)	(1,228)	(1,162)
Other	(23)	(26)	(16)
Balance at end of year	\$ 9,994	\$ 9,520	\$ 11,112

EC8 Total sum of all taxes paid

See Note S of the Consolidated Financial Statements in the Company's Annual Report on Form 10-K for the year ended December 31, 2003 for information regarding income taxes:

http://63.236.106.222/ireye/ir_site.zhtml?ticker=DOW&script=1901

EC9 Subsidies received

This information is not consolidated for TDCC at this time.

EC10 Donations

Donations per Region (US in Thousands)

	1996	1997	1998	1999	2000	2001	2002	2003
North America	\$15,346	\$19,524	\$17,203	\$17,433	\$19,178	\$24,705	\$20,210	\$14,875
Europe	964	1,307	972	994	1,069	1,774	1,287	1,260
Pacific	229	456	240	191	349	373	546	518
Latin America/Mexico	297	704	298	297	337	372	318	212
Total Donations	\$16,836	\$21,991	\$18,713	\$18,915	\$20,933	\$27,224	\$22,361	\$16,865

Environmental Performance Indicators

EN1 Total materials use

The Company operates in an integrated manufacturing environment. Basic raw materials are processed through many stages to produce a number of products that are sold as finished goods at various points in those processes.

The two major raw material streams that feed the integrated production of the Company's finished goods are chlorine-based and hydrocarbon-based raw materials.

Salt, limestone and natural brine are the base raw materials used in the production of chlor-alkali products and derivatives. The Company owns salt deposits in Louisiana, Michigan and Texas, USA; Alberta, Canada; Brazil; and Germany. The Company also owns natural brine deposits in Michigan and limestone deposits in Texas.

Hydrocarbon raw materials include liquefied petroleum gases, crude oil, naphtha, natural gas and condensate. These raw materials are used in the production of both saleable products and energy. The Company also purchases electric power, benzene, ethylene and styrene to supplement internal production. Expenditures for hydrocarbons and energy accounted for 36 percent of the Company's production costs and operating expenses for the year ended December 31, 2003. The Company purchases these raw materials on both short- and long-term contracts.

Other significant raw materials include acrylic acid, acrylonitrile, aniline, bisphenol, cellulose, octene, toluene diamine, and methanol. The Company purchases these raw materials on both short- and long-term contracts.

We do not roll up the total material use for TDCC at this time, but are considering this for future reporting.

EN2 Percentage of materials used that are waste from other organizations

This information is not collected and consolidated by the Company at this time.

EN3 Direct energy use by primary source

Our energy focus is on energy intensity—reducing the amount of energy needed to produce a pound of product by two percent per year from 1995–2005. This is in addition to a 20 percent improvement from 1990–1994.

There was an improvement in energy intensity of approximately 2.9 percent in 2003 compared to 2002. Improved operating rates and the contribution of over 200 Six Sigma energy efficiency projects in 2003 were major factors in the improvement. Overall energy intensity has improved 17 percent since 1994.

High energy prices and energy price volatility—coupled with the environmental impact of energy production and consumption—makes energy use a critical issue for Dow. Implementing an aggressive energy efficiency and conservation effort is an important part of Dow's plan to address this critical issue.

Business and Site energy efficiency teams have been established throughout the Company to focus both up and down as well as across the product chain. As a result of focused business and site efforts, over 700 Six Sigma projects have been chartered in the past four years to address all aspects of energy production, use, efficiency and cost reduction.

Below are a few of the many projects that have made significant contributions in these areas in 2003

- Two older and less energy efficient ethylene crackers were shut down at Seadrift and Texas City, Texas. Production from these units was shifted to newer more efficient Dow facilities resulting in 15–20 percent less energy consumed for this incremental volume.
- Dow Central Germany's Boehlen site reduced the import of natural gas by 25 percent through efficiency improvement and energy optimization projects. This saved the site five million Euros.
- The Plaquemine, Louisiana, EO/EG plant was able to save \$7.5 million dollars in energy costs through a comprehensive variable cost reduction program.
- Implementation of new seawater pump operation procedures at the Terneuzen, Netherlands, site resulted in a savings of over 4,000 megawatt hours of electricity.
- The MDI plant in Stade, Germany, successfully completed a project to burn hydrogen instead of natural gas for a furnace. This resulted in a reduction of natural gas purchases of over 1.6 million Euros.
- The Chlor-Alkali, EDC/VCM, and Ethylene plants focused on reducing electrical energy consumed by motors at the Fort Saskatchewan, Alberta, Canada, site. The combined effort resulted in a yearly savings of almost 12,000 megawatt hours.
- A simple, yet elegant change in the process control strategy and operating procedures eliminated wasted steam in the Polycarbonate Plant in Stade, Germany. The project resulted in a 20 percent reduction in total steam consumption.
- Implementation of a new boiler steam dispatch protocol at the Freeport, Texas, site resulted in natural gas savings of over 800 million BTU/day.
- A benchmarking study conducted by Polyolefins and Elastomers at Tarragona, Spain, resulted in a site utility optimization program that saved \$625,000 in the cost of steam, compressed air and nitrogen in 2003.
- Polypropylene operations at Freeport, Texas, saved \$865,000.00 on energy cost in 2003 through process design upgrades, improvement of operating practices and product mix rationalization.

EN4 Indirect energy use by primary source

This information is not collected and consolidated by the Company at this time, but is scheduled to be included in future reports.

EN5 Total water use

This information is not collected and consolidated by the Company at this time, but is scheduled to be included in future reports.

EN6 Location and size of land owned, leased, or management for biodiversity habitats

This information is not collected and consolidated by the Company at this time. However, please refer to our various Site Public Reports for examples of management for biodiversity habitats @

http://www.dow.com/dow_news/speeches/index.html

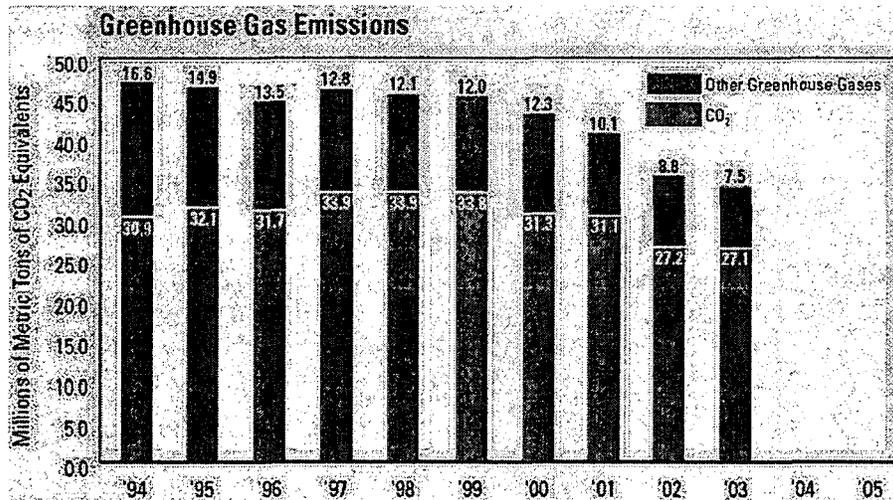
EN7 Description of major impacts on biodiversity

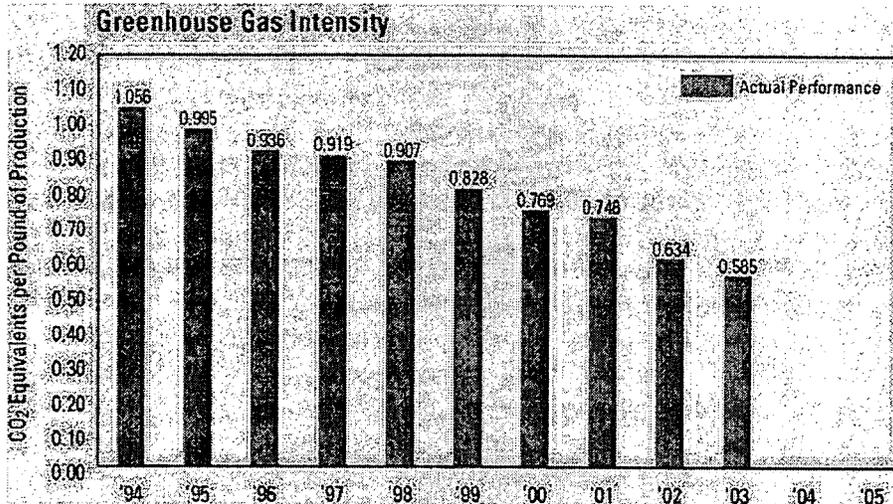
This information is not collected and consolidated by the Company at this time. However, please refer to our various Site Public Reports for examples of management for biodiversity habitats @

<http://www.dow.com/about/pbreports/index.htm>

EN8 Greenhouse gas emissions

The graph below shows the performance for all greenhouse gases for TDCC:

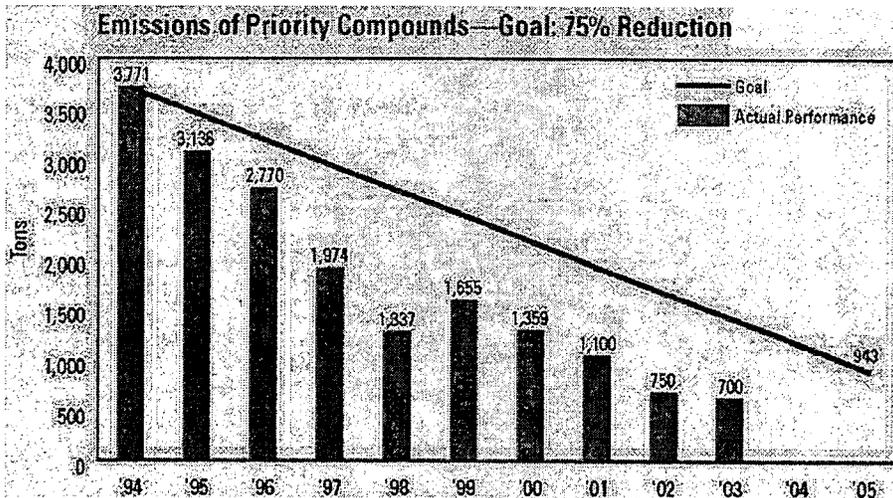




EN9 Use and emissions of ozone-depleting substances

The following Selected Ozone Depletors are included in the overall summary of priority compounds that the Company has targeted for reduction: Carbon tetrachloride, 1,1,1-trichloroethane, CFC-11, CFC-12, CFC-113, CFC-114, CFC-115, CFC-123, CFC-500, CFC-502, CFC-1301, H2402.

The graph below shows the performance for all priority compounds for TDCC:



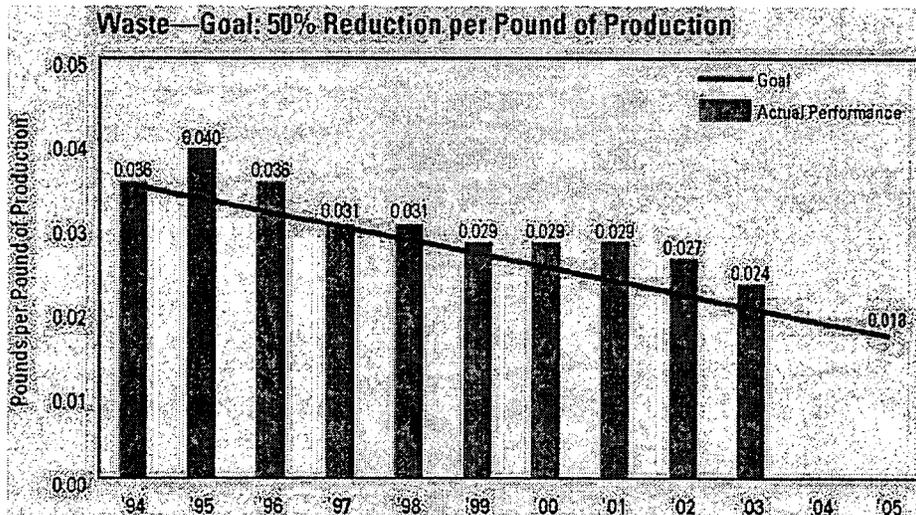
EN10 NOx, SOx, and other significant air emissions by type.

This data is not rolled up and reported on at this time

EN11 Total waste by type and destination

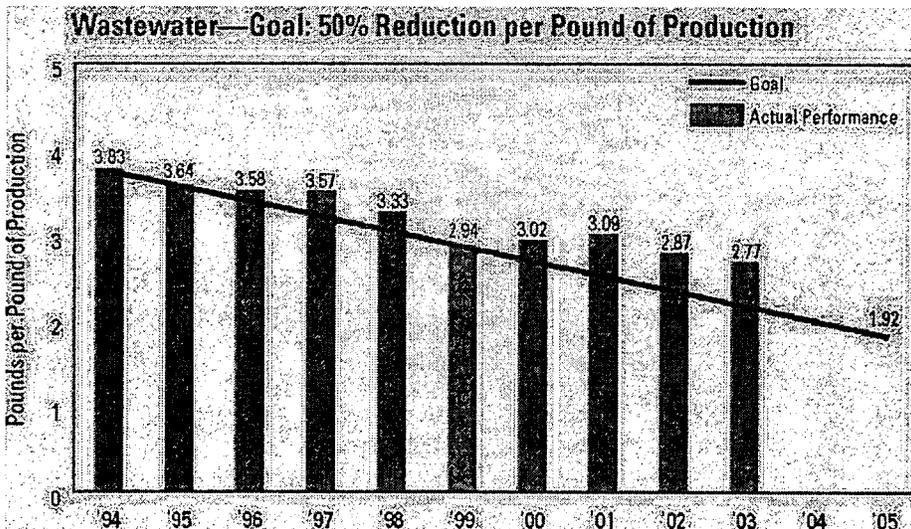
TDCC reports on total waste per pound of product produced, not on an absolute basis. We are evaluating this type of information for future reporting. Below is the rolled-up data for 2003 for

waste per pound of production



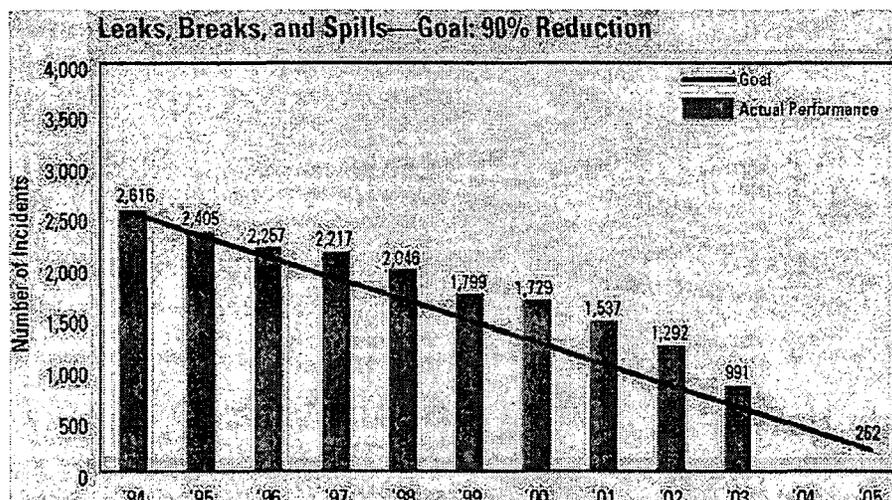
EN12 Significant discharge to water by type

TDCC reports on total wastewater per pound of product produced, not on an absolute basis. We are evaluating this type of information for future reporting. Below is the rolled-up data for 2003 for wastewater per pound.



EN13 Significant spills of chemicals, oils, fuels

Continuing our focus on effective implementation of our Loss of Primary Containment (LOPC) Reduction Initiative, we achieved a 23 percent reduction in leaks, breaks, and spills in 2003, our largest annual improvement ever. This measure includes loss of containment of materials, whether lost to the environment or captured in engineered containment systems. The goal focuses us on operational excellence—keeping materials where they are intended to be.



EN14 Significant environmental impact of principle products and services

Environmental matters are covered in the Company's Annual Report on Form 10-K for the year ended December 31, 2003, on page 41:

http://63.236.106.222/ireye/ir_site.zhtml?ticker=DOW&script=1901

EN15 Percentage of products sold which are reclaimable at the end of useful life of the product

Not collected or consolidated for the Company at this time.

EN16 Incidents of fines for non-compliance

Fines and penalties are tracked globally and are recorded in the year they are paid. In lieu of paying a fine or penalty, alternate pay amounts usually encompass projects benefiting the environment or local community, such as pollution prevention or remediation programs, public awareness, education activities, or wetland conservation activities. Fines and penalties are troubling not only because they indicate government-mandated performance, but also because they require cash outlays at the same time we are so focused on cost containment within the Company.

In 2003, Dow paid \$2,428,070 in fines and penalties. One North American facility accounted for 92 percent of the fines. Because fines and penalties are again a lagging indicator, we expect

that our recent improvement in LOPC performance will begin to reflect the progress that we have made.

Social Performance Indicators

LA1 Breakdown of workforce

Employees per Region:

North America: 55%

Europe: 31%

Pacific: 6%

Latin America: 8%

Employees Gender: Female: 24% Male: 76%

Percentage of Female Managers: 16%

Age:

<35 Female: 7% Male: 14%

35-50 Female: 13% Male: 43%

>51 Female: 4% Male: 19%

LA2 Net employment creation and average turnover

Personnel count was 46,372 at December 31, 2003; 49,959 at December 31, 2002; and 52,689 at the end of 2001. The decline in headcount in 2003 was the direct result of the Company's Action Plan initiated late last year and attrition. Headcount declined in 2002 primarily due to the Company's merger-related workforce reduction program.

LA3 Percentage of employees represented by independent trade unions

US: 16%

Total: 10%

LA4 Policy and procedure involving information, consultation, and negotiations with employees in changes in the reporting organization operations.

We do not have a policy concerning information, consultation, and negotiation.

LA5 Practice of recording and notification of occupational accidents and diseases, and how they relate to the ILO Code of Practice on Recording and Notification of Occupational Accidents and Diseases.

Regarding serious safety releases or accidents impacting the local community, process safety events, etc. - it is policy for businesses to contact the VP of EH&S and the Executive VP of Operations ASAP - certainly within 24 hours.

In Health Services we have organized all Dow sites into geographic regions. Each region has a regional health director. These regional health directors are responsible to implement our

requirements and standards within their entire region. Part of this includes an obligation to assure that all local laws and regulatory requirements are followed. Most states and countries have regulations requiring reporting of occupational injuries and illness to the government authorities. It is the obligation of the regional health director to accomplish this reporting according to expectations. It is also their responsibility to fulfill reporting requirements internally.

LA6 Formal joint health and safety committees comprising management and worker representatives and proportion of workforce covered by any such committees.

TDCC has no formal joint health and safety committees comprising management and worker representatives

LA7 Injury and Illness rates

In 2003, we realized a 19 percent improvement in our safety performance—including both Dow employees and contractors. We ended the year with our best-ever performance of a 0.58 recordable injury/illness rate (per 200,000 work hours), representing a 77 percent improvement since 1994. And, over 70 percent of our facilities had no incidents at all.

But it's not about numbers: it's about people. In January 2004, we achieved a significant milestone—10,000 people were NOT hurt as a result of our performance improvement since 1994. In other words, had we remained at our 1994 performance levels, that many more people would have been hurt.

We had no employee or contractor fatalities in 2003. We continue to focus on safety, reporting, and addressing the minor incidents to help assure we avoid the serious ones. In 2003, greater than 80 percent of employees' visit to Dow medical were either first aid or precautionary visits. Our goal is for every worker at Dow to go home safely every day.

In addition, in 2003, the US American Chemistry Council did a benchmarking study with its members regarding injury and illness performance within its industry and compared to other industries. The following is a table of the results (note for US operations only!), showing TDCC performance against others in our industry and other industries:

	Injury/ Illness Rate (#/ 200,000 hours)
Dow US Employees and Contractors	0.73 (2003 data)
Chemical Industry (SIC Code 28)	4.00 (2001 data)
All Industry	7.50 (2001 data)
All Manufacturing	8.10 (2001 data)

LA8 Description of policies and programs on HIV/AIDS

TDCC does not have a "special" global policy on HIV/ AIDS. We do have a commitment and processes for dealing with employee health and their experiences with any "serious illness" which does include HIV/ AIDS. We did not want to have to write a separate "policy" for every single serious illness such as a cancer illness program/ policy and a HIV/AIDS and a MS

process etc. Therefore, many years ago we established a process for dealing with employees with serious illness. This was created by Health Services and HR. The official process is the Medical Review Board. This is global and has been in place for years.

When an employee has a medical condition that impacts work, the employee and his/her leader/supervisor should work together collaboratively to find solutions that benefit both the employee and the Company. In some cases, the situation is complex. The leader needs the help of other resources within the Company to learn of all available options, and to insure both consistent and fair treatment and compliance with employment law. In such cases, the leader consults with his/her Human Resources Business Partner, who may suggest a MRB or other options.

A Medical Review Board is a cross functional team brought together to determine the best course of action to manage an employee whose work is impacted by an illness, injury, disability or mental condition. A representative from the employee's management line, a Human Resources professional, a representative from the Legal area and a Health Services medical representative are the required members for a MRB. Additional members may be appointed as needed, such as a psychological services (EAP) representative or a representative from the Diversity department. MRBs are management boards and therefore do not include the employee whose work is being impacted.

Given the special situation in South Africa, we have developed a regional policy, driven by the World Economic Forum Best Practice Road Map:

DOW SOUTH AFRICA HIV / AIDS POLICY

Dow South Africa:

- Acknowledges the seriousness and implications of the HIV / AIDS epidemic for Dow South Africa Southern Africa and its employees;
- Seeks to minimize the social, economic, development and health consequences to the Company and its staff; and
- Commits itself to providing effective resources and leadership to implement an HIV / AIDS program.

PRINCIPLES

Dow South Africa affirms that:

- Employees and their representatives will be consulted on the content and implementation of this policy;
- Employees with HIV / AIDS will be protected against unlawful discrimination and practices;
- HIV positive status will not constitute a reason to preclude any person from employment;
- Employee benefits depend on the rules and requirements of the relevant funds and schemes which may change from time to time; and
- Reasonable precautions will be taken to ensure confidentiality (on a need to know basis) regarding the HIV status of any employee.

HIV / AIDS PROGRAM IN THE WORKPLACE

CO-ORDINATION AND IMPLEMENTATION

Dow South Africa will appoint an HIV / AIDS Program Coordinator/Focal Point and working group within the Health Services and EAP structure to:

- Monitor that the policy is communicated to all staff;
- Monitor and evaluate the Company's HIV / AIDS program;
- Advise management regarding program implementation and progress;
- Liaise with local AIDS service organizations and other resources in the community; and
- Promote the creation of a supportive and non-discriminatory working environment.

PROGRAM COMPONENTS

The HIV / AIDS program of Dow South Africa will provide employees access to:

- Information and education;
- A variety of prevention strategies, (e.g. condoms)
- Health services for the appropriate management of HIV related infections/diseases, risk behavior and other diseases that may impact on the HIV/AIDS epidemic or HIV/AIDS individuals
- Universal precautions including personal protective equipment for staff who may potentially be exposed to blood or blood products;
- Appropriate support and counseling services to employees affected by the disease and where reasonably possible to their families.

PLANNING

Dow South Africa will conduct periodic AIDS impact analyses in order to determine the present and future impact of the epidemic on Dow South Africa's Human Resources.

POLICY REVIEW

This policy will be reviewed on a regular basis to take account of the progression of the epidemic, developments in medical care and its impact on employee benefits.

LA9 Average hours of training per year per employee

The average hours of training per employee was 7 hours in 2003, down from 10 hours in 2002. This number represents only technical training in our Human Resources classrooms, or online at our learn@dow.now internal website. It does not include any outside Dow training.

LA10 Description of equal opportunity programs

At Dow, we recognize value and leverage our differences for competitive advantage. It is a key to our success. We encourage a culture of mutual respect in which everyone understands and values the similarities and differences among our employees, customers, communities and other stakeholders. We work to provide an atmosphere that encourages positive interaction and creativity among all employees. Dow attracts and hires talented and motivated people who wish to excel. We provide equal access to the best jobs in the world for people who are willing to compete, and equal employment opportunity to all employees regardless of age, race, color, national origin, sexual orientation, gender, disability or religion.

See: http://www.dow.com/about/aboutdow/code_conduct/ethics_conduct.htm

LA11 Composition of senior management and corporate governance bodies

Full details on senior management, the board of directors, and the various board committees can be found at our Corporate Governance website:

<http://www.dow.com/corpgov/index.htm>

HR1 Policies related to human rights relevant to operations

See our Code of Conduct:

http://www.dow.com/about/aboutdow/code_conduct/ethics_conduct.htm

HR2 Evidence of human rights issues being included in investment decisions

Information is not collected and consolidated for the corporation at this time.

HR3 Policies on how human rights performance is monitored

Information is not collected and consolidated for the corporation at this time.

HR4 Policy on non-discrimination

See our Code of Conduct:

http://www.dow.com/about/aboutdow/code_conduct/ethics_conduct.htm

HR5 Freedom to associate

See our Code of Conduct:

http://www.dow.com/about/aboutdow/code_conduct/ethics_conduct.htm

HR6 Child labor policy

See our Code of Conduct:

http://www.dow.com/about/aboutdow/code_conduct/ethics_conduct.htm

HR7 Forced Labor policy

See our Code of Conduct:

http://www.dow.com/about/aboutdow/code_conduct/ethics_conduct.htm

SO1 Managing impact on communities

We use both Community Advisory Panels and Community Surveys to assess the impact of our operations on the communities in which we operate. This is managed through our Community Relations Network within the Company.

Community Relations develops relationships and partnerships through continuous, productive and honest dialogue with communities. Education Initiatives are also a part of Community Relations. We have 37 operational Community Advisory Panels that meet periodically throughout the year at our major sites of operations. We do community survey work in many, but not all of these locations, depending on costs and issues of concern. The following is a summary of the Community Survey results over the last several years:

Public Favorability Scores for Dow Sites

Plant Site	Goal ¹	1998	1999	2000	2001	2002	2003
Altona, Australia	60		63				
Aratu, Brazil	60				71		
Bahia Blanca, Argentina	60			48			
Dow Olefinverbund GmbH, Germany	80		54				77
Cartagena, Colombia	60				67		
Charleston (WV), USA	80				79	84	
Charleston (WV) ² , USA	80			77			
Drusenheim, France	60					69	
Fort Saskatchewan, Canada	80		81		81		84
Freeport (TX), USA	80		80		79		81
Guaruja, Brazil	60				75		
Jundiai, Brazil	60				89		
King's Lynn, UK	60			79		74	
Midland (MI), USA	80		83		80		
Plaquemine (LA), USA	80		81			78	
Prentiss, Canada	60						69
Rheinmunster, Germany	60					74	
San Lorenzo, Argentina	60			63			71
Sarnia, Canada	60		74		72		
Seadrift (TX), USA	80				73		
Stade, Germany	80					77	
Taft (LA), USA	80				68		
Tarragona, Spain	60		57				
Terneuzen, The Netherlands	80	83		86		86	
Texas City (TX), USA	80				67		

¹Favorability goals are based on an evaluation of the individual site's business importance and impact on the local

community.

²This survey around the Charleston, West Virginia location was done before the merger transaction involving The Dow Chemical Company and Union Carbide Corporation.

SO2 Policies around bribery and corruption

See our Code of Conduct:

http://www.dow.com/about/aboutdow/code_conduct/ethics_conduct.htm

SO3 Policies around lobbying and contributions

See our Code of Conduct:

http://www.dow.com/about/aboutdow/code_conduct/ethics_conduct.htm

PR1 Policy for preserving customer health and safety during use of products and services

See our Code of Conduct:

http://www.dow.com/about/aboutdow/code_conduct/ethics_conduct.htm

PR2 Policy around customer use of products/ services, product information and labeling

See our Code of Conduct:

http://www.dow.com/about/aboutdow/code_conduct/ethics_conduct.htm

PR3 Policy around consumer privacy

See our Code of Conduct:

http://www.dow.com/about/aboutdow/code_conduct/ethics_conduct.htm

Appendix A



Improved daily.

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Biomonitoring

Description

Biomonitoring is the laboratory measurement of chemicals in blood or other body fluids. By itself, biomonitoring only provides a snapshot of a given chemical's presence or absence in the body at a single point in time. It does not provide any information on the source, trend, or possible health effects of the chemical.

Scientists have long understood that we absorb many chemical substances from our environment. These are critical processes that sustain life, such as absorbing oxygen from air and nutrients from food. Today, because of recent technological advances in analytical chemistry, scientists can detect extraordinarily low levels of natural and man-made chemicals in blood or other body fluids. While biomonitoring has promise as a public health tool to help us better understand exposure to a wide-range of substances, like all potentially useful tools, biomonitoring has limitations. Biomonitoring studies report the presence of a given chemical measured in the body at a single point in time. They do not tell us where the chemical came from (natural or synthetic source), the trend (increasing or decreasing) of exposure over time, or if there will be any adverse health effects associated with the level reported.

Dow's Position

Dow supports continued research in the area of biomonitoring as an evolving approach to obtain additional chemical exposure information. Dow has a long-standing commitment to health-related research and chemical product stewardship under Responsible Care. As part of this commitment, Dow works with the scientific community and governments to promote the development of methodologies needed to appropriately interpret biomonitoring results as a foundation for risk-based decisionmaking.

Dow also supports:

Science-based programs based on accepted scientific principles and established public health criteria. Such a program should be scientifically sound, adequately robust, and transparent. These programs should also provide clear information to the participants to aid in the understanding of the results in a health context.

A risk-based approach to public policy. There must be a risk-based process for interpreting biomonitoring results in the appropriate context, particularly if the results are to be used for regulatory or other policy decision-making purposes. At this time, biomonitoring should only be used to define further research needs and exposure trends over time, as it cannot answer questions about risk or safety.

Appropriate interpretation and communication of biomonitoring results. While Dow is supportive of the Exposure Report Card of the U.S. Centers for Disease Control and Prevention (CDC) and other similar programs that establish background biomonitoring

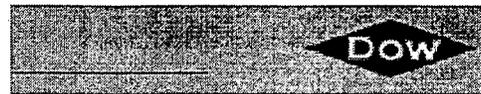
data, we believe these results need to be evaluated in the context of the health risks. The presence of trace levels of chemicals in the body can be misinterpreted, and therefore, must be communicated in a public health context.

Dow's Actions

We support the further development of biomonitoring data as a part of the study of environmental exposures as follows:

- We conduct research that provides insight into the relationships between our chemicals and human health.
- To use biomonitoring to improve public health and to assure proper regulatory decisions in conjunction with other studies that can help with the assessment of sources of exposure, timing of exposure, level of exposure, the dose rate, and the potential, if any, for health effects need to be addressed.
- Dow is a founding member of and active participant in the Alliance for Chemical Awareness, <http://www.chemicalawareness.org/>, a group dedicated to expanding research data on various chemicals.
- Dow also supports the High Production Volume Chemical Challenge program, the Children's Health Initiative, and similar programs. These voluntary programs work to make sure information about chemical health and environmental risks is available to the public.

For more information, visit www.dow.com/biomonitoring.



Our Commitments Issues & Challenges

European Union REACH

Description

The European Union's Registration, Evaluation, and Authorization of Chemicals (REACH), when formally adopted, will require manufacturers and importers of chemicals to submit hazard, use, and risk data for substances manufactured or imported in quantities of more than one metric tonne per year. Certain low-risk substances such as polymers, intermediates, and substances regulated by other legislation may be totally or partly exempted from registration requirements.

Dow's Position

Dow supports REACH's underlying objectives of enhancing the protection of human health and the environment and of increasing the knowledge base on hazards and risks of chemical substance and their uses. However, Dow believes many of the requirements and processes of REACH as currently proposed are disproportionate, inefficient and unbalanced compared with other socio-economic interests.

Dow's Actions

- Although Dow and CEFIC, (the European chemical industry association) continue to advocate for a more workable regulatory framework, prudence dictates that preparations be undertaken within Dow to eventually implement the requirements of EU REACH even though substantial changes to the proposed regulations may yet occur.
- Dow is committed to make constructive contributions to the further improvement of the REACH proposals by actively engaging in the Commission's REACH Implementation Projects (RIPs) as well as in various impact studies undertaken in the framework of the Commission's Strategic Partnerships. Dow urges policymakers to carefully consider the results of these projects.
- Although Dow anticipates increased costs for product testing, risk characterization and preparation of reports for EU government agencies to comply with the legislation, we also expect to share the costs of such activities with industry partners so as to avoid duplicative work and lessen its financial burden. Some Dow products may be subject to the authorization process under EU REACH, but it is expected that Dow will be able to demonstrate adequate risk management for the use and application of the majority of such substances.

For additional external resources visit:
[European Union REACH information](#)

Last Updated: October 19, 2004

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Our Commitments Issues & Challenges

European Commission Announces Agreement on Proposed Regulation for Chemicals

On October 29, the European Commission announced it had reached agreement on a proposal for a new regulatory framework for chemicals.

The proposal will now be submitted to the European Council of Ministers and the European Parliament. Both bodies must vote on the proposal before it can become regulation. Should both the Council and Parliament adopt it, the proposed regulation could come into force in 2006.

The proposed regulatory framework is called REACH – Registration, Evaluation and Authorization of CHemicals. Under REACH, manufacturers and importers of chemicals will be required to submit hazard, use, and risk data for substances manufactured or imported in quantities of more than one metric tonne per year. Certain low-risk substances such as polymers, intermediates, and substances regulated by other legislation may be totally or partly exempted from registration requirements.

The evaluation phase of REACH addresses further hazard data requirements and risk assessment. Certain high-hazard substances may only be marketed when authorized for specific uses, provided adequate risk management or socio-economic needs are demonstrated. REACH would also make manufacturers and importers responsible for demonstrating the safety of chemicals and their uses before production or marketing could begin.

One challenge REACH poses for industry is that it does not differentiate between new substances and substances which have been in common use for many years. Under REACH, so-called “existing substances” would have to be registered through the same process as new substances. It is estimated that more than 30,000 substances are currently produced and marketed in the countries of the European Union (EU).

Dow and CEFIC, the European chemical industry association, support the need for more efficient chemicals management legislation in the European Union. They also support REACH's underlying objectives of enhancing the protection of human health and the environment and of increasing the knowledge base on hazards and risks of chemical substance and their uses. However, both Dow and CEFIC believe many of the requirements and processes of REACH are disproportionate, inefficient and unbalanced compared with other socio-economic interests. Dow and CEFIC are also concerned that REACH may prevent the chemical review process from delivering on its prime environmental and human protection objectives and that it could erode the competitiveness of Europe-based chemical and downstream industries.

The process of developing new chemicals management legislation in the EU started in 1998 when ministers of environment of EU member states called for a revision of the current legislation. In early 2001, the Commission published a new policy for chemicals management in the form of a “White Paper for a Future Chemicals Strategy.”

Since that time, Dow and CEFIC have been actively advocating for a more workable regulatory framework and urging the EU to undertake more extensive impact assessments. As the proposal moves to the EU Council and Parliament, Dow will continue to actively advocate for adapting REACH to become more efficient and balanced.

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Persistent Organic Pollutants/Stockholm Convention Treaty

Persistent, Bioaccumulative and Toxic substances (PBTs) are of particular concern to Dow, our industry, and the public. Of the 12 PBTs listed under the Stockholm POPs Treaty, for which there is international agreement, the majority are pesticides which are neither created nor emitted by Dow. Of the remaining three PBTs in the treaty, public reports are currently available. The company has an Internet web site specific to dioxin, first established in 1999 and substantially expanded in 2001. The emissions of the remaining two PBTs in the Stockholm POPs Treaty that are applicable to Dow, hexachlorobenzene and polychlorinated biphenyls, while not reported on the web site, are reported publicly in both EPA's Annual Toxic Release Inventory (TRI) and Canada's National Pollutant Release Inventory (NPRI).

Dow's focus has been and continues to be on reducing emissions of these PBTs, rather than phasing out of products that contribute positively to society, and there is substantial data to indicate that excellent progress is being made.

Dow is a company whose products for decades have improved the quality of life for people around the world by maintaining safe municipal drinking water supplies, providing life-saving medications, reducing energy consumption in buildings, and modernizing transportation. Trace amounts of substances such as dioxins and PBTs are sometimes generated during the production of some of our products, in particular chlorinated organic substances. The company is proud of the real progress that we have made through the years to reduce the emissions of such substances. We continue to work towards reducing the emissions of these unintended by-products.

Some might argue that the generation of unwanted by-products should be the signal that we should no longer make particular materials. Dow firmly believes that its products are of tremendous benefit to society, valued by the public and essential to the safety and security of the public. Dow has long recognized that dioxins are an unwanted and toxic by product and in 1994 and without regulatory requirements, Dow volunteered to reduce its emission of dioxins to air and water by 90% over the next decade.

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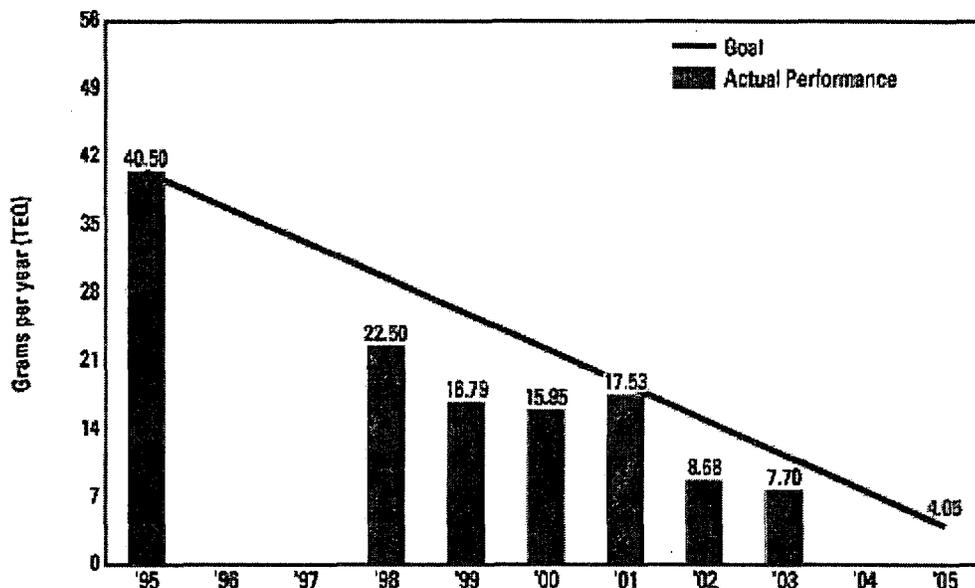
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Dioxin Background

In 1995, Dow made a commitment to reduce its worldwide dioxin emissions to air and water by more than 90 percent by the year 2005. To date, we have spent more than \$500 million on improvements to our processes and treatment technologies to reduce both the generation and emission of dioxins. As a result, our emissions have been reduced 80 percent.

Dioxins are one of the 12 chemicals covered under the Stockholm POPs (Persistent Organic Pollutants) treaty for which there is an international agreement. Dow actively supports the treaty, though the majority of these chemicals are pesticides that are neither created nor emitted by Dow.

Dioxin Emissions to Air and Water—Goal: 90% Reduction



Notes:

In 2001, we experienced an upset in a treatment unit that led to an increase above our 2000 emissions. In 2002 and 2003, we continued our focus on improvement projects to maintain process consistency and further reduce our air and water dioxin emissions. We are committed to meeting our 2005 dioxin reduction goal.

In 1996 and 1997, no data are shown in the above chart. This is due to the fact that Dow used monitoring data generated from 1995 through 1997 to document and establish its 1995 air and water emissions baseline.

Disposal

Dow currently has no specific reduction goals for landfill disposal of dioxins. Dow does, however, report landfill disposal of dioxins in the U.S. Toxics Reduction Inventory and Canadian NPRI sections of this web site.

The reason Dow has chosen to focus its efforts on dioxin emissions to air and water in goal setting is because these emissions ultimately end up in the environment. Conversely, Dow uses specially designed hazardous waste landfills for dioxin disposal where there is no potential for release to the environment.

For more information on Dioxins:

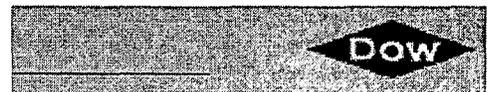
<http://www.dow.com/commitments/debates/dioxin/background.htm>

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What are Dioxins?

Dioxins are a family of chemicals comprising 75 different types of dioxin compounds and 135 related compounds called furans. They are unwanted by-products of industrial and natural processes, usually involving combustion. Major industrial sources of dioxin to the environment include incinerators, metal smelters, cement kilns, the manufacture of chlorinated organics, and coal burning power plants. Dioxins are also produced by non-industrial sources like residential wood burning, backyard burning of household trash, oil heating, and emissions from diesel vehicles. According to the U.S. EPA, cigarette smoke also contains a small amount of dioxin. For further information, see the [U.S. Government Information on Dioxin](#).

Dioxin

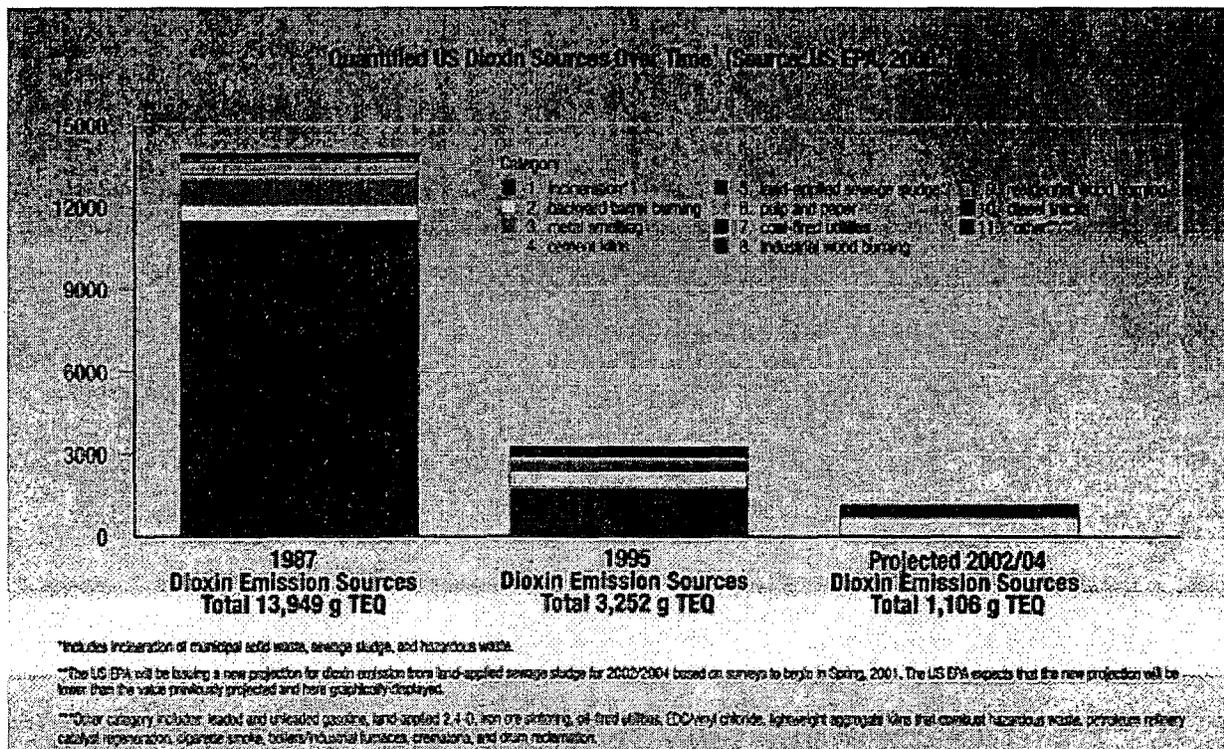
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- [U.S. Government Information on Dioxin](#)

Dow has focused its dioxin reduction efforts on internal sources of dioxin that lead to low levels of environmental emissions. We examine each technology that may contribute to dioxin emissions to determine cost-effective options for further reductions. Incineration is a high priority, since air emissions from incinerators have the potential to increase human and environmental exposures.

Dow has optimized our incinerators to improve technology and operation excellence. Dow is also examining recycling options that would reduce incineration in general. Dow supports efforts to reduce dioxin and actively shares and promotes improvements and solutions across the industry.



Dioxin Emissions Are Projected to Decline 92% Between 1987 and 2002/2004

¹ "Dioxin" here is defined as the totality of 7 dioxins and 10 furans. "TEQ" denotes "toxic equivalent", a quantitative measure of the combined toxicity of a mixture of dioxin-like chemicals.

² US Environmental Protection Agency (May, 2000; updated October 19, 2000). Inventory of Sources of Dioxin in the

United States.

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What is dioxin?

Dioxin is the name of a family of chemical compounds that are unintentional byproducts of certain industrial, non-industrial and natural processes, usually involving combustion.

Different dioxin compounds have different toxicities. Sometimes the term dioxin is also used to refer to TCDD, the most well studied and most toxic form of dioxin. The many different types of dioxin actually vary greatly in toxicity -- some of them 10,000 times less toxic than TCDD.

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Where does dioxin come from?

No one makes dioxin on purpose. Historically, incinerators, the manufacture of certain herbicides, and pulp and paper bleaching were among the largest industrial sources of dioxin. However, according to the Environmental Protection Agency (EPA), regulations and voluntary changes by industry have dramatically reduced dioxin releases from these industrial sources by 92% between 1987 and today, with releases expected to continue to drop as new regulations are fully implemented. Today, EPA considers "uncontrolled combustion," including open burning of household trash, agricultural burning and landfill fires, to be the largest unaddressed sources of dioxin in the environment, [1] accounting for an estimated 57% of total releases. [2] Increasingly, natural sources, such as forest fires and composting, are also being recognized as contributors of dioxin to the environment. Because dioxin occurs naturally in the environment, it can never be totally eliminated.

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How much dioxin am I exposed to?

Levels of dioxin in food — which account for 95 percent of our exposure to dioxin — have been cut in half over the past seven years. [3] EPA has clearly emphasized that the U.S. food supply is among the safest and most nutritious in the world. [4] The World Health Organization sets its Tolerable Daily Intake (TDI) at a range of 1 to 4 pg/kg-bw/day (picograms per kilogram of body weight per day) for adults. A picogram is one-trillionth of a gram. EPA estimates that the average U.S. adult intake is 0.5 to 1 pg/kg-bw/day, clearly within, or below, that range.

People today are exposed to less dioxin than at any time in the recent past. According to EPA, the amount of dioxin in the average person's body has declined by more than 50% since the late 1980s. [5] Studies of levels of dioxin in human breast milk, blood and fat tissue all show significant declines — with decreases ranging from 50 to 70 percent between 1980 and 1996. [6] We also recommend you visit the [Chlorine Chemistry Council web site](#) for an update on the Centers for Disease Control latest report on dioxins and human exposure.

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What are the possible health effects of exposure to dioxin?

Over the past 30 years, researchers have conducted many studies to investigate the potential for adverse health effects from accumulated levels of dioxin in people's bodies. According to EPA, "currently there is no clear indication of increased disease in the general population attributable to dioxin-like compounds." [8]

Adverse health effects related to dioxin — such as chloracne, a severe skin condition — have only been seen in people exposed to extremely large quantities of dioxin. Extensive studies of people exposed to relatively high levels of dioxin through occupational exposures, accidents or military service do not suggest that adverse effects to human health will occur at the low levels in today's environment.

A large historical study of workers showed increased rates of cancer, possibly from dioxin. However, those rates were only seen in workers exposed for many years at amounts 100 to 10,000 times more than the general population. [9] Exposure to other chemicals and cigarette smoking may also have affected the results of the study, published in the May 1999 Journal of the National Cancer Institute.

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What are companies and the government doing about dioxin?

Government and industry have worked together to reduce dioxin emissions dramatically since the 1970s. According to EPA, as a result of these efforts, known industrial emissions in the United States will be reduced by more than 90% from 1980 levels within the next few years. [10]

The chlor-alkali industry is not a significant source of dioxin releases to the environment, accounting for less than one percent of overall dioxin emissions.

As part of its commitment to the principles of Responsible Care[®], the chlor-alkali industry is committed to working cooperatively with the government to reduce releases and develop new methods of cleaner production while continuing to create the many products that help save lives everyday.

However, because dioxins can come from natural and non-industrial sources such as forest fires and open burning of garbage and landfill fires, we will never be able to eliminate dioxin completely from the environment.

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Is dioxin from local companies creating a risk to my health?

Since 95% of human exposure to dioxin is through the diet, exposure levels are generally more a function of what we eat rather than where we live. Our food comes from a wide range of sources throughout the world. Therefore, living near an industrial facility does not necessarily mean that you are exposed to higher levels of dioxin than the overall population.

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Is there anything I can do to reduce my exposure to dioxin?

The EPA, FDA and other agencies note that since dioxin accumulates in animal fats, following normal dietary recommendations for a healthy, low-fat diet is the best way to reduce the potential for dioxin exposure.

"The best strategy for lowering the risk of dioxins while maintaining the benefits of a good diet, according to the agencies," is to follow the recommendations in the Dietary Guidelines to choose fish, lean meat, poultry, and low or fat-free (skim) dairy products and to increase consumption of fruits, vegetables and grain products. [12]

Yet while recognizing people's concern over dioxin exposure, the Environmental Protection Agency, Food and Drug Administration, and other federal agencies stress that the U.S. food supply is among the safest and most nutritious in the world. Neither agency recommends avoiding specific foods or taking any special precautions to avoid dioxin exposure.

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Why am I hearing about dioxins now?

EPA's Toxics Release Inventory was established in 1986 to track information on 650 chemical substances manufactured, processed or used by U.S. production facilities each year. EPA may add or remove chemicals to the TRI list based on their toxicity. Dioxin was added to the TRI for reporting purposes beginning in the year 2000.

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Why did Dow set a dioxin reduction goal?

Dow takes dioxin reduction seriously and we not only believe that dioxin emissions to the environment need to be reduced, we continue to work hard to make that happen.

In 1995, we enhanced our dioxin reduction efforts by committing to reduce our dioxin emissions to the air and water by 90 percent by the year 2005. We have invested more than \$500 million dollars in a wide variety of source reduction and improved treatment technology projects to meet this goal. To date, our efforts have resulted in a 75 percent reduction of our dioxin emissions.

It is also important to remember that dioxin levels in the environment have declined significantly over the past 30 years, and will continue to decrease as new regulations and voluntary industry initiatives take effect.

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Why was 1995 chosen as the baseline?

1995 marked the year that Dow publicly announced aggressive, voluntary, global EH&S goals for the year 2005. That same year, the U.S. EPA completed its initial baseline inventory for dioxin emissions.

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How did Dow determine its 1995 dioxin emissions baseline and how much dioxin was Dow emitting to the environment in 1995?

Dow used monitoring data generated from 1995 through 1997 to document and establish its 1995 air and water emissions baseline. Upon completion in 1997, Dow determined its 1995 baseline of dioxin emissions to air and water was 40 grams (TEQ). That is the reason no data are shown in the overall target graph for 1996 and 1997.

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How did Dow achieve its current 75 percent reduction from the 1995 dioxin emissions baseline?

Dow is three-quarters of the way toward our 90% goal of reducing dioxin emissions to air and water — after implementing a number of dioxin abatement and technology projects. These projects included new source reduction technology, incineration technology and abatement, scrubbers to curtail stack emissions, filters for water emissions and other post treatment technologies such as recycling waste streams for reuse.

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Once the 90 percent dioxin reduction goal is reached, how much dioxin will Dow be emitting to the environment?

Once our goal is achieved, Dow's total global dioxin emissions to air and water will be approximately four grams (TEQ).

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How do Dow's dioxin emissions compare to the rest of the chemical industry?

We encourage you to visit the [Chlorine Chemistry Council web site](#) where you will find chemical industry data.

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What is the Toxics Reduction Inventory (TRI) and when was dioxin added to the TRI?

Each year, the U.S. Environmental Protection Agency (EPA) requires chemical manufacturers and manufacturing facilities in many industries to report emissions to air, water, and land for about 650 chemical substances. The EPA compiles the data in its annual Toxics Release Inventory (TRI). The TRI was created in 1986 as part of the agency's Emergency Planning and Community Right-to-Know Act. Environment Canada has a very similar requirement known as the National Pollutants Release Inventory.

Periodically, both Environment Canada and the EPA add chemicals to the reporting list. In 2001, both EPA and Environment Canada included dioxin in their respective TRI and NPRI reporting for the first time. As a result, companies report their dioxin releases or emissions each year under NPRI to Environment Canada on June 1 and to the U.S. EPA on July 1.

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Dow says it has reduced dioxin emissions by 75 percent since 1995. Why, then, are your TRI dioxin numbers higher than those you have shown as part of your 2005 90 percent reduction goal?

In addition to dioxins that are released into the environment through the air or water, the TRI requires companies to report dioxins that are generated on site and the ways these dioxins are

treated, such as being destroyed in highly efficient incinerators or disposed of in regulatory-approved secure landfills or underground caverns. These dioxins that do not reach the open environment and they do not create the potential for human exposure. These additional numbers do not reflect more dioxins in the environment, but are included in the reporting.

Dow's 90 percent reduction goal is focused on those emissions that get into the environment via the air or water.

*The U.S. EPA has also required the use of a different measurement standard for TRI than is commonly used for reporting dioxin emissions. See Dow's web section on [Toxicity vs. Mass: Two Ways to Measure Dioxins](#).

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How will dioxin affect me if I live near a Dow manufacturing site?

According to the U.S. EPA, 95 percent of human dioxin exposure is through our diet. Since diet is the primary exposure pathway, exposure levels are generally more a function of what we eat rather than where we live. Our food comes from a wide range of sources throughout the world. Therefore, living near an industrial facility with dioxin emissions does not necessarily mean that you are exposed to higher levels of dioxin than the overall population.

It is also important to know that people's risk from dioxin is declining as environmental levels of dioxin decline. According to the U.S. EPA, dioxin levels in the environment have declined dramatically over the last 30 years. In addition, Dow continues to decrease its own dioxin emissions.

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Have any Dow employees been exposed to dioxin and what is the status of their health?

While there have been over 30 years of research and theories about dioxin and health effects, there remains no scientific consensus that dioxin causes health effects in people at today's environmental levels. Dow has routinely monitored the health of our employees, and all results indicate that the extremely low levels dioxin they may have been exposed to have not had any impact on their health.

More specifically, Dow extensively studied a group of 2,187 male employees who were potentially exposed to dioxins during their employment with the company between 1937 and 1982. This study group provides a particularly valuable assessment of potential risks related to dioxins because it is exceptionally large, it has a long follow-up time (averaging 30 years per employee), and it is based on high quality industrial hygiene monitoring data. The study shows that Dow employees who worked in plants where dioxins were potentially present have lower overall mortality rates than the general population.

While there is a lack of scientific consensus on the risk of dioxin to human health, everyone agrees that dioxin emissions to the environment should be reduced.

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[1] Questions and Answers About Dioxins, Interagency Working Group on Dioxin (representatives from the U.S. Environmental Protection Agency, Department of Health and Human Services, Department of Agriculture, Department of Veterans Affairs, Department of Commerce, Department of State, and the White House Office of Science and Technology Policy), July 2000.

[2] Draft Dioxin Reassessment, Part I: Estimating Exposure to Dioxin-Like Compounds, Volume 2: Sources of Dioxin-Like Compounds in the United States, Chapter 1, U.S. Environmental Protection Agency, September 2000.

[3] Assessment of the Health Risk of Dioxins: Re-Evaluation of the Tolerable Daily Intake (TDI), Executive Summary, World Health Organization, 1998.

[4] Questions and Answers About Dioxins (see citation #1)

[5] Draft Dioxin Reassessment, Environmental Protection Agency, September 2000.

[6] Pöpke, O., "PCDD/PCDF: Human Background Data for Germany, a 10-Year Experience," Environmental Health Perspectives 106: 723-731, 1998. Stanley, J.S., Ayling, R.E., Cramer, P.H., Thornburg, K.R., Remmers, J.C., Breen, J.J., Schwemurger, J., Kang, H.K., and Watanabe, K., "Polychlorinated Dibenzo-p-Dioxin And Dibenzofuran

Concentration Levels in Human Adipose Tissue Samples From The Continental United States Collected From 1971 Through 1987," Chemosphere 20: 895-901, 1998.

[7] Pinsky, P. & Lorber, M.N., "A model to evaluate past exposure to 2,3,7,8-TCDD," Journal of Exposure Analysis and Environmental Epidemiology, 8, (2), 187-206, 1998.

[8] Dioxin: Summary of the Dioxin Reassessment, Information Sheet 1, U.S. Environmental Protection Agency, Office of Research and Development, June 12, 2000.

[9] Steenland, K., Piacitelli, L., Deddens, J., Fingerhut, M. and Chang, L.I., "Cancer, Heart Disease and Diabetes in Workers Exposed to 2,3,7,8-Tetrachlorodibenzo-p- dioxin," Journal of the National Cancer Institute 91:779-86, 1999.

[10] Questions and Answers About Dioxins (see citation #1)

[11] Hagenmeier, H. and Walczok, M., "Time Trends in Levels, Patterns and Profiles for PCDD/PCDF in Sediment Cores of Lake Constance," Organohalogen Compounds 28: 101-104, 1996 (sediment). Ferrario, J., Byrne, C., Dupuy, A.E., Winters, D.L., Lorber, M., and Anderson, S., "Analytical Method and Results from the Analyses of USEPA Historical Food Samples for Dibenzo-p-Dioxins/-Furans/Coplanar PCBs," Organohalogen Compounds 35: 29-32, 1998 [food]. Winters, D.L., Anderson, S., Lorber, M., Ferrario, J., and Byrne, C., "Trends in Dioxin and PCB Concentrations in Meat Samples from Several Decades of the 20th Century," Organohalogen Compounds 38: 75-78, 1998 [food].

[12] Questions and Answers About Dioxins (see citation #1)

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Our Commitments Issues & Challenges

Persistent Organic Pollutants/Stockholm Convention Treaty

Persistent, Bioaccumulative and Toxic substances (PBTs) are of particular concern to Dow, our industry, and the public. Of the 12 PBTs listed under the Stockholm POPs Treaty, for which there is international agreement, the majority are pesticides which are neither created nor emitted by Dow. Of the remaining three PBTs in the treaty, public reports are currently available. The company has an Internet web site specific to dioxin, first established in 1999 and substantially expanded in 2001. The emissions of the remaining two PBTs in the Stockholm POPs Treaty that are applicable to Dow, hexachlorobenzene and polychlorinated biphenyls, while not reported on the web site, are reported publicly in both EPA's Annual Toxic Release Inventory (TRI) and Canada's National Pollutant Release Inventory (NPRI).

Dow's focus has been and continues to be on reducing emissions of these PBTs, rather than phasing out of products that contribute positively to society, and there is substantial data to indicate that excellent progress is being made.

Dow is a company whose products for decades have improved the quality of life for people around the world by maintaining safe municipal drinking water supplies, providing life-saving medications, reducing energy consumption in buildings, and modernizing transportation. Trace amounts of substances such as dioxins and PBTs are sometimes generated during the production of some of our products, in particular chlorinated organic substances. The company is proud of the real progress that we have made through the years to reduce the emissions of such substances. We continue to work towards reducing the emissions of these unintended by-products.

Some might argue that the generation of unwanted by-products should be the signal that we should no longer make particular materials. Dow firmly believes that its products are of tremendous benefit to society, valued by the public and essential to the safety and security of the public. Dow has long recognized that dioxins are an unwanted and toxic by product and in 1994 and without regulatory requirements, Dow volunteered to reduce its emission of dioxins to air and water by 90% over the next decade.

What Do You Think?

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Our Commitments Issues & Challenges

TRI Dioxin Reporting (U.S.)

Toxics Release Inventory — Dioxin Air and Water Reporting for Dow U.S. Sites

In 1995, Dow committed to reduce its worldwide production of dioxin emissions to air and water by more than 90 percent by the year 2005. Each of the Dow U.S. sites noted in the tables below has worked hard to develop an understanding of dioxin emissions at their respective facilities and have developed and implemented specific emission reduction projects. These projects have helped Dow achieve an 80 percent reduction in its dioxin emissions to air and water. To achieve Dow's 90 percent dioxin reduction goal, each of the listed U.S. sites will emit only a few grams (TEQ) or less of dioxin.

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Dioxin Air and Water Emissions — Summary in both [TEQ](#) and [TM17](#)

Dioxin Air and Water Emissions (TEQ)*			Dioxin Air and Water Emissions (TM17)		
Year 2003	TEQ g/yr		Year 2003	TM17 g/yr	
Location	Air	Water	Location	Air	Water
Louisiana Operations	0.22	2.5	Louisiana Operations	14.8	262
Michigan Operations	0.03	0.02	Michigan Operations	.61	.89
Texas Operations	1.7	2.8	Texas Operations	85	318

*Dow expects to reach four grams (TEQ) a year to air and water as result of its global dioxin reduction efforts.

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Our Commitments Issues & Challenges

TRI Dioxin Reporting (U.S.)

Toxics Release Inventory — Dioxin Disposal and Destruction Reporting for Dow U.S. Sites

Since Dow destroys dioxins or disposes of them in an environmentally responsible manner, only a small percentage of the dioxin Dow generates is ever released into the open environment. These environmentally responsible methods of dioxin destruction/disposal are:

- Using sophisticated incineration techniques that destroy dioxin
- Disposal to specially designed hazardous waste landfills
- Disposal to underground caverns

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Dioxin Disposal and Destruction — Summary in both TEQ and TM17

Dioxin Disposal Estimates (TEQ)

Year 2003

Location	TEQ g/yr	
	Disposed Landfill	Disposed Underground Cavern
Louisiana Operations	9.2	0
Michigan Operations	95.8	0
Texas Operations	57	5.3

Dioxin Disposal Estimates (TM17)

Year 2003

Location	TM17 g/yr	
	Disposed Landfill	Disposed Underground Cavern
Louisiana Operations	1406	0
Michigan Operations	16,253	0
Texas Operations	21,800	81

Dioxin Destruction Estimates (TEQ)

Year 2003

Location	TEQ g/yr
	Destruction
Louisiana Operations	809
Michigan Operations	461
Texas Operations	240

Dioxin Destruction Estimates (TM17)

Year 2003

Location	TM17 g/yr
	Destruction
Louisiana Operations	34,300
Michigan Operations	27,222
Texas Operations	7,500

Our Commitments Issues & Challenges

NPRI Dioxin Reporting (Canada)

The National Pollutant Release Inventory (NPRI)

Each year the National Pollutant Release Inventory (NPRI) of Environment Canada requires chemical manufacturers and manufacturing facilities from many other industries to report tonnes of emissions to air, water, land, underground caverns and off-site transfers for over 300 chemical substances if the releases exceed limits set by Environment Canada. The data are compiled by Environment Canada in its annual National Pollutant Release Inventory (NPRI). The NPRI was created in 1992 to provide information to Canadians on the release of pollutants by facilities in their community.

Dioxin and the NPRI

The 2000 NPRI included dioxin for the first time. As a result, companies such as Dow report their releases or emissions of dioxin to Environment Canada on June 1 each year. Under NPRI rules, manufacturing facilities engaged in a specified list of activities must report dioxin releases and disposals. Under the NPRI, Dow Canada has reported dioxin releases and new disposal data from our Fort Saskatchewan site. Dow Canada has reported dioxin air emissions in our Public Report since 1995.

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NPRI Dioxin Reporting (Canada)

Dow Canada Dioxin Air Emissions and Disposal Estimates

In 1994, Dow Canada made a commitment to the Accelerated Reduction/Elimination of Toxics (ARET) Challenge to reduce dioxin emissions 90% by 2000. Air emissions were identified as a priority since these emissions presented the most potential for human exposure. Testing in 1994 revealed air emissions from the Fort Saskatchewan site were 1.7 grams TEQ. Today, these emissions have been reduced more than 95%, and since 2000 have remained well below 0.1 grams TEQ annually.

In 1998, once the technology to reduce dioxin air emissions was identified and installed, Dow Canada began testing for dioxins in onsite waste and recycle streams. These onsite waste and recycle streams were considered a lower priority due to the limited potential for exposure.

Some initial tests were conducted in 1998, with more extensive testing finalized in 2000. Results of these tests can be found in the table. These data have been submitted to Environment Canada's National Pollutant Release Inventory. The increase in dioxin disposal estimates (2001 and 2004) occurs when wastes containing dioxins are removed from an onsite collection pond to approved onsite disposal.

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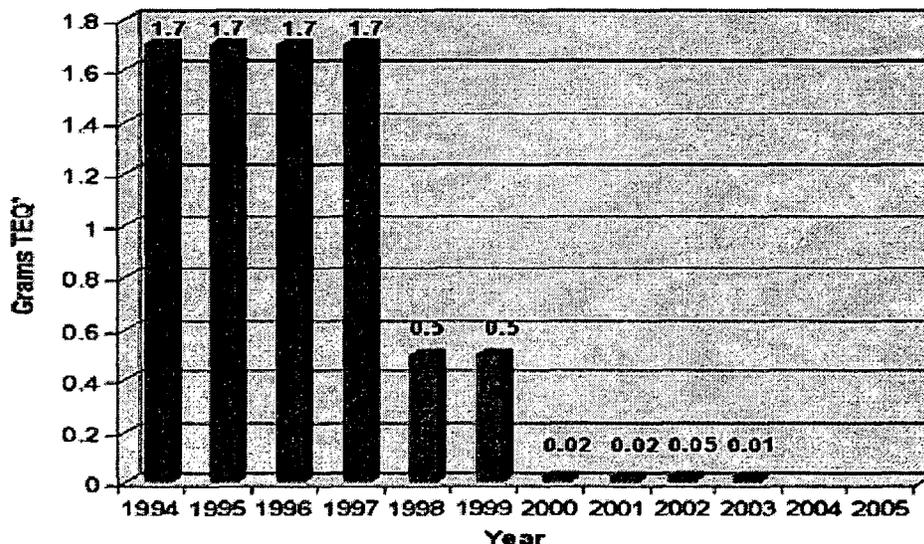
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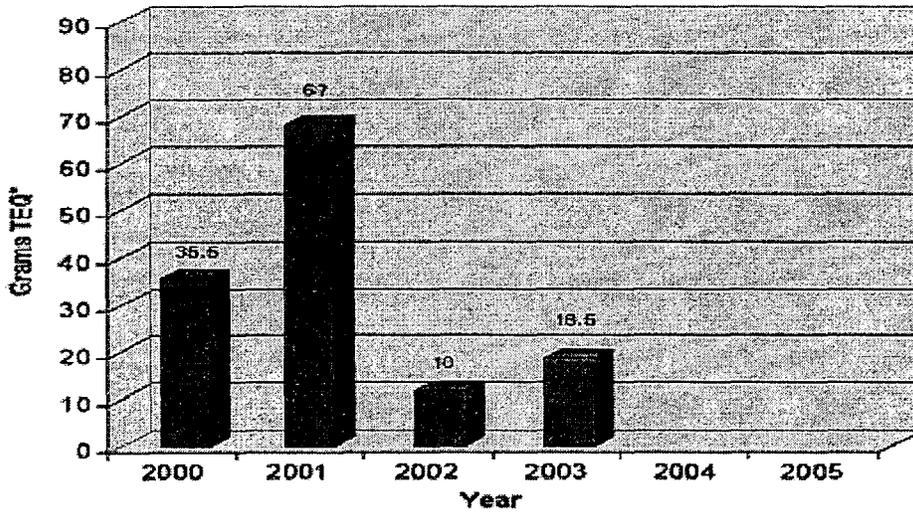
[Dow Canada Dioxin Air Emissions and Disposal Estimates](#)

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DOW CANADA DIOXIN AIR EMISSIONS 1994-2005
Goal - 90% Reduction



DOW CANADA DIOXIN DISPOSAL



Dow Canada is committed to the virtual elimination of dioxin emissions, and is now working to reduce releases of dioxins into wastes through a pollution prevention approach.

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Chlorpyrifos



Stopping the Swarm

Dow AgroSciences Product Plays Key Role in Global Fight Against Locust Devastation

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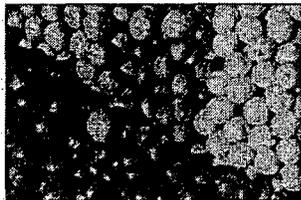
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Chlorpyrifos North America About Chlorpyrifos

About Chlorpyrifos



It's easy to take our quality of life for granted, but even today, insect pests cause billions of dollars worth of damage and threaten our food supply, our property, our health, and the livelihood of our growers. Chlorpyrifos is an active

ingredient used primarily to control insect pests. It was discovered by

The Dow Chemical Company in 1962.

About Chlorpyrifos

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Worldwide Acceptance

Chlorpyrifos is one of the most-widely used active ingredients for pest control products in the world. It is used to protect a number of important agricultural crops, such as corn, citrus, alfalfa, peanuts, and others, from pest insect attack. It is also used to control over 250 non-agricultural insect and arthropod pests, including subterranean termites, cockroaches, fleas, ants, and others, that are found in and around structures and on lawns, trees and shrubs. Chlorpyrifos was first registered in 1965 and has been on the market for more than thirty years. Today, it is registered in more than 98 countries worldwide, including most developed nations. Dursban* and Lorsban* insecticides are frequently used trade names for chlorpyrifos.

Crop, Property and Health Protection

Chlorpyrifos is one of the great success stories in pest control today. It is used in and around tens of millions of homes worldwide each year to effectively control disease-bearing pests, such as cockroaches, ticks, fleas, termites and other insects. Growers count on chlorpyrifos insecticide to defend more than 50 different crops against damage caused by insect pests.

Proven Protection and Quality

More than 3,600 studies have been conducted examining critical aspects of chlorpyrifos products as they relate to health and safety. More than US \$100 million has been spent examining the uses and impact of chlorpyrifos-containing products on human health and the environment. In terms of human health and safety, no pest control product has been more thoroughly studied.

Mode of Action

Chlorpyrifos is an organophosphate insecticide. Like other organophosphates, its insecticidal action is due to the inhibition of the enzyme acetylcholinesterase, resulting in the accumulation of the neurotransmitter, acetylcholine, at nerve endings. This results in excessive transmission of nerve impulses, which causes mortality in the target pest.

Dow AgroSciences LLC

Dow AgroSciences LLC is the primary manufacturer of chlorpyrifos. Other companies in China, Denmark, Israel and India also manufacture chlorpyrifos.

Dow AgroSciences LLC, based in Indianapolis, Indiana, USA, is a global leader in providing pest management and biotechnology products that improve the quality and quantity of the earth's food supply and contribute to the safety, health and quality of life of the world's growing population.

Dow AgroSciences has approximately 6,000 people in over 50 countries dedicated to its business, and has worldwide sales of approximately US \$3 billion. Dow AgroSciences LLC is a wholly-owned subsidiary of The Dow Chemical Company. For more information about Dow AgroSciences, visit www.dowagro.com.

Labels and Safety Data Sheets

To download information on chlorpyrifos products, visit the [Labels and Safety Data Sheets](#) web site. Labels and safety data sheets for Dow AgroSciences products are available by region: North America; Europe, Middle East and Africa; Latin America; and Asia-Pacific.

The conclusions that are contained within this chlorpyrifos.com web site relating to toxicological and/or environmental

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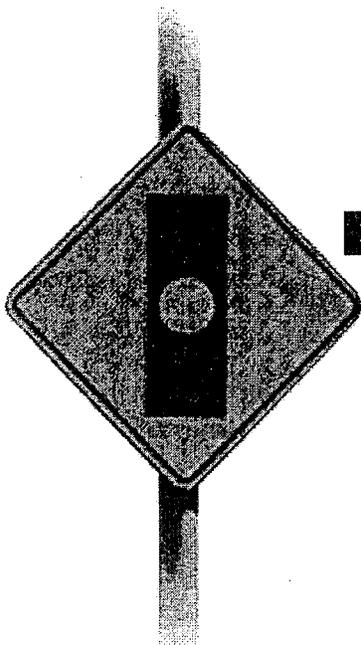


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Labels & Safety Data Sheets



Ensuring Safety

Find downloadable information regarding labels and safety data sheets.

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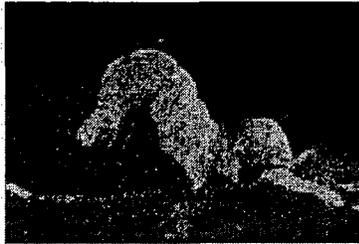
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Chlorpyrifos North America About Chlorpyrifos

Pests are the Problem



Insect pests significantly impact our economy and quality of life. Pests can damage property, reduce crop yields, and impact human health.

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Pests Damage Property

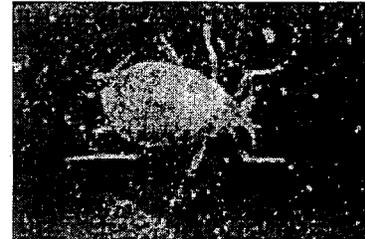
Insect pests such as termites and carpenter ants inflict a tremendous amount of property damage. Entomologists have identified over 40 species of termites that attack human dwellings. The National Pest Management Association International states that every year termites cause an estimated US \$2 billion of damage globally. Scientists say that, based on normal feeding activity, it takes three to eight years to cause appreciable damage and subterranean termites are by far the most destructive species as they can collapse a building entirely.

Pests Destroy Crops

The most recent and comprehensive estimates of crop loss due to pests were made by Oerke and his colleagues in 1994*. They found that insects caused the largest crop loss by inflicting 15 percent decrease to potential output. In rice alone, US \$45.4 billion is lost to insects globally, while wheat and potatoes both lost over 10.4 billion each. Because rice, wheat, and potatoes are all important food crops, especially for the developing nations of Asia, Africa, and Latin America, pest control is critical.

Pests Threaten Our Health

Insect pests affect our health and well-being by inflicting short- and long-term injury on thousands each year. Insects can transmit as many as 15 major disease-causing organisms to humans. They contaminate our food and cause discomfort, pain and debilitating diseases. For example:



- Malaria is a public health problem in more than 90 countries. Malaria is estimated to cause up to 500 million clinical cases and over one million deaths each year. Every 30 seconds, a child somewhere dies of malaria. In any given year, nearly ten percent of the global population will suffer a case of malaria.‡
- Cockroaches transmit a variety of digestive tract disorders including food poisoning, dysentery and diarrhea, and have been linked to the development of childhood asthma and allergies.
- Pests such as fleas and mosquitoes have been responsible for devastating epidemics. The recent bubonic plague outbreak in India is one reminder of this very real threat.

*E.-C. Oerke, H-W. Dehne, F. Schonbeck and A. Weber. 1994. Crop Production and Crop Protection: Estimated losses in major food and cash crops. 808 pp

‡ Malaria Foundation International. <http://www.malaria.org>

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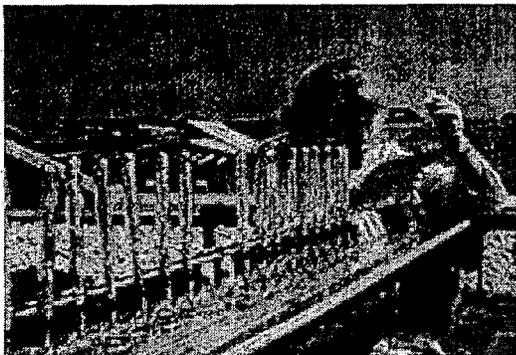


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Chlorpyrifos North America The Science Behind Chlorpyrifos



Chlorpyrifos products have been extensively researched and tested over many years.

More than 3,600 studies and scientific reports have been provided to the agencies that regulate crop protection around the world. These data support the continued registration of chlorpyrifos, and Dow AgroSciences continues to

The Science Behind Chlorpyrifos

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update this scientific database each year.

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Chlorpyrifos North America The Science Behind Chlorpyrifos

Physical/Chemical Properties



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Chemical Name

O,O-diethyl O-(3,5,6-trichloro-2-pyridyl)phosphorothioate

Common Name

Chlorpyrifos (BSI, E-ISO, ANSI, ESA, BAN)

Molecular Weight

350.6

Empirical and Structural Formula

$C_9H_{11}Cl_3NO_3PS$

CAS Registry Number

2921-88-2

State

Crystalline solid

Color

White to tan

Odor

Mild mercaptan

Melting Point

41.5 – 42.5° C

Boiling Point

> 300° C

Vapor Pressure

3.35 mPa at 25° C

Density

1.51 g/ml at 21° C

Solubility, Mean

Acetone	>400 g/L at 20° C
Dichloromethane	>400 g/L at 20° C
Ethyl Acetate	>400 g/L at 20° C
Methanol	250 g/100mL at 20° C
Toluene	>400 g/L at 20° C
n-Hexane	>400 g/L at 20° C
Water	1.05 ppm (w/v at 25° C)

Partition Coefficient (n-octanol and water)

$K_{ow} = 50,000$

Stability

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- a) in sterile buffered water
 - pH 4.7 at 25° C: half-life of 63 days
 - pH 6.9 at 25° C: half-life of 35 days
 - pH 8.1 at 25° C: half-life of 23 days

b) in organic solvents

There have been no signs of degradation in xylene-range aromatic solvents used in formulations of chlorpyrifos.

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Fate and Behavior

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Degradation Pathway

Chlorpyrifos is a degradable compound, and a number of environmental forces may be active in its breakdown. In all systems (soil, water, plants and animals), the major pathway of degradation begins with cleavage of the phosphorus ester bond to yield 3,5,6-trichloro-2-pyridinol (TCP). This first step is a detoxification, as TCP has no insecticidal activity and is considered toxicologically insignificant by regulatory authorities. In soil and water, TCP is further degraded via microbial activity and photolysis to carbon dioxide and organic matter. In animals, TCP may be excreted directly or following conjugation; in plants TCP conjugates are sequestered.

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Fate in Soil

Chlorpyrifos may enter the soil environment by direct application or through spray drift/foliar washoff. Laboratory soil studies demonstrate that chlorpyrifos is only moderately persistent and binds strongly to soil particles, preventing leaching to ground water.

When applied at normal agricultural rates, typical aerobic soil degradation half-lives are on the order of one to two months. Both microbial degradation and abiotic degradation (i.e., hydrolysis) are important factors in its dissipation from soil, with the latter being especially predominant in alkaline soils. At higher termiticidal application rates, the persistence of chlorpyrifos increases (half-lives of 6 months to four years), thus maintaining an effective termite barrier for several years.

Chlorpyrifos has a soil adsorption coefficient (K_{oc}) of greater than 5000, and so exhibits a strong tendency to be adsorbed by soil and soil organic matter. This places chlorpyrifos in the "immobile" leaching category and field-testing has confirmed the negligible downward mobility of chlorpyrifos. The strong adsorption to soil, together with the rapid degradation, results in limited surface runoff potential in agricultural settings. Large-scale field runoff studies have confirmed that even under relatively severe conditions (heavy rainstorms closely following application), generally less than 1 percent of the applied chlorpyrifos can move off the edge of treated fields through runoff water and eroding soil particles.

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Fate in Aquatic Environments

Laboratory studies on the fate of chlorpyrifos in pure water indicate that hydrolysis and photolysis occur at moderate rates under neutral conditions. Hydrolytic and photolytic half-lives are both around a month, at neutral pH 25° C. Under more alkaline conditions, hydrolysis proceeds more rapidly, with half-lives of around two weeks observed at pH 9. In natural water samples, however, degradation often proceeds significantly faster; a 16-fold enhancement of hydrolysis rate has been observed in pond and canal water samples. Results of field-testing conducted in aquatic ecosystems corroborate the rapid dissipation of chlorpyrifos from natural waters. Half-lives in the water column of less than one day are typical, due to a combination of degradation, volatilization and partitioning into sediments. Dissipation rates in sediment are similar to those observed in soil.

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Plant Fate and Metabolism

Results of greenhouse and field research studies show no tendency for chlorpyrifos soil residues to be taken up into plants through growing plant roots; chlorpyrifos is non-systemic in nature. On the surface of plant foliage, rapid dissipation of residue occurs. The most important route of dissipation is volatility, with photodegradation being somewhat less important. Typical foliar dissipation half-lives of 1 to 7 days have been observed. Dissipation rates from turfgrass and thatch are often slightly longer, with 7 to 10 day half-lives most common. Following foliar application, small quantities of chlorpyrifos are absorbed into plant tissue and are readily metabolized/detoxified into TCP conjugates.

From the standpoint of biological availability, dislodgeable foliar residues of chlorpyrifos comprise a rather small proportion of the total residue present and decline even more rapidly than total residues. Dislodgeable residues typically represent less than 10 percent of total residues, and half-lives of 0.5 to 3 days are common.

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Aquatic Organism Bioaccumulation and Metabolism

Trace amounts of chlorpyrifos can be absorbed from surrounding water by fish and other aquatic organisms. Reported aquatic bioconcentration factors (BCF) for fish have ranged from 100 to 5,100, which reflects a propensity for chlorpyrifos to partition from water into tissues. Importantly, the residues absorbed by fish and other aquatic organisms are rapidly detoxified and excreted and, as a result, chlorpyrifos is not a bioaccumulative compound and does not increase in concentration by transfer up the food chain. Elimination half-lives of 0.6 to 3.4 days have been observed in fish and of 1.6 to 2.2 days for oysters. Fish biotransform chlorpyrifos to a variety of metabolites, including TCP and glucuronide conjugates of TCP. The TCP and conjugates formed are then excreted into the surrounding water.

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Terrestrial Animal Fate and Metabolism

Chlorpyrifos is readily taken up from food, and absorption efficiencies of 41 to 72 percent have been observed. Dermal uptake of chlorpyrifos, however, has been found to vary significantly across species. Absorption efficiencies in mammals via the dermal route have been observed as low as 1 percent for man and as high as 60 percent for rats. In contrast, cuticular uptake by target insects may approach 90 percent efficiency. Mammals, birds and insects readily transform and metabolize chlorpyrifos. The primary metabolite, TCP, is readily excreted itself or in its conjugated form. Chlorpyrifos metabolism in animals is a dynamic process, and this is exemplified by the observed elimination half-life of 17 hours in the rat following an oral dose.

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Chlorpyrifos North America The Science Behind Chlorpyrifos

Toxicological Properties of Chlorpyrifos



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Mechanism of Action

Chlorpyrifos is one of the many organophosphate insecticides. Like other organophosphates, chlorpyrifos' insecticidal activity is caused by the inhibition of the enzyme acetylcholinesterase which results in the accumulation of the neurotransmitter, acetylcholine, at the nerve endings. This results in excessive transmission of nerve impulses, which causes mortality in the target pest. This reaction is also the mechanism by which high levels of organophosphate insecticides can produce toxic effects in mammals.

In mammals, acetylcholinesterase can be found in both nervous tissue and in red blood cells. However, the red blood cell enzyme is not associated with nerve conduction, and its depression alone is not associated with toxicity.

Mammals possess yet another enzyme known as plasma butyryl-cholinesterase, or pseudocholinesterase, which is also inhibited by organophosphate insecticides. It is an entirely different enzyme compared with the acetylcholinesterase found in nervous tissue and red blood cells. Pseudocholinesterase has no known function and its activity can be depressed without adverse effect.

Of the three cholinesterase enzymes, the plasma-derived pseudocholinesterase is generally the most sensitive to inhibition by commonly used organophosphate insecticides. This is especially true for chlorpyrifos-induced inhibition. The acetylcholinesterase enzymes found in red blood cells and nervous tissue also show large differences in sensitivity to chlorpyrifos; with the enzyme found in red blood cells being much more sensitive. Consequently, significant depression of both pseudocholinesterase and red blood cell acetylcholinesterase can occur without evidence of toxicity.

Furthermore, animal studies demonstrate that modest reductions in brain acetylcholinesterase activity in response to the administration of chlorpyrifos fail to elicit toxic effects. In these studies, observable signs of toxicity required a greater than 60 percent reduction in brain acetylcholinesterase activity. These data provide strong evidence that, with respect to chlorpyrifos, significant depression of brain acetylcholinesterase is required to cause toxicity in mammals.

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Toxicology Testing

The potential for technical chlorpyrifos and chlorpyrifos-containing formulations to cause adverse health effects has been extensively examined in approved regulatory studies using laboratory animals. This information is supplemented by results of well-controlled, voluntary clinical studies.

Toxicity testing in animals is performed with the active ingredient and with formulations. Animal studies often involve use of exaggerated doses to fully explore toxic potential.

Acute Toxicity

Short-term (acute) exposure studies are mainly intended to determine the harmful effects that could

occur due to an accident, misuse or deliberate ingestion of a large quantity of the product (e.g., suicide attempt). They may also attempt to predict the likelihood of skin and eye irritation and skin sensitization.

Oral and Dermal Toxicity

Chlorpyrifos is of only moderate toxicity by the acute oral and dermal routes of exposure in numerous animal studies.

The acute toxicity of formulated chlorpyrifos is generally less than that of technical chlorpyrifos. Toxicity also varies with formulation. Microencapsulated formulations and granules are less toxic than emulsifiable concentrates (EC).

Skin and Eye Irritation

Skin and eye irritation studies evaluate possible irritant or corrosive effects of a compound. These studies are also considered in classifying the acute toxicity of a compound. Skin and eye irritation studies are graded along certain norms:

- non-irritating
- positive indicates irritation, but no degree of severity
- slight, moderate, severe and corrosive indicate degrees of irritation
- reversible indicates initial irritation, the effects of which were reversed after a specific period of time.

Chlorpyrifos is not considered a skin irritant or skin sensitizer. However, prolonged or repeated exposure to emulsifiable concentrate (EC) formulations may cause skin burns. Granular (G), wettable powder (WP), microencapsulated and finished dilutions (e.g., ready to use) formulations are not likely to cause significant skin irritation.

Chlorpyrifos is poorly absorbed through the human skin, with dermal penetration measured at 1 to 3 percent. A single prolonged exposure of an EC concentrate might result in the material being absorbed in harmful amounts. A single prolonged exposure to G, WP and microencapsulated concentrates or finished dilutions of 1 percent or less are not likely to result in the material being absorbed through skin in harmful amounts.

Inhalation Toxicity

Due to the low vapor pressure of chlorpyrifos, acutely toxic levels of vapors cannot be attained at room temperature. A repeated inhalation study was conducted in which rats received nose-only exposures to chlorpyrifos vapors 6 hours/day, 5 days/week for 13 weeks, at concentrations of 0, 75, 147 or 296 µg/m³ of air (0, 5, 10 or 21 ppb, respectively). No signs of toxicity were observed in any animals throughout the test. No effects were observed on plasma, red blood cell or brain cholinesterase, or on any other parameters evaluated. The experimental level of 296 µg/m³ was a level that approached complete saturation of the air, a nearly impossible condition except under controlled laboratory conditions.

Chronic Toxicity

Repeated oral studies of chlorpyrifos have shown the only effects to be those associated with the inhibition of cholinesterase enzymes. No effects were observed on any organs or tissues. Chlorpyrifos is not carcinogenic in lifetime animal studies. A long-term dietary study in rats showed the No Observable Effect Level (NOEL) to be 0.1 mg/kg body weight/day. No significant depression of plasma or red blood cell cholinesterase occurred at this dosage. Even in rats receiving 3.0 mg/kg/day of chlorpyrifos, no adverse effects were observed during the two-year test period.

Carcinogenicity

Chlorpyrifos was not carcinogenic in two-year dietary studies done with both rats and mice.

Mutagenicity

A number of mutagenicity tests have been conducted on chlorpyrifos - both in *vivo* (whole animal) and in *vitro* (test tube). The results indicate that chlorpyrifos has minimal mutagenic potential.

Teratogenicity

Chlorpyrifos is not considered teratogenic.

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Human Toxicity

Voluntary Clinical Studies

Chlorpyrifos is rather unique in that, in addition to the wealth of animal testing data, information from voluntary clinical studies is also available. Human volunteers ingesting either a single dose or daily repeated doses of chlorpyrifos showed that plasma butyryl-cholinesterase levels may be depressed by over 60 percent with no effect on red blood cell acetylcholinesterase levels. Moreover, in these same studies, no signs or symptoms of toxicity were observed. The test material was rapidly metabolized, with excretion of the principal metabolite (TCP) in the urine. The half-life for elimination of the principal metabolite from the body was 27 hours, which means that essentially all (>90 percent) of an oral dose of the chemical would be eliminated in 4 days. In the same study, chlorpyrifos, applied to the forearm of volunteers was shown to be absorbed through the skin in only limited amounts (1 to 3 percent of that applied).

Symptoms of Intoxication

Signs and symptoms of organophosphate insecticide poisoning in humans may be headache, dizziness, loss of coordination, muscle twitching, tremors, nausea, abdominal cramps, diarrhea, sweating, pinpoint pupils, blurred vision, salivation, tearing, excessive urination and tightness in the chest. Obviously, many of these symptoms are nonspecific and are not unique to organophosphate poisoning. Measurement of plasma butyryl-cholinesterase enzyme via a simple blood test may differentiate exposure to organophosphate insecticides from other potential sources of aforementioned symptoms.

Immediate medical treatment should be sought if any of the above-mentioned signs become apparent after exposure is known to have occurred. If you have additional health or safety questions regarding this molecule, consult your country's Material Data Safety Sheet (MSDS) as it will have local numbers and information. Within the United States, please call the PROSAR International Poison Center at 1-800-369-4352. Within Europe, please call 01553 76 1251 (UK).

Because chlorpyrifos acts on the enzymes in the blood, an antidote is available in cases of accidental or intentional overexposure. A health care professional should determine serum and/or red blood cell cholinesterase levels prior to administration of the antidote. Atropine by injection is the preferable antidote. Oximes, such as 2-PAM/protopam, may be therapeutic if used early. However, oximes should be used only in conjunction with atropine. Treatment is based on the judgment of the physician in response to actions of the patient. In all but exceptional cases, persons seriously poisoned with chlorpyrifos recover rapidly with appropriate treatment leaving no long-term effects. In case studies, persons showing mild symptoms of poisoning show a rapid and complete recovery even if antidote therapy is not used.

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Chlorpyrifos North America The Science Behind Chlorpyrifos

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Routes of Exposure and Potentially Exposed Populations

Exposure to chlorpyrifos may occur as a result of ingestion, skin contact, or inhalation of vapor or spray mist. These exposures may be associated with occupational use of chlorpyrifos via activities associated with the manufacture or through its handling and use by professional pesticide applicators or farmers. Non-dietary exposure of consumers may result following reentry into chlorpyrifos-treated areas of homes or yards. Due to the wide variety of agricultural uses of chlorpyrifos, dietary ingestion of trace chlorpyrifos residues in food also represents a potential route of exposure for consumers. Information for all these routes of exposure has been generated. Completion of risk and safety assessments involves a comparison of the magnitude of exposure with some toxicological endpoint (e.g., No Observable Effect Level), usually with inclusion of a safety factor. For chlorpyrifos, toxicological endpoints have been set based on studies in both animals and humans.

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Occupational Exposure

Agricultural Workers

Chlorpyrifos formulations may be applied to a myriad of agricultural crops by ground boom spray application, airblast application, aerial application, or soil incorporation. Studies have been conducted to assess exposures to mixer/loader operator, applicators and workers responsible for reentry into treated crops. All the agricultural worker scenarios tested have indicated that the No Observable Effect Level (NOEL) based on red blood cell acetylcholinesterase inhibition will not be exceeded when used according to the label.

Urban Pest Control Workers

Chlorpyrifos formulations are applied by professional pest control and lawn care applicators in a variety of urban pest control scenarios, both indoors and outdoors. The most common urban uses involve indoor crack and crevice sprays, outdoor turfgrass spray and granule applications and application to the soil around and beneath structures for termite control. Several studies have been conducted to assess exposures to the applicators involved in these types of applications, and in all cases results have indicated that the NOEL based on red blood cell acetylcholinesterase inhibition will not be exceeded for labeled applications.

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Non-Dietary Consumer Exposure

A number of exposure evaluations have been conducted to determine potential non-dietary exposures to consumers. These studies include evaluations performed within homes following the use of a chlorpyrifos-containing product and residue data collected from field trials. Based on studies that were conducted to evaluate exposures to chlorpyrifos during and following labeled uses, it is not expected that such use would cause adverse effects to the homeowner. Airborne concentrations of chlorpyrifos measured within homes following crack and crevice, spot and termite applications using a chlorpyrifos-containing formulation are low. Several studies have demonstrated that indoor airborne levels are consistently below the lifetime exposure guideline proposed by the National

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Dietary Consumer Exposure

Use of chlorpyrifos products may result in the presence of trace residues in the harvested portions of various agricultural commodities for primary or secondary human consumption. Controlled field trials are conducted to determine maximum residue levels to which consumers may be exposed. For chlorpyrifos, more than 300 of these types of trials have been completed and the resulting database supports use of chlorpyrifos on more than 100 crops worldwide. In addition, actual market-basket data for residues present in agricultural products on supermarket shelves have been collected. This information indicates that actual dietary exposure levels are several orders of magnitude below those estimated from controlled residue trials.

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Chlorpyrifos North America The Science Behind Chlorpyrifos

Wildlife and Other Non-Target Species



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Chlorpyrifos and chlorpyrifos-containing products are toxic to fish and wildlife. Laboratory studies indicate moderate to very high toxicity to birds, fish, and terrestrial and aquatic invertebrates. Incorporation of granular formulations into soil mitigates risk to terrestrial organisms by reducing exposure and to aquatic organisms by reducing runoff. Care must be taken when using sprayable formulations to avoid inadvertent contamination of aquatic and off-site terrestrial habitats. The following is a summary of the ecotoxicological properties of chlorpyrifos. The qualitative statements characterizing toxicity are standard United States Environmental Protection Agency terminology.

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Birds

Technical chlorpyrifos is moderately toxic to the mallard duck (*Anas platyrhynchos*), house sparrow (*Passer domesticus*) and starling (*Sturnus vulgaris*), highly toxic to the red-winged blackbird (*Agelaius phoeniceus*) and bobwhite quail (*Colinus virginianus*) and very highly toxic to the ring-neck pheasant (*Phasianus colchius*) when administered as a single oral dose. Chlorpyrifos is moderately to highly toxic when fed to birds in their diet.

Aquatic Organisms

Technical chlorpyrifos is very highly toxic to fish and aquatic invertebrates. Acute LC₅₀ values range from less than 1 mg/L to greater than 200 mg/L. Therefore, Best Management Practices (BMP) should be followed to prevent the movement of chlorpyrifos into aquatic systems.

Non-Target Insects

As an insecticide, it is not unexpected that chlorpyrifos is toxic to non-target insects. Applications procedures should be used that will mitigate exposure.

Earthworms

Chlorpyrifos presents a low risk to earthworms. At typical application rates, chlorpyrifos should have little impact on earthworms.

Microorganisms

Chlorpyrifos exhibits little or no toxicity to microorganisms.

Terrestrial Plants

As an insecticide, chlorpyrifos is not expected to exhibit herbicidal activity.

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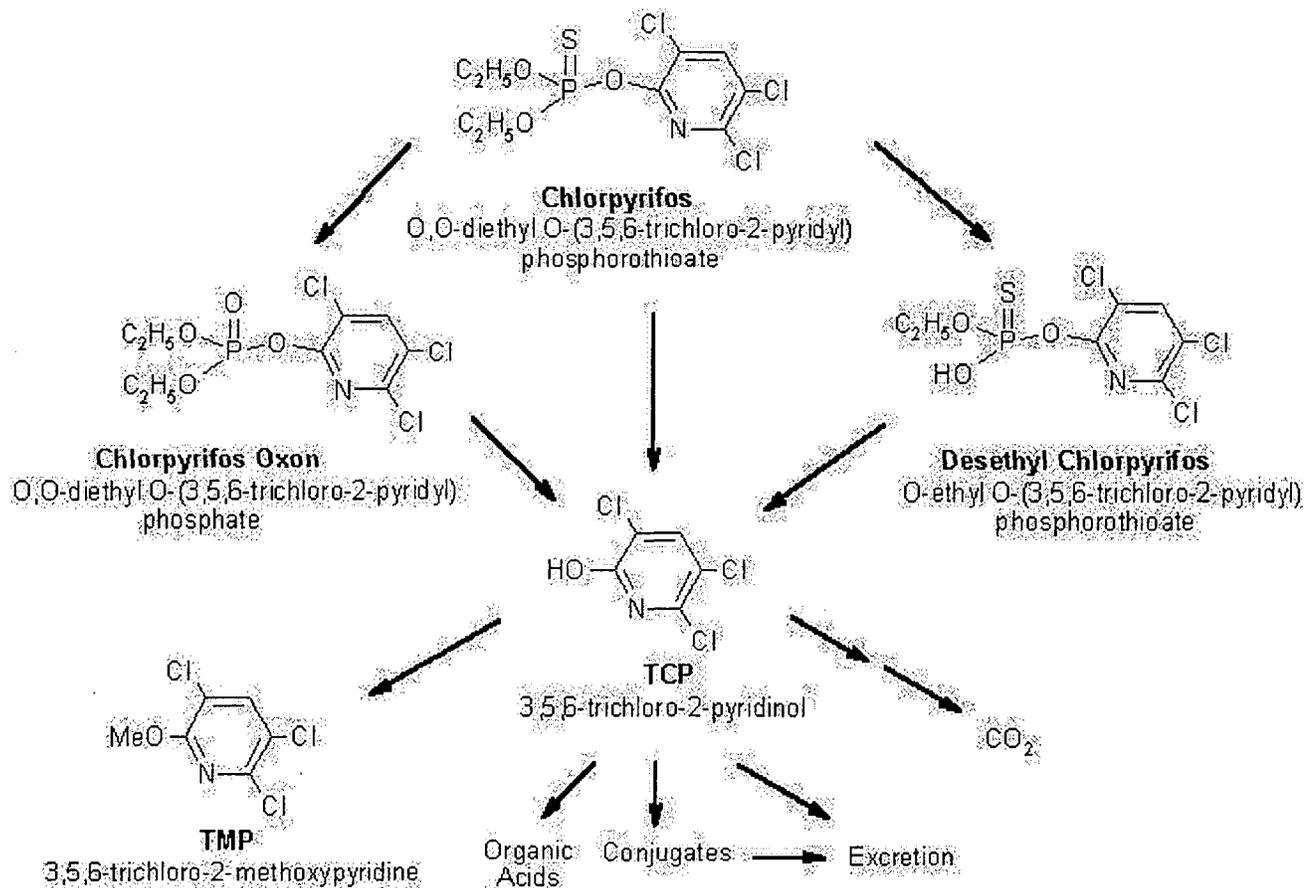
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Chlorpyrifos North America The Science Behind Chlorpyrifos

Reports and Publications

Reports and Publications contain a comprehensive listing of detailed studies on chlorpyrifos insecticides. Select a link below to download a pdf of these studies.

- [Use and Efficacy \(56KB PDF\)](#)
- [Toxicology \(61KB PDF\)](#)
- [Human Exposure and Risk \(65KB PDF\)](#)

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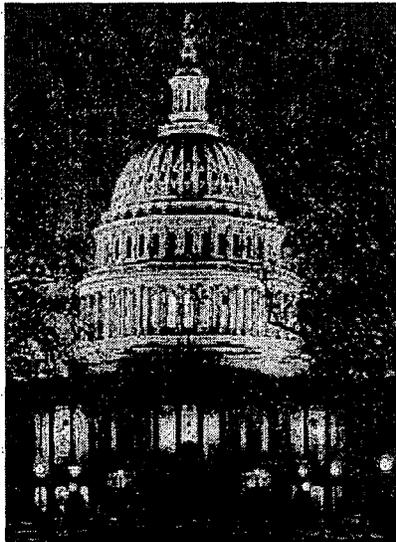
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Chlorpyrifos North America Regulatory and Public Affairs



Dow AgroSciences is in the business of applying science and technology to improve the quality of life of the worlds' growing population. We believe our products and services aid in the production of an abundant and nutritious food supply and support responsible pest control. Technology has given society gifts that make our lives more enjoyable and sustainable. However, the application of science and technology is not without issues.

Regulatory and Public Affairs

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As the body of scientific research grows, and we learn more about potential issues, we are committed to changing, evolving and continuously improving - with the conviction that science and technology can provide solutions. Resolving complex issues does not come without debate and controversy. We believe in the multi-stakeholder process, where all parties come to the table to work through the issues. It is our corporate responsibility to participate in that dialogue, and most importantly, to be part of the solution.

Dow AgroSciences is leading the efforts of the chlorpyrifos registrants to support regulatory and public affairs along with several companies such as [Makhteshim-Agan](#) and [Cheminova](#).

News Releases

01-Mar-04

[Japan Approves Global Standard Maximum Residue Level for Chlorpyrifos in Citrus](#)

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Chlorpyrifos North America Regulatory and Public Affairs

Chlorpyrifos Reregistration

Reregistration of Chlorpyrifos Insecticides in the United States

On September 28, 2001, pesticides containing the active ingredient chlorpyrifos passed a major regulatory milestone when the USEPA published the proposed [Interim Reregistration Eligibility Decision \(IRED\)](#) for these products. Under U.S. law, all pesticides registered prior to 1984 must undergo [reregistration](#), an evolving health and safety review process that often takes a decade or more. During this process, EPA examines health and safety data for these pesticide active ingredients and determines whether they are eligible for reregistration.

The EPA has determined that all current agricultural uses of chlorpyrifos in the United States will be maintained. Proposed label changes in the IRED address the EPA's concerns of hypothetical risks to agricultural workers and the environment.

FQPA Changed the Reregistration Process

The Food Quality Protection Act ([FQPA](#)) modified two laws that regulate the registration of pesticides in the United States: the Federal Insecticides, Fungicides and Rodenticides Act (FIFRA) and the Federal Food, Drug and Cosmetics Act (FFDCA). Three major changes in the pesticide registration process occurred under the FQPA. First, for each individual pesticide, all potential sources of exposure must be assessed together. This is known as the aggregate exposure assessment and includes potential sources of exposure from food, water and non-food uses of a pesticide. Secondly, if a pesticide belongs to a class of products with a common mechanism of action, such as the organophosphates, then potential exposure from all these products must be assessed together. This is known as the cumulative exposure assessment. Third, both the aggregate and cumulative assessments are conducted on a risk only basis, without respect to the benefits of the use of the pesticide.

Non-Food Uses

In June 2000, the technical registrants of chlorpyrifos announced that they had voluntarily reached an [agreement](#) with the U.S. Environmental Protection Agency (EPA) on changes in the use of insecticides containing chlorpyrifos. The changes in use were substantive, especially for non-food uses of these products. These actions addressed the EPA's concerns with the aggregate risk assessment. As a result of these changes in use, chlorpyrifos passed the EPA's aggregate assessment of potential risks and exposure from food, water and non-food uses.

Ecological Risk Mitigation

To address ecological risk, registrants brought forward a [Label Improvement Program](#) that proposed changes to agricultural product labels such as reduced rates, added retreatment intervals, and buffer zones to better manage spray drift. These changes, as well as a probabilistic ecological risk assessment that was conducted, demonstrate agricultural uses of chlorpyrifos do not pose unacceptable environmental risks.

Agricultural Worker Risk Mitigation

Limited mitigation has been proposed to address two areas of concern for the EPA related to hypothetical risks to agricultural workers. [Requirements in personal protective equipment \(PPE\)](#) for individuals mixing, loading or applying chlorpyrifos products for agricultural remain essentially the same as current labeling, except for mixers and loaders for aerial applications and applicators using groundboom or airblast application equipment.

Next Steps

The EPA issues an IRED for a pesticide that is undergoing reregistration, requires a reregistration

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eligibility decision (RED) and also needs a cumulative assessment under FQPA. The EPA anticipates finalizing the IRED for chlorpyrifos containing insecticides during the first-half of 2003. Once the IRED is issued and posted on the EPA website and published in the Federal Register, the EPA will request registrants to submit amended product labels for review. The EPA will then issue an implementation schedule for review and approval of the amended labels. It will take twelve to eighteen months following issuance of the IRED before the changes in product labeling take effect.

The EPA is in its last stages of finalizing the organophosphate cumulative risk assessment. The outcome of the current cumulative assessment supports the changes in chlorpyrifos uses that registrants have agreed to through the reregistration process. Once the cumulative risk assessment is finalized, the EPA will issue a Reregistration Eligibility Decision for chlorpyrifos.

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Lorsban Reregistration Milestone Achieved for Dow AgroSciences 17-Year Review Nears Completion

Lorsban* insecticides have cleared a major regulatory hurdle now that the interim reregistration eligibility decision (IRED) for these products has been signed by the U.S. Environmental Protection Agency (EPA).

Under U.S. law, all pesticides registered prior to 1984 must undergo reregistration, an evolving health and safety review process that often takes a decade or more as regulators demand new scientific data to address existing and hypothetical concerns.

Under this new U.S. reregistration action, Lorsban remains intact with all of its agricultural uses. The health and environmental aspects of these products have been thoroughly evaluated by the EPA, and farmers and professional applicators can continue to use these products with confidence.

A major focus of the IRED is a label improvement proposal that reflects how Lorsban products are actually used in today's agriculture. These changes represent a significant benefit for end-users such as farmers and commercial applicators since Lorsban products are used on a wide number of crops with diverse methods of application.

The new labeling also introduces buffer zones and retreatment intervals for added environmental protection, and contains provisions to further reduce potential exposures to agricultural workers.

For more information, see [Summary of Changes](#).

Disclaimer: These changes are merely proposed and have not been accepted by the Environmental Protection Agency (EPA). Please consult www.dowagro.com for the latest labels and Material Safety Data Sheets (MSDS). Always follow the label on the product you are using.

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Proposed Changes to Personal Protective Equipment (PPE) and Engineering Controls

Proposed changes to handler personal protective equipment

- Liquid formulations for containers more than 2.5 gallons
- Liquid formulations for containers 2.5 gallons or less
- Wettable powders in water-soluble packages
- Ground boom applications
- Granular formulations

Engineering controls

- Liquid formulations packaged in containers holding more than 2.5 gallons
- Liquid formulations packaged in containers holding 2.5 gallons or less
- Wettable powder formulations
- Granular formulations

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Voluntary Agreement Announced on Changes in Use of Chlorpyrifos Products in the United States

On June 8, 2000, technical registrants of chlorpyrifos insecticides reached agreement with the U.S.

Environmental Protection Agency (EPA) on changes in the use of insecticides containing chlorpyrifos, in alignment with the Clinton Administration's stated goal of reducing the potential exposure of children to all pesticides.

Fundamental changes in the way pesticides are regulated in the United States determined that continued

efforts to retain certain uses of chlorpyrifos in the U.S. no longer made business sense for the registrants in the current regulatory environment. Under these new circumstances, registrants of chlorpyrifos, including Dow AgroSciences, Makhteshim-Agan, Cheminova, Gharda, Luxembourg Industries and Platte Chemical, had to make some very difficult decisions, including restrictions on some uses of chlorpyrifos and a phase-out of certain uses in and around homes in the United States.

In its ongoing implementation of the Food Quality Protection Act of 1996 (FQPA), the EPA has demonstrated that it intends to apply standards far more restrictive than those historically established by the scientific community and accepted by the EPA and other regulatory bodies around the world.

The Agreement between the registrants of chlorpyrifos and the EPA involved a voluntary cancellation of most in-and-around-the-home uses of chlorpyrifos in the U.S., including use of the product as a full-barrier termiticide treatment in existing residential structures (post-construction). Use of products affected by this agreement will be allowed until existing stocks are depleted.

Chlorpyrifos will remain available in the U.S. for use as a termiticide for new residential construction (pre-treat) until December 31, 2005. This date may be extended, however, based on the results of an exposure study specific to this application.

Retail sale of chlorpyrifos products labeled for use in and around homes in the U.S. were discontinued December 31, 2001. Products containing chlorpyrifos remain available for various U.S. nonresidential uses such as golf courses and ornamental nurseries as well as for all U.S. agricultural crop uses except tomatoes.

The Agreement included refinements in agricultural applications that result in a reduction of chlorpyrifos residues in the U.S. on apples and grapes.

This Agreement was specific to the U.S. sale and use of chlorpyrifos.

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Residential Uses of Chlorpyrifos in Perspective: Voluntary Withdrawal and Phase-out of Most Residential Uses in the United States

Fundamental changes in the way pesticides are regulated in the United States determined that continued efforts to retain certain uses of chlorpyrifos in the U.S. no longer made business sense for the registrants in the current regulatory environment. Under these new circumstances, registrants of chlorpyrifos, including Dow AgroSciences, Makhteshim-Agan, Cheminova, Gharda, Luxembourg Industries and Platte Chemical, had to make some very difficult decisions, including restrictions on some uses of chlorpyrifos and a phase-out of certain uses in and around homes.

These restrictions were the result of a new U.S. law, the Food Quality Protection Act (FQPA) of 1996, under which regulatory authorities imposed safety margins more restrictive than those used by the World Health Organization (WHO) and many other developed nations. The resulting limitations on uses in the U.S. are not the result of any new significant data on chlorpyrifos that invalidated previous assessments. Instead, the changes reflect the U.S. Environmental Protection Agency's decision to evolve the rules about how to assess risk of pesticide use in the United States.

The U.S. Environmental Protection Agency (EPA) began their evaluation of all organophosphates under FQPA soon after its passage in 1996. During the 4 years leading up to the June 2000 announcement regarding chlorpyrifos, the EPA evolved or changed several key science policies in conjunction with their implementation of the FQPA. These policies have been the focus of considerable controversy and debate by numerous scientific advisory forums, policy forums and governmental bodies.

Four science policies ultimately had significant impact on available use patterns for chlorpyrifos in the United States. Each policy had individual regulatory impact that was then compounded within the revised risk assessment issued from the U.S. EPA in 2000 (EPA, 2000). As the policies (often interim policies) were implemented, the U.S. EPA dividing line for "acceptable/unacceptable risk" was incrementally lowered. Embedded within each science policy, are some very conservative assumptions that impacted the risk/safety evaluation. These policies are:

- selection of a regulatory endpoint (choice of enzyme to focus on in toxicity studies);
- use of animal data alone without consideration of available human data for setting a regulatory reference dose;
- application of the 10X FQPA safety factor (based in large part on studies which are not necessarily relevant to assessed exposures);
- conservative use of the 99.9%tile consumer scenario as an acute dietary endpoint.

The resulting impact of these policy decisions as compared to safety standards established by various regulatory authorities around the world is summarized in Table 1. The impact of conservative policies implemented by the EPA has resulted in decisions that do not align with other key regulatory agencies around the world.

Table 1. Divergence of Global Risk Assessment Standards for Chlorpyrifos (Cleveland, 2001)

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	NOEL (mg/kg)	Endpoint basis for Standard	Risk assessment standard (mg/kg per day) ^a	Magnitude of difference from EPA
Acute Standard				
US EPA	0.5	Plasma (rat)	0.0005	
WHO/FAO	1.0	RBC AchE (human)	0.1	200X higher
California	1.0	RBC AchE (human)	0.1	200X higher
Australia	1.0	RBC AchE (human)	0.1	200X higher
Chronic Standard				
US EPA	0.03	RBC AchE (dog)	0.00003	
WHO FAO	0.1	RBC AchE (human)	0.01	300X higher
	1.0	Brain AchE (rat)		
	1.0	Brain AchE (dog)		
	1.0	Brain AchE (mouse)		
California	0.1	Brain AchE (rat)	0.01	300X higher
Australia	0.3	Plasma BuChE (human)	0.03	100X higher

^aThese are either reference doses or acceptable daily intake standards. For the US, the EPA has legal authority to impose a specific additional FQPA 10X-safety factor for infants and children.

Impact of New Standards on Risk Assessment of Residential Uses by US EPA

A key analysis that drove the registrants' decision to voluntarily withdraw from certain residential uses of chlorpyrifos was the risk assessment of residential post-application exposure from indoor applications of chlorpyrifos. Historically, the threshold of concern from Margin of Exposure (MOE) calculations from such assessments was 10, based on a chronic reference dose supported by human clinical data. Because the EPA implemented an interim policy that did not allow the consideration of human data, an additional 10X-safety factor for extrapolation from animal to humans was added. Finally, the FQPA required the EPA to impose an additional 10X-safety factor. Thus the EPA's safety standard for chlorpyrifos risk assessments rose from a MOE of 10 to a MOE of 1000.

Table 2 summarizes EPA's estimates of post-application risks to residents from indoor crack and crevice applications of chlorpyrifos products in the United States. The MOEs calculated for this exposure scenario exceeded 100 for both adults and children but would not have exceeded the EPA's level of concern had either human data been considered or the FQPA safety factor not been applied. But the MOE hurdle for the EPA's level of concern was then 1000 and no amount of risk assessment refinement or risk management could meet this new standard.

It is important to recognize that these MOE calculations are very conservative. It is the registrants' position that MOEs above 100 meet an acceptable health protective standard especially since they are based on plasma Bu AChE endpoints. In addition, the EPA did not consider data submitted in support of microencapsulated formulations of chlorpyrifos.

Although United States law provides registrants the right to challenge the EPA's determination, an important condition of such a challenge is that the EPA has to take a regulatory action against a use. Because these uses involved over-the-counter products and products applied by pest control professionals, the popular press and media hyperbole associated with pesticide risks in the United

States would have forced product de-selection in the market as a result of any EPA action. Thus, registrants believed it was in the best interest of all the parties to voluntarily withdraw certain uses through an orderly phase-out process. In imposing these new restrictions, the U.S. EPA acknowledged that labeled use of chlorpyrifos products did not pose an imminent hazard, thus an orderly phase-out of certain uses was agreed upon rather than a ban.

Table 2. United States Environmental Protection Agency estimates of Post-Application Risks to Residents from indoor crack & crevice applications of chlorpyrifos in the United States.

Product	Rate Applied	Exposure Calculation Method	MOE			
			Adult		Child	
			1 day TWA ¹	10 day TWA	1 day TWA	10 day TWA
Dursban Pro (4 lb/gal EC)	5%	Residential SOP	390	440	110	240
Dursban Pro (4 lb/gal EC)	5%	Biomonitoring Studies	560	670	130	360

¹ Time weighted average

References:

Cleveland, Cheryl B., George R. Oliver, Bill Chen and Joel Mattson. 2001. Risk assessment under FQPA: Case study with chlorpyrifos. *NeuroToxicology* 22: 699-706.

US EPA. Human Health Risk Assessment: Chlorpyrifos. U.S. Environmental Protection Agency Office of Pesticide Programs, Health Effects Division (7509C). June 8, 2000.
www.epa.gov/oppsrrd1/op/chlorpyrifos.htm

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Summary of Significant Recent Regulatory Reviews of Chlorpyrifos: Relevance to Risk Characterization and Registration of Residential Uses

United Kingdom

Review of Chlorpyrifos: Risks to Amateur Users and Residents of Treated Premises Following Use of Non-Agricultural Products [(ACP 299 (279/00)]. Minutes of the 278th Meeting of the Advisory Committee on Pesticides (ACP) on 7 September 2000.

During the September 2000 meeting, the Advisory Committee on Pesticides reviewed refined risk assessments conducted by the Health & Safety

Executive (HSE) of the risk to amateur users and residents from non-agricultural uses of chlorpyrifos. This was part of an ongoing review for the use of cholinesterase inhibiting compounds in the United Kingdom. Risk to professional users of chlorpyrifos containing products were not considered in this specific review but are a part of the overall review program.

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Key Conclusions and Recommendations:

- Data produced by Dow AgroSciences and the HSE on user and residential exposure to chlorpyrifos were sufficiently reliable that exposure predictions may be based on these data.
- Reference scenarios put forward to represent user and residential exposure were acceptable.
- Approval for amateur baits should continue provided that the bait stations are sufficiently child resistant to prevent accidental access and ingestion.
- The HSE should determine the feasibility of developing a national standard for child resistance.
- Registrants should consider the feasibility of reformulating amateur baits and all water-based products with microencapsulated chlorpyrifos.
- Professional use of gel baits containing microencapsulated chlorpyrifos in domestic situations should be allowed to continue.
- Amateur and professional use in domestic situations of chlorpyrifos containing aerosols, trigger sprays and other sprays should continue, given the conservative nature of the exposure reference scenario and pending identification of an appropriate no observed adverse effect level (NOAEL) following submission of an additional study.
- The HSE will develop present proposals for simplifying the current labeling of all chlorpyrifos-containing aerosols, trigger sprays and other sprays, to ensure that children and pets are kept away from treated areas until dry.

Note: Dow AgroSciences completed the requested 6-week acetylcholinesterase study in Beagle dogs and submitted the study to the Pesticide Safety Directorate in July 2001. ACP reviewed this study and accepted it, recommending that acceptable daily intake (ADI) and acceptable operator exposure level (AOEL) values of 0.01 mg/kg bw be confirmed.

WHO/JMPR

The Joint FAO/WHO Meeting on Pesticide Residues (JMPR) is an international expert scientific group that is administered jointly by the Food and Agriculture Organization (FAO) of the United Nations and the World Health Organization (WHO). JMPR, which consists of the FAO Panel of Experts on Pesticide Residues in Food and the Environment and the WHO Core Assessment Group, has been meeting regularly since 1963. The FAO Panel of Experts is responsible for reviewing residue and analytical aspects of the pesticides under consideration, including data on

their metabolism, fate in the environment, and use patterns, as well as estimating the maximum residue levels that might occur as a result of the use of the pesticides according to good agricultural practices. The WHO Core Assessment Group is responsible for reviewing toxicological and related data and for estimating, where possible, acceptable daily intakes (ADIs) for humans of the pesticides under consideration.

1999 Joint FAO/WHO Meeting on Pesticide Residues, Rome, 20-29 September 1999

Conclusions and Recommendations:

- Estimate of acceptable daily intake for humans: 0-0.01 mg/kg bw
- Estimate of acute reference dose: 0.1 mg/kg bw
- Possible differences between adult and developing mammals are currently addressed in the commonly performed studies of reproductive and developmental toxicity in various animal species.
- The Joint FAO/WHO concluded that it currently has no basis for changing its approach to addressing the susceptibility of developing mammals as compared with that of adult organisms in the toxicological evaluation of pesticides. The routine use of safety factors such as the new US EPA's FQPA safety factor, in addition to those currently used is not justified on the basis of current information.
- Estimated Theoretical Maximum Daily Intakes for the five GEMS/Food regional diets, based on existing MRLs, were in the range of 6-30% of the ADI. The Joint FAO/WHO concluded that the intake of residues of chlorpyrifos resulting from its uses that have been considered by the JMPR is unlikely to present a public health concern.

1998 Joint FAO/WHO Meeting on Pesticide Residues, Rome, 21-30 September 1998

Conclusions and Recommendations:

- The Joint FAO/WHO will continue to make use of the results of biomedical tests involving human subjects when they are properly designed and when they meet appropriate ethical guidelines.
- Inhibition of plasma and brain butyrylcholinesterase is not a toxicologically significant effect for the purpose of establishing the ADI because there is no evidence that butyrylcholinesterase inhibition has any adverse effect.
- Statistically significant inhibition of brain and erythrocyte acetylcholinesterase by 20% or more represents a clear toxicological effect and any decision to dismiss such findings should be justified.

World Health Organization, 1997. Chemical methods for the control of vectors and pests of public health importance. Chavasse, D.C. and H.H. Yap, (WHO/CTD/WHOPES/97.2).

The WHO regularly reviews recommended products for control of mosquitoes, flies and cockroaches. WHO currently recommends chlorpyrifos for over-the-counter (OTC) products with the following specifications:

- Spray : 0.5% ai
- Aerosols: 0.5-1%
- Dust : 1-2%
- Bait : 0.5%
- Micro cap : 0.2-0.4%

Australia

Summary of Recommendations for Home Garden and Indoor Use of Certain Chlorpyrifos Products - Public Health Implications from the Australia National Registration Authority Review of Chlorpyrifos, September 2000

Australian guidelines for registrations of pesticides indicate that pesticides for household, home garden or domestic use should be "relatively harmless or capable of causing only mild illness if poisoning occurs". They should not cause irreversible toxicity on repeated exposure, nor require the use of safety/personal protective equipment that is not readily available to householders. The National Registration Authority (NRA) determined that liquid formulations containing chlorpyrifos at

50g/L or less are acceptable for home and garden use in terms of compliance with these guidelines. During the course of the NRA review it was found that many products labeled for indoor use did not include labeling to specifically preclude indoor broadcast applications. Although product labels supported crack and crevice treatments, they did not contain statements to prevent indoor broadcast use. In order to provide clear instructions to users/applicators, specific statements will be placed on labels of certain products as follows.

Recommendations and Requirements:

- Registrations and label approvals of all emulsifiable concentrate (EC) and liquid concentrate (LC) products for home, garden and domestic pest control use products that contain chlorpyrifos in amounts greater than 50 g/L shall be cancelled.
- Labels of all EC and LC products containing chlorpyrifos in amounts greater than 50 g/L and in package sizes of 1 Liter or less must include statements *"This product is too hazardous for use by householders. Householders must not use this product in or around the home."*
- Registrations and label approvals of all EC and LC products containing chlorpyrifos in amounts greater than 50 g/L and in package sizes of 1 Liter or less that do not include the label statements *"This product is too hazardous for use by householders. Householders must not use this product in or around the home."* shall be cancelled
- Label of any product containing chlorpyrifos at concentrations above 5% that can be applied inside buildings as a spray, must contain the statements *"DO NOT apply inside buildings except as a crack and crevice treatment. DO NOT apply to surface areas such as interior floors or walls."*

India

India Ministry of Agriculture, Directorate of Plant Protection, Quarantine and Storage: Expert Committee to Review the Use of Chlorpyrifos in India.

The India Ministry of Agriculture commissioned an expert committee to review the use of chlorpyrifos in India with respect to the changes in use announced by the US EPA on June 8, 2000. The committee was commissioned in September of 2000 and completed their review of chlorpyrifos uses in February of 2001.

Conclusions and Recommendations:

- Agriculture and non-agriculture usage of chlorpyrifos will continue as per current practice in India.
- No restrictions on Ready-to Use (RTU, also known as OTC) registrations for indoor use will be imposed for concentrations of 5% or less. Concentrations of greater than 5% will be handled by Professional Pest Control Operators (PCO) only.

United States - California

California Department of Pesticide Regulation Risk Characterization of Chlorpyrifos, 2000.

The California Department of Pesticide Regulation (CDPR) is required by state law to conduct periodic reviews of health and safety consideration of pesticides registered for use within the state. CDPR developed its own independent estimates of the health risks from chlorpyrifos exposure in 2000 (Cochran et al., 2000). In addition, an appraisal of risks from nonoccupational exposure to chlorpyrifos was recently published by the review leader (Cochran, 2002).

Conclusions:

- Analysis of the data indicates that the label-approved use of chlorpyrifos (both current and previous) does not constitute a significant health risk to the general public.
- Most nonoccupational illnesses resulting from entry into areas treated with chlorpyrifos likely stem from odor rather than the ability of the organophosphate to inhibit acetylcholinesterase (AChE).
- Based on biological monitoring studies, chronic aggregate nonoccupational exposures to chlorpyrifos ranged from 0.0002 mg/kg-day (adults) to 0.0005 mg/kg-day (infants and small children)—1 order of magnitude less than exposures estimated by standard procedures.
- Other biological monitoring data indicated that cumulative exposure to all organophosphate pesticides ranged from 0.0003 mg/kg-day (adults) to 0.003 mg/kg-day (children).

- The US EPA's policy of not utilizing human data caused USEPA to multiply the 10-fold overestimate of exposure by another factor of 10, as the human data showed that laboratory animals were not 10 times less sensitive to the toxicity of chlorpyrifos than humans.
- The US EPA appended an additional safety factor of 10 for developmental toxicity, even though no developmental toxicity occurred below the NOEL for reduced brain AChE activity.
- Considering all these factors, the risks of aggregate, nonoccupational exposure to chlorpyrifos have been overstated by US EPA by more than a 1000-fold.

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Cochran, R. C., Kishiyama J., Aldous, C.N., Pfeifer, K.F. and Schreider, J. 2000. Chlorpyrifos (Dursban, Lorsban): Risk Characterization Document. Medical Toxicology Branch, Department of Pesticide Regulation, California Environmental Protection Agency, Sacramento, CA.

Cochran, R.C. 2002. Appraisal of Risks from Nonoccupational Exposure to Chlorpyrifos. Regulatory Toxicology and Pharmacology 35: 105-121.

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Endocrine Disruption

The term "endocrine" is non-specific and encompasses any hormone-related biological process in the body. Because hormones regulate normal reproduction, growth and development, these biological processes are monitored carefully in animal studies that are required to establish adequate safety margins for chemicals. There are also special reproduction and development studies that evaluate parental animals and their offspring through two generations of life. Pathologists carefully evaluate the reproductive organs in these studies, and toxicologists evaluate the growth and reproductive function of these animals. In fact, test laboratories have toxicologists that specialize in studies of reproduction and development. If there is any sign of dysfunction, there is a wide array of additional studies that can be conducted.

Natural and synthetic chemicals that can affect endocrine function will, at high enough levels of exposure, alter reproduction and growth. For example, sometimes sweet clover has elevated levels of natural endocrine disruptors; therefore any sheep that may graze on sweet clover pastures are known to be at risk of reproductive problems.

Chlorpyrifos has been extensively studied for a wide range of biological effects, including effects on endocrine function. No endocrine effects have been found in experimental animals that have been exposed to very high levels of chlorpyrifos (several thousands of times higher than human exposure) from conception to birth to adulthood to old age. Toxicologists at regulatory agencies throughout the world evaluate these chlorpyrifos studies, and endocrine effects have not been identified as an issue.

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Persistent Organic Pollutants

At a recent meeting of the Regionally Based Assessment of Persistent Toxic Substances in Heredia, Costa Rica, discussions occurred and concerns were raised regarding pesticide chemicals which may be considered as potential persistent organic pollutants (POPs). Specific pesticides under discussion included paraquat, chlorothalonil, triazines, endosulfan and chlorpyrifos.

Dow AgroSciences is very serious about the program being undertaken in support of the Stockholm Convention on Persistent Organic Pollutants to further research and regulate the introduction of POPs into the environment. As the primary manufacturer of the insecticide chlorpyrifos, Dow AgroSciences provided data and comments on the criteria for POPs listing under the Stockholm Convention and how these relate specifically to the characteristics of chlorpyrifos.

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What is a persistent organic pollutant?

During 2002, the United Nations affiliated Inter-Organization Program for the Sound Management of Chemicals (IOMC) issued a report titled *Reducing and Eliminating the Use of Persistent Organic Pesticide: Guidance on Alternative Strategies for Sustainable Pest and Vector Management*. The report identified POPs as chemicals that:

- are extremely stable and persistent in the environment,
- bio-accumulate in organisms and food chains,
- are toxic to humans and animals and have chronic effects such as disruption of reproductive, immune and endocrine systems, as well as being carcinogenic, and
- are transported in the environment over long distances to places far from the points of release.

The report further indicated that nine pesticides (aldrin, toxaphene, DDT, chlordane, dieldrin, endrin, HCB, heptachlor, mirex) are currently included in the initial list of POPs for action under the Stockholm Convention.

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Prior Informed Consent

Prior Informed Consent (PIC) aims to provide developing countries with information about bans or severe restrictions imposed by governments on a chemical due to health or environmental concerns. After a chemical is included on the PIC list, governments have the right to prohibit its import.

The PIC initiative is operated by the Food and Agriculture Organization (FAO) of the United Nations and the United Nations Environment Program (UNEP). The development and implementation of PIC has been a cooperative program between governments and FAO and UNEP. In December 1989, the Rotterdam Convention created the international framework of PIC. In 1996, negotiation of an international legally binding convention for PIC was initiated. A Diplomatic Conference was held in Rotterdam in September 1998 for governments to sign the convention, at which time 61 countries signed. Fifty countries must now ratify the instrument before it will enter into force.

PIC provides countries with information in the form of Decision Guidance Documents (DGDs) on pesticides and chemicals. Designated National Authorities of importing countries are required to assess the potential risks associated with continued importation of these pesticides and chemicals. PIC is viewed as an interim measure until all countries have established effective regulatory infrastructures.

The development and implementation of PIC were monitored by CropLife International for the crop protection industry and by the International Council of Chemical Associations (ICCA) for the chemical industry. CropLife International has actively supported the FAO Code of Conduct, and has made compliance with the FAO Code by national associations and their members a condition of membership. The crop protection industry will continue to assist and encourage individual countries and the FAO to establish effective registration schemes where they do not already exist. As a member of CropLife, Dow AgroSciences fully supports the scope of Prior Informed Consent.

Chlorpyrifos is not listed on PIC.

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Global Maximum Residue Levels

Following the application of a pesticide product, trace residues may be present at harvest on agricultural commodities, such as fruits, vegetables, or cereal grains or in processed commodities, such as fruit juices, vegetable oils, and flours. Thus, government regulatory authorities have established maximum residue limits (MRLs) or tolerances as a check for compliance with national good agricultural practices (GAP) and to facilitate international trade. An MRL is defined as the maximum concentration of pesticide residue that is legally permitted or recognized as acceptable in, or on, a food, agricultural commodity or animal feed as set by Codex or a national regulatory authority. In some countries, including the United States, MRLs are referred to as "tolerances", and in general the two terms are synonymous.

While the benefits of crop protection in food production are clear, there is ongoing dialogue over whether any residues that may remain on food pose a threat to human health. Before any crop protection product can be registered for use, it must pass through a rigorous legislative process that includes a scientific risk assessment of possible health effects.

MRLs are not safety limits, and exposure to residues in excess of an MRL does not automatically imply a hazard to health. MRLs for pesticides are established using verified scientific facts that take into account levels of residues in the crop following treatment according to GAP principles. MRLs are derived as a result of this process on a crop by crop basis to reflect differences in growing conditions, treatment times and other factors. They can and do vary internationally but conventions are in place to facilitate international trade. MRLs are not set on the basis of toxicological data but they must be acceptable toxicologically. When using results from supervised trials carried out under GAP to establish MRLs, it is normal to have available relevant metabolism and toxicological data. Given all the relevant background data, MRLs are usually established using the worst case scenario.

Additional Information



[European Crop Protection Association brochure - Pesticide Residues in Food: Overview of the residue situation in raw food commodities and prepared food by Dr. Helmut Frehse. \(1.0MB PDF\)](#)

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Definition of Maximum Residue Levels

While the benefits of crop protection in food production are clear, there is ongoing dialogue over whether any residues that may remain on food pose a threat to human health. Before any crop protection product can be registered for use, it must pass through a rigorous legislative process that includes a scientific risk assessment of possible health effects. In fact, the Chairman of the UK Government's Advisory Committee on Pesticides has stated that "comparing systems of registration, we have to have a great deal more information about a pesticide than we do about a pharmaceutical compound used in human medicine."

Residues per se need not be a cause for concern. Established fact indicates that there are many substances of which certain quantities are positively beneficial to human health whereas larger intakes could be highly toxic if not fatal. As Paracelsus (1493-1541), the father of modern toxicology said, "it's the dose that makes the poison."

An MRL is defined as the maximum concentration of pesticide residue that is legally permitted or recognized as acceptable in, or on, a food, agricultural commodity or animal feed as set by Codex or a national regulatory authority. MRLs are intended primarily as a check that the Good Agricultural Practice (GAP) is being followed and to assist international trade representatives in importing and exporting produce treated with pesticides. MRLs are not safety limits, and exposure to residues in excess of an MRL does not automatically imply a hazard to health. MRLs are established by national regulatory authorities and by the Codex Alimentarius Commission, which sets standards that are intended to apply to international trade. The Codex figures are based on assessments made by the Joint FAO/WHO meeting on Pesticide Residues. In the United States, the term "tolerance" is often used instead of MRLs, but the words are interchangeable.

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How MRLs Are Established

MRLs, or the maximum concentration of pesticide residue that is legally permitted or recognized as acceptable in, or on, a food, agricultural commodity or animal feed as set by Codex or a national regulatory authority, are established using verified scientific facts that take into account levels of residues in the crop following treatment according to GAP principles. MRLs are derived as a result of this process on a crop by crop basis to reflect differences in growing conditions, treatment times and other factors. They can and do vary internationally but conventions are in place to facilitate international trade. MRLs are not set on the basis of toxicological data but they must be acceptable toxicologically. When using results from supervised trials carried out under GAP to establish MRLs, it is normal to have available relevant metabolism and toxicological data. Given all the relevant background data, MRLs are usually established using the worst case scenario.

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Impact on Regional and Global Trade

MRLs, the maximum concentration of pesticide residue that is legally permitted or recognized as acceptable in, or on, a food, agricultural commodity or animal feed as set by Codex or a national regulatory authority, can and do vary country by country due to different pests and use practices (GAPs). It is important to recognize that MRLs are not set on the basis of toxicological data.

Residues of pesticides in food commodities can easily be used as trade barriers and residues issues have led to major international trade and political friction. Trade issues may arise due to the fact that most countries allowable residue limits (MRLs) are set for the use of the pesticide in the same country that the residue trials were conducted. MRLs are often put into National laws, and crops with residues above the MRL become illegal and must be destroyed, regardless of whether health standards have been exceeded. Since national MRLs are normally incorporated into national law, it is usually impossible for such countries to accept imports with higher residue level than their national MRL.

On the international level, the Codex Alimentarius Commission has sought to establish a globally applicable listing of harmonized MRLs to support international trade. Thus, many countries refer to Codex MRLs when considering regulatory and trade aspects of pesticide residues. In addition, regulatory authorities in a number of individual countries or regional associations may also set national MRLs based on approved uses and/or import MRLs to accommodate international trade considerations.

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Geographic MRLs

The most widely recognized bodies which establish national or multinational MRLs, the maximum concentration of pesticide residue that is legally permitted or recognized as acceptable in, or on, a food, agricultural commodity or animal feed as set by Codex or a national regulatory authority, include regulatory authorities in Australia, Canada, the European Union, Japan, New Zealand, and the U.S. Specific listings of existing MRLs for chlorpyrifos and other pesticides may be on the following web sites:

Australia

[Australia Pesticides and Veterinary Medicines Authority \(APVMA\)](#)
[Current listing of Australia MRLs from APVMA](#)

Canada

[Canada Pest Management Regulatory Authority \(PMRA\)](#)
[Listing of recently established Canada MRLs from PMRA](#)

CODEX

[Codex Maximum Residue Limits \(MRL's\) Established for Chlorpyrifos](#)

European Union

[European Food Safety Authority \(EFSA\)](#)
[Current listing of EU MRLs by crop, pesticide, or food commodity from EFSA](#)

Japan

[Japan Ministry of Health, Labor, and Welfare \(MHLW\)](#)
[Current listing of Japan MRLs by the Japan Food Chemical Research Foundation](#)

New Zealand

[New Zealand Food Safety Authority \(NZFSA\)](#)
[Current listing of New Zealand MRLs from NZFSA](#)

United States

[Environmental Protection Agency \(EPA\)](#)
[U.S. Code of Federal Regulations Section 180 listing of tolerances](#)
[Listing of chlorpyrifos tolerances from 2003 version of 40 CFR 180](#)

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Codex Committee on Pesticide Residues (CCPR)

The Codex Committee on Pesticide Residues (CCPR) operates under the auspices of the Codex Alimentarius Commission. The specific functions of the CCPR are to:

- (a) establish maximum limits for pesticide residues in specific food items or in groups of food;
- (b) establish maximum limits for pesticide residues in certain animal feeding stuffs moving in international trade where this is justified for reasons of protection of human health;
- (c) prepare priority lists of pesticides for evaluation by the Joint FAO/WHO Meeting on Pesticide Residues (JMPR);
- (d) consider methods of sampling and analysis for the determination of pesticide residues in food and feed;
- (e) consider other matters in relation to the safety of food and feed containing pesticide residues; and,
- (f) establish maximum limits for environmental and industrial contaminants showing chemical or other similarity to pesticides, in specific food items or groups of food.

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The CCPR is hosted and chaired by the Netherlands, and has met on a yearly basis for more than 30 years. The CCPR is comprised of approximately 50 national delegations from member countries, and also a number of observer delegations from international organizations including CropLife International and Consumers International. When the CCPR conducts its annual, week-long session, more than 200 member and observer participants are typically present.

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Codex Maximum Residue Limits (MRL's) Established for Chlorpyrifos

Including modifications approved
by the Codex Alimentarius
Commission during 2003

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Codex Code	Commodity Name	MRL (mg/kg = ppm)
AL 1020	Alfalfa fodder	5
AL 1021	Alfalfa forage (green)	20
TN 0660	Almonds	0.05
FP 0226	Apple (see "Pome Fruit")	
FI 0327	Banana	2
VB 0400	Broccoli	2
VB 0041	Cabbages, Head	1
VR 0577	Carrot	0.1
MO 1280	Cattle, kidney	0.01
MO 1281	Cattle, liver	0.01
MM 0812	Cattle meat	1 (fat)
VB 0404	Cauliflower	0.05
VL 0467	Chinese cabbage (type Pe-tsai)	1
FC 0001	Citrus fruits	2
SB 0716	Coffee	0.05
VP 0526	Common bean (pods and/or immature seeds)	0.01
SO 0691	Cotton seed	0.05*
OC	Cotton seed oil,	0.05*

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0691	crude	
DF 0269	Dried grapes (= Currants, Raisins and Sultanas)	0.1
PE 0112	Eggs	0.01*
FB 0269	Grapes	0.5
GC 0645	Maize	0.05
AS 0645	Maize fodder	10
AF 0645	Maize forage	20
OR 0645	Maize oil, edible	0.2
ML 0107	Milk of cattle, goats and sheep	0.02
VA 0385	Onion, Bulb	0.2
VP 0063	Peas (pods and succulent = immature seeds)	0.01
AL 0528	Pea vines (green)	1
FS 0247	Peach	0.5
TN 0672	Pecan	0.05*
VO 0445	Peppers, Sweet	2
FS 0014	Plums (including Prunes)	0.5
MO 0818	Pig, Edible offal of	0.01*
MM 0818	Pig meat	0.02 (fat)
FP 0009	Pome fruits	1
PM 0110	Poultry meat	0.01 (fat)
PO 0111	Poultry, Edible offal of	0.01*
GC 0649	Rice	0.1
MO 0822	Sheep, Edible offal of	0.01
MM	Sheep meat	1 (fat)

0822		
GC 0651	Sorghum	0.5
AS 0651	Sorghum straw and fodder, dry	2
FB 0275	Strawberry	0.3
VR 0596	Sugar beet	0.05
AV 0596	Sugar beet leaves or tops	40
VO 0447	Sweet corn	0.01*
VO 0448	Tomato	0.5
TN 0678	Walnuts	0.05*
GC 0654	Wheat	0.5
AS 0654	Wheat straw and fodder, dry	5
CF 1211	Wheat flour	0.1

* = At or about the limit of determination

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FQPA

What is FQPA?

The Food Quality Protection Act (FQPA) was signed into law in the U.S. in August 1996. The law contains far reaching provisions, which revised food safety standards for pesticides regulated by the U.S. Environmental Protection Agency (EPA).

In addition, FQPA required the U.S. EPA to begin immediately applying the new standard to all of the existing pesticide tolerances. Since 1996, EPA has been reviewing all existing and new pesticide tolerances under this new FQPA standard. In 1999, EPA chose to first review the organophosphates, the chemical class which includes chlorpyrifos.

FQPA impacts not only users in the United States, but worldwide, as regulators in other countries evaluate their own provisions in light of possibly stricter standards imposed by the U.S. EPA.

How the FQPA Process Works

For every class of product being evaluated, the U.S. EPA prepares a risk assessment. To do this, the agency must:

- decide whether existing health-based standards for that pesticide are protective enough for special groups such as infants and children;
- figure estimated exposures to the pesticide from food, water and residential exposures; and,
- compare estimated exposures to how much the agency believes to be acceptable.



Following this process, the U.S. EPA then shares their draft risk assessment and science chapters with the registrants. The registrants are offered an opportunity to correct any errors or inaccuracies. After reviewing the registrants' comments, the EPA may revise their assessments further and then release their comments on the Internet for a 60-day public comment period. Comments during this time may be submitted by any interested third parties including growers, members of the general public, academics, activists and the registrants. The U.S. EPA will consider

the comments and revise the assessments as they feel appropriate. The U.S. EPA then releases the final assessments, along with any regulatory decisions about the product

The FQPA gives the U.S. EPA extensive power to decide what residue levels are acceptable for each type of food product. If residues cannot be kept within the U.S. EPA's new guidelines, the chemical may be restricted or may no longer be available for that specific use.

Re-Registration Eligibility Decisions (REDs)

After the EPA completes the review the Agency usually issues a RED document that summarizes the risk assessment conclusions and outlines any risk reduction measures that are necessary for the pesticide to remain registered in the U.S. Those pesticides that are RED candidates for fiscal year 2004 are:

Interim Re-registration Eligibility Decisions (IREDs)

The EPA will issue an IRED for a pesticide that is undergoing re-registration, requires a RED, and needs an assessment under FQPA. The IRED, issued after the EPA completes the individual

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pesticide's risk assessment, may include risk reduction measures to gain the benefits of these changes before the final RED can be issued.

TREDS (Reports on FQPA Tolerance Reassessment Progress and Interim Risk Management Decisions)

The EPA issues a TRED for a pesticide that requires tolerance reassessment decisions, but does not require a RED because:

- the pesticide was registered after November 1, 1984, and by law is not included within the re-registration program;
- EPA completed a RED for the pesticide before FQPA was enacted on August 3, 1996; or
- the pesticide is not registered for use in the U.S. but tolerances are established that allow crops treated with the pesticide to be imported from other countries.
- Some TREDS do not become final until the EPA considers the cumulative risks of all the pesticides in the cumulative group

[Current list of pesticides being evaluated for re-registration during 2004](#)

Current Re-registration Status for Chlorpyrifos

In February 2003, the EPA declared that chlorpyrifos was eligible for re-registration with the issuance of the IRED document. The review of labels and supportive data submitted at the EPA's request is currently underway. The re-registration process will complete the final hurdle when the Organophosphate Cumulative Risk Assessment is issued from the EPA in the near future. The OP-CRA is the final step in the process, which accounts for the cumulative effects of the various products within this family of chemistry.

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International Chlorpyrifos Evaluations & Standards



In addition to national scientific and regulatory evaluations, chlorpyrifos has been the subject of several international evaluations that have resulted in the establishment of globally recognized standards and recommendations. These evaluations have been conducted by internationally relevant and authoritative bodies working under the auspices of the United Nations and various treaties that deal with agricultural production, world trade, pesticide management, and public health. Key international evaluations and standards that have been set for chlorpyrifos include product quality, hazard classification, human exposure, food quality, water quality and public health.

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Chlorpyrifos North America Regulatory and Public Affairs

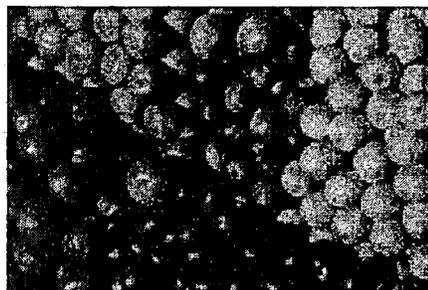
Product Quality

The [International Code of Conduct on the Distribution and Use of Pesticides](#) is a set of voluntary guidelines for pesticide manufacturers and governments established by the Food and Agriculture Organization (FAO) of the United Nations. It was adopted in 1985, and was most recently revised in 2002. One provision of the Code involves the supply of pesticides of adequate quality which adhere to recognized standards. Both the FAO and the World Health Organization (WHO) have established pesticide management programs to set such international specifications, which establish minimum active ingredient purity standards as well as maximum limits for hazardous impurities. [FAO specifications](#) are established for products with agricultural uses. WHO specifications are established for products with public health uses. Since 2002, the FAO and WHO have collaborated on the establishment of common specifications for pesticide technical products through the FAO/WHO Joint Meeting on Pesticide Specifications (JMPS).

Chlorpyrifos has been evaluated by both the FAO and WHO with respect to establishment of product specifications.

International Product Quality Standards for Chlorpyrifos

The Food and Agriculture Organization (FAO) of the United Nations first established product quality specifications for technical chlorpyrifos and emulsifiable concentrate (EC) formulations during 1984. The FAO specification for chlorpyrifos requires technical product to contain a minimum active ingredient content of 940 g/kg (94% wt/wt) and meet several physical property criteria. Although no relevant impurities were identified (i.e., no impurities which might impact human health, residues, or crop safety), limits on water (1 g/kg) and acetone insolubles (5 g/kg) were also established. Specification requirements for EC formulations included limits on selected physical properties and storage stability characteristics. In establishing these specifications, FAO also recognized specific analytical procedures for their monitoring.



The existing [FAO specifications for chlorpyrifos \(38KB DOC\)](#) may be found on the FAO Web site.

The World Health Organization (WHO) first established product quality specifications for technical chlorpyrifos and emulsifiable concentrate (EC) formulations during 1989. The WHO specification for chlorpyrifos requires technical product to contain a minimum active ingredient content of 940 g/kg (94% wt/wt) and to meet several physical property criteria. Although no relevant impurities were identified (i.e., no impurities which might impact human health, residues, or crop safety), limits on water (1 g/kg) and acetone insolubles (5 g/kg) were also established. Specification requirements for EC formulations included specific limits on selected physical properties. In establishing these specifications, WHO also recognized specific analytical procedures for their monitoring.

For more information, download the [WHO specifications \(29KB PDF\)](#) for chlorpyrifos.

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A re-evaluation of the FAO and WHO product quality specifications



for chlorpyrifos, under the Joint Meeting on Pesticide Specifications (JMPS), occurred during 2002. The objective of this evaluation, which had been requested by Dow AgroSciences, was to revise and update the specifications to reflect current manufacturing practices and standards. Detailed information concerning the manufacturing and product chemistry of chlorpyrifos products was evaluated, and reference was also made to the toxicological evaluation of chlorpyrifos recently completed by WHO via the Joint Meeting on Pesticide Residues. The FAO/WHO JMPS recommended several

revisions to the FAO and WHO technical product specifications for chlorpyrifos. These included an increase in minimum active ingredient content to 970 g/kg (97% wt/wt) and designation of sulfotep as a relevant impurity with a maximum content of 3 g/kg (0.3% wt/wt). Changes were also proposed for the FAO and WHO specifications for EC formulations, and new specifications for ultra-low volume (ULV) and capsule suspension (CS) formulations of chlorpyrifos were also proposed. Finalization of these revised specifications under the new system is expected to occur during the 2004 FAO/WHO JMPS meeting, at which time additional data regarding analytical methods are expected to be available.

For more information and copies of the FAO and WHO JMPS evaluation reports, which include summary of chemical, physical, and toxicological characteristics of chlorpyrifos products evaluated, download:

- [FAO Web site - FAO Evaluation Report for Chlorpyrifos \(224KB PDF\)](#)
- [WHO Web site - WHO Evaluation Report for Chlorpyrifos \(209KB PDF\)](#)

Significance

FAO and WHO product specifications for chlorpyrifos provide an international standard by which technical and formulated product quality can be determined. As such, they are directly applicable to products recommended and employed by the WHO for public health protection purposes and also by the FAO for locust control programs. In addition, the specifications serve as reference points for national regulatory authorities in their quality monitoring and control programs for pesticide products. Finally, because the specifications established by FAO and WHO under the new cooperative program apply specifically to products from manufacturers who have submitted detailed manufacturing, composition and toxicology information, a means of protection against generic product of inferior or undetermined quality is provided. Thus, when the revised FAO and WHO specifications for chlorpyrifos are finalized, they are expected to apply only to products manufactured by Dow AgroSciences and also by Makhteshim-Agan, the latter of which passed an equivalency evaluation for its product.

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Hazard Classification

The "WHO Recommended Classification of Pesticides by Hazard" has been developed by the World Health Organization (WHO) as part of the [International Program on Chemical Safety \(IPCS\)](#). The Classification was first established in 1975, and its overall aim is to promote responsible handling and adequate precautionary labeling of pesticide products. The criteria for classification are based on acute toxicity and risks to health, and pesticide products are grouped into five categories based on results of animal testing:

- Class Ia: Pesticides which are extremely hazardous
- Class Ib: Pesticides which are highly hazardous
- Class II: Pesticides which are moderately hazardous
- Class III: Pesticides which are slightly hazardous
- Pesticides which are unlikely to present an acute hazard

Chlorpyrifos has been evaluated by the WHO with respect to hazard classification.

International Hazard Classification for Chlorpyrifos

The World Health Organization (WHO) through its International Program on Chemical Safety (IPCS) has evaluated chlorpyrifos toxicology data for purposes of hazard classification. The WHO classified chlorpyrifos technical product as a Class II active ingredient, which is the category for "pesticides which are moderately hazardous". The WHO criteria as applied to formulated chlorpyrifos products results in WHO classifications that include Class II (Moderately Hazardous), Class III (Slightly Hazardous), and unclassified (unlikely to present acute hazard), depending on active ingredient content and modifications caused by co-formulants (e.g., solvents, emulsifiers, carriers, stabilizers).

Download:

In addition, the WHO has made available a number of hazard communication summaries concerning chlorpyrifos including an [International Chemical Safety Card \(ICSC\)](#) and [WHO/FAO Data Sheet \(DS\)](#) on the Inchem Web site.

Significance

The WHO hazard classification of chlorpyrifos provides a benchmark of its relative acute toxicity to other pesticide products. This classification and relative ranking provides a basis for national regulatory authorities to establish standardized precautions and handling instructions with respect to manufacturing, transportation, labeling, use, and disposal. Many regulatory authorities are in the process of implementing additional restrictions and labeling precautions for those pesticide products in Class Ia (Extremely Hazardous) and Class Ib (Highly Hazardous), and the classification of chlorpyrifos as a Class II product (Moderately Hazardous) further supports the favorable regulatory profile it enjoys.

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Human Exposure

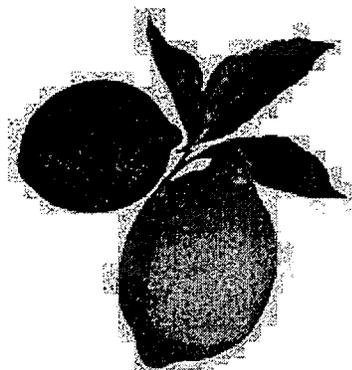
Establishment of product quality standards for pesticides as well as food and water standards for pesticide residues requires evaluation of toxicology and health assessment information and designation of human exposure limits. As part of the FAO/WHO Joint Meeting on Pesticide Residues (JMPR), the World Health Organization (WHO) Core Assessment Group is responsible for reviewing toxicological and related data and for estimating, where possible, acceptable daily intakes (ADIs) for humans of the pesticides under consideration. The resulting ADI values are then used, in comparison with estimated exposure information, for risk assessment purposes. The JMPR has been active in this regard since 1963, and publishes on a yearly basis the results of its deliberations and conclusions on ADI limits as WHO toxicology evaluations.

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Chlorpyrifos has been evaluated by the WHO Core Assessment Group for the JMPR in connection with establishment of human exposure guidelines.

International Guidance Values for Human Exposure to Chlorpyrifos



The World Health Organization (WHO) first evaluated the toxicology and health aspects of chlorpyrifos through the FAO/WHO Joint Meeting on Pesticide Residues (JMPR) during 1972, and subsequent reevaluations occurred during 1977 and 1982. The most recent re-evaluation of chlorpyrifos occurred during 1999, at which time the WHO considered more than 200 detailed studies in animals and human volunteers dealing with acute, subchronic, chronic, developmental, reproductive, neurological, and metabolic aspects. Based on this reevaluation, the WHO reconfirmed the existing its acceptable daily intake (ADI) in humans for chlorpyrifos of 0.01 mg/kg body weight/day. The ADI was based on both:

- 1) a No Observable Effect Level (NOEL) in animals of 1 mg/kg bw/day with inclusion of a 100-fold uncertainty factor related to between-species and within-species variability; and
- 2) a NOEL in humans of 0.1 mg/kg bw/day with inclusion of a 10-fold uncertainty factor for within-species variability.

The WHO also established an acute reference dose (ARfD) for single day exposures to chlorpyrifos of 0.1 mg/kg bw/day, based on a NOEL of 1 mg/kg bw/day from a human volunteer study with inclusion of a 10-fold uncertainty factor related to within-species variability. The WHO found no reason to include any additional uncertainty factors (e.g., for greater sensitivity of the young) in the calculation of these toxicological risk assessment endpoints beyond those routinely employed. In addition, the WHO concluded that chlorpyrifos:

- Is not a skin sensitizer
- Is not genotoxic
- Is not carcinogenic in rats and mice
- Has no effect on cognitive function at doses up to 5 mg/kg bw/day
- Exhibits low dermal absorption in humans (<2% in 180 hours)
- Is rapidly eliminated from the body and shows no evidence of potential for accumulation

Download:

- The [detailed evaluation report](#) resulting from the 1999 WHO/JMPR evaluation of chlorpyrifos toxicology information on the Inchem Web site.

Significance

The outcome of the WHO evaluation of chlorpyrifos confirms the availability of a full and complete database of studies and testing information conducted in compliance with international guidelines. Internationally relevant human exposure limits for chlorpyrifos, both on long-term (ADI) and short-term (ARfD) bases, provide useful reference points for both international advisory bodies and national authorities for risk assessment and risk management purposes. These endpoints are suitable for use with respect to both dietary (e.g., food and water intake) and non-dietary (e.g., operator, applicator) routes of exposure. Comparison of anticipated or measured levels of chlorpyrifos exposure in humans which may result from various uses provides the basis for decisions on which uses to authorize and with which precautions and limits. On the international level, the WHO-recommended chlorpyrifos exposure limits facilitate the establishment of various international standards including product quality specifications recommended by the FAO/WHO Joint Meeting on Specifications and Codex maximum residue limits recommended by the FAO/WHO Joint Meeting on Pesticide Residues. On the national level, the WHO-recommended exposure limits provide reference points for conduct of exposure and risk assessments associated with authorization or reevaluation of chlorpyrifos uses.

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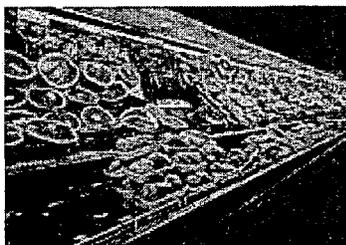
Food Quality

The Codex Alimentarius Commission (CAC) was created in 1962 to establish voluntary, international standards related to food quality in order to facilitate international trade. Food standards elaborated by Codex include maximum residue limits (MRLs) for trace concentrations of pesticide residues in food, and activities are coordinated by the Codex Committee on Pesticide Residues (CCPR).

The scientific evaluations upon which Codex MRLs are based result from the FAO/WHO Joint Meeting on Pesticide Residues (JMPR), which has been meeting since 1963. For the JMPR, World Health Organization (WHO) experts review toxicological and related data and estimate, when possible, acceptable daily intakes (ADIs) of the pesticides for humans. For the JMPR, Food and Agriculture Organization (FAO) experts review pesticide use patterns (good agricultural practices), data on the chemistry and composition of pesticides and methods of analysis for pesticide residues, and estimate maximum residue levels (MRLs) that might occur as a result of the use of the pesticides according to good agricultural practices.

Chlorpyrifos has been evaluated by both the FAO/WHO Joint Meeting on Pesticide Residues (JMPR) with respect to establishment of Codex Maximum Residue Limits (MRLs) on food commodities.

International Food Quality Standards for Chlorpyrifos



The Food and Agriculture Organization (FAO) of the United Nations first evaluated the food residue chemistry aspects of chlorpyrifos through the FAO/WHO Joint Meeting on Pesticide Residues (JMPR) during 1972, and a number of evaluations of new information have occurred since that time. During 2000, a complete reevaluation of chlorpyrifos residue chemistry data was conducted, at which time the FAO considered approximately 250 detailed studies focused on analytical methods, plant and animal metabolism, environmental fate, and field trials and food processing studies from around the

world. Based on this reevaluation, the FAO recommended maximum residue limits (MRLs) for chlorpyrifos on 48 different agricultural commodities from almonds to cauliflower to pig meat to peaches to wheat. Recommended MRLs were based on results of the field trials and relevant good agricultural practice (GAP) information for approved chlorpyrifos uses on a worldwide basis, and ranged from 0.01 to 40 ppm depending on commodity. Based on the human exposure limits for chlorpyrifos (ADI, ARfD) established by the WHO, the FAO considered also the potential dietary exposure to chlorpyrifos which might result from trace food exposures.

The detailed evaluation report resulting from the 2000 FAO/JMPR evaluation of chlorpyrifos residue chemistry information may be accessed on the FAO Web site (2.8MB ZIP).

The recommendations of the 2000 FAO/JMPR meeting concerning chlorpyrifos maximum residue limits (MRLs) for various food commodities were discussed and debated by the 2002 and 2003 meetings of the Codex Committee on Pesticide Residues (CCPR). Following an affirmative evaluation of the proposals, the Codex Alimentarius Commission adopted the recommended MRLs as official Codex MRLs during July 2003.

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Significance

Codex MRLs for chlorpyrifos provide harmonized food residue standards that are useful at both the national and international levels with respect to pesticide monitoring and management. At the national level, presence of residues in agricultural commodities at or below the Codex MRL concentration helps assure that good agricultural practice (GAP) has not been disregarded by excess application or inadequate pre-harvest intervals. With respect to international trade, Codex MRLs provide reference points for both exporting and importing countries with respect to determining suitability of the traded commodities. In this regard, the World Trade Organization through a 1995 agreement on the Application of Sanitary and Phytosanitary Measures (SPS) identified Codex MRLs as the official reference for food safety issues (CX/PR 98/13) which affect international trade and as the basis for resolution of any resulting trade disputes. The significant number of Codex MRLs that have been established for chlorpyrifos support its many worldwide uses.

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Water Quality

The objectives of the [Water Sanitation and Health \(WSH\)](#) program of the World Health Organization (WHO) include the reduction of water-borne illnesses and establishment of water quality standards for contaminants. Standards established by WSH include maximum limits for trace levels of pesticides which might appear in drinking water either accidentally through agricultural use or intentionally as part of public health programs.

Chlorpyrifos has been evaluated by the Water Sanitation and Health (WSH) program of the World Health Organization (WHO) with respect to establishment of drinking water quality guidelines.

International Water Quality Standards for Chlorpyrifos

During 2003 the World Health Organization (WHO) developed a recommended guideline value for chlorpyrifos residues in drinking water. The primary rationale for the WHO in making the recommendation was the public health use of chlorpyrifos for mosquito larvae control. The technical basis for the recommendation was the acceptable daily intake (ADI) for chlorpyrifos of 0.01 mg/kg body weight/day established by the 1999 WHO/FAO Joint Meeting on Pesticide Residues (JMPR). By following the standard WHO practice of reserving 10% of the ADI for drinking water intake, a drinking water guideline value for chlorpyrifos of 30 μ g/L (ppb) was proposed by WHO.

Download a copy of the [WHO drinking water guideline document](#) (23KB PDF) on the WHO Web site.

Significance

Monitoring and regulation of pesticide residues that may be present in drinking water are important aspects of pesticide management in many countries. Trace residues of chlorpyrifos may be present in water following intentional application of mosquito larvicide products or inadvertent entry (spray drift, surface runoff) resulting from agricultural uses. The WHO guideline value for chlorpyrifos provides a health-based reference point for regulatory authorities in determining the suitability of such water for human drinking water purposes.

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Public Health

The World Health Organization Pesticide Evaluation Scheme (WHOPES), set up in 1960, is an international program which promotes and coordinates the testing and evaluation of new pesticides proposed for public health use. The major work products of WHOPES include an international set of recommended pesticide products and procedures for public health protection and pesticide product quality, specifications.

Under WHOPES, new pesticides submitted by the agrochemical industry are evaluated for their effectiveness against disease vectors and nuisance pests and their toxicity to humans and beneficial species. The toxicity evaluations are performed by the WHO Core Assessment Group of the FAO/WHO Joint Meeting on Pesticide Residues (JMPR).

The Evaluation Scheme consists of four phases:

1. laboratory evaluation of efficacy
2. small-scale field evaluation on the natural population of pests
3. large-scale field trials of pest control efficacy and disease management
4. establishment of product quality specifications for pesticides

Chlorpyrifos has been evaluated by the WHO Pesticide Evaluation Scheme (WHOPES) with respect to public health use recommendations and product quality standards.

International Public Health Standards for Chlorpyrifos

Based on its broad-spectrum of insecticidal activity, chlorpyrifos has proven useful for the control of various vectors and pests of public health importance. The World Health Organization Pesticide Evaluation Scheme (WHOPES) has reviewed the use of chlorpyrifos with respect to mosquito larvae control (1980) and other public health uses including control of adult mosquitoes, fleas, bed bugs, cockroaches, spiders, ticks, and mites (1997). Recommended application methods and precautions for chlorpyrifos public health uses are outlined in the report "Chemical Methods for the Control of Vectors and Pests of Public Health Importance" issued by the WHO in 1997 (WHO/CTD/WHOPES/97.2).

In conjunction with the recommended application methods and precautions for chlorpyrifos as a public health pesticide standard, the WHO has also established product quality specifications for technical chlorpyrifos and emulsifiable concentrate (EC) formulations.

Download the existing WHO specifications for chlorpyrifos products for public health (29KB PDF) from the WHO Web site.

In addition to evaluations of product efficacy, the WHO also considers potential human and environmental risks as part of the WHOPES program. The 2002 chlorpyrifos product chemistry and toxicology evaluation (209KB PDF) by the WHO/FAO Joint Meeting on Pesticide Specifications

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(JMPS) summarizes the latest such consideration on the part of WHO.

Significance

Worldwide efforts to battle arthropod vector-borne disease are heavily dependent on use of chemical insecticides, including chlorpyrifos. Literally millions of human lives are at stake, and the WHO "roll-back malaria" program is just one example of a broad, global initiative to improve public health. The testing and recommended application methods and precautions for products and establishment of product quality specifications for public health pesticides serve as reliable references for international and national vector control efforts.

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Acutely Toxic Pesticides

Dow AgroSciences, as a member of CropLife International, fully recognizes that the safe management of pesticides represents a significant challenge in Developing Countries and Economies in Transition (DC/EITs), and supports CropLife initiatives that are committed to encouraging the responsible use of pesticides.

CropLife International is engaged in practical programs to reduce risks linked to pesticides and to educate farmers how to safely use pesticides. To date, programs supported by CropLife International have trained more than 2.5 million farmers and members of their communities in over 80 countries in the safe and effective use of pesticides. The plant science industry recognizes the need to increase the effectiveness of these programs and will continue to work in partnership with relevant stakeholders to achieve this goal.



The occurrence of Acute Pesticide Poisonings (APP) in DC/EITs is a complex issue and must be examined from a broad range of perspectives. Many farmers in these countries are very poor and their businesses suffer from low commodity prices. Their socio-economic conditions result in the use of the most cost effective tools available. These include the use of toxic products, which are mostly out of patent and produced by local manufacturers.

CropLife International is a member of the Acutely Toxic Pesticides Working Group of the International Forum on Chemical Safety (IFCS) commissioned by Forum III to provide input on the extent of the problem of acutely toxic pesticides in DC/EITs and provide guidance for sound risk assessment, management and risk reduction. The IFCS was created in 1994 to integrate and consolidate international efforts to manage chemical safety. The IFCS is represented with 155 governments, intergovernmental, non-governmental organizations as well and industry and private sector representatives.

A clear distinction has to be made between incidents of severe or fatal occupational poisonings and less serious poisoning incidents. CropLife International concurs with the findings of the IFCS Working Group that mild overexposure symptoms are principally a result of poor occupational hygiene practices including inadequate laundering of work clothes and poor personal hygiene such as not washing hands after use and before eating. Occupational practices are best addressed by stepping up education campaigns, such as those currently coordinated by CropLife Associations in cooperation with many stakeholders in rural communities around the world, rather than through legislation.

The more serious cases of occupational pesticide poisoning and community poisoning, which were the focus of the Working Group's attention, clearly require more careful analysis separate from cases of intentional poisonings. It can be concluded that serious occupational and accidental cases of pesticide poisoning are extremely rare, especially so in perspective to the more than one billion pesticide applications that are estimated to occur annually in DC/EITs. Sadly, the reality is that the majority of severe or fatal poisoning cases appear to be the results of suicide. This raises social questions that are far beyond the influence of the industry.

Given the complex nature of inadvertent pesticide exposure, preventive strategies will vary

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Healthy Food Research
according to the needs of particular DC/EITs and communities but clearly there is a need to strengthen awareness of proper hygiene practices amongst all user groups.

For more complete review of the CropLife Position, please review their [Position Paper \(181KB PDF\)](#) or visit their [website](#).

For further information on IFCS visit their [website](#).

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Food Safety and Food Chain: Process for Establishing Acceptable Daily Intake

Due to consumer concerns regarding potential residues on foods, both international and national regulators have developed an extensive system of tests to protect consumers from potential harm while providing the finest fruits and vegetables. The registration of a pesticide for use in gardens or farm fields requires an assessment of the potential negative effects of that pesticide on human health. To anticipate how a pesticide might impact human health, laboratory animals such as mice and rats are exposed to varying dosages of the pesticide in their foods – from very minimal to extremely high levels. Toxicologists then evaluate the observable effect(s) of consuming known quantities of the pesticide on acute, sub-chronic, chronic, mutational, reproduction and neurological effects in the test subjects. Information gained from such a test is evaluated by toxicologists and medical experts to determine potential human effects.

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1. Toxicologists from governmental authorities, such as United States Environmental Protection Agency (U.S. EPA), European Union (EU) Commission and the Japan Ministry of Health, Labor and Welfare (JMHLW); and international organizations, such as the United Nations Food and Agriculture Organization (FAO) and World Health Organization (WHO), begin the evaluation process by determining the quality of toxicological studies in terms of compliance to study guidelines and Good Laboratory Practice (GLP).
2. The second step in the evaluation process is the selection of the highest pesticide dose that does not cause any adverse effects to experimental animals. This dose level is referred to as the No-Observed Adverse Effect Level (NOAEL). The NOAEL value can be established from single or multiple exposure studies.
3. The NOAEL usually is divided by a safety factor of 100 (safety factors range from 10 to 1,000) to take into account individual differences among people and the extrapolation of human health from animal data. This value is known as the Acceptable Daily Intake (ADI). In the United States, the term 'Reference Dose (RfD)' is often used instead of ADI.
4. The ADI generally is expressed in terms of milligram of a pesticide consumed per kilogram of body weight (mg/kg) per day. It is the amount of a pesticide residue that, if ingested daily over a 70-year lifetime, a human could consume without expecting any health-related problems. The ADI is used as the toxicological indicator when pesticide residues are tested on foods designed for human consumption.



It must be emphasized that the ADI does not represent a level of toxicity. Individuals may, on occasion, exceed the ADI so long as their average daily intake is below the ADI. Although called an acceptable daily intake, the ADI should always be compared with average intakes over prolonged periods - not with day to day intakes.

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Chlorpyrifos North America Resource Center

Resource Center



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Physical/Chemical Properties

Chemical Name

O,O-diethyl O-(3,5,6-trichloro-2-pyridyl)phosphorothioate

Common Name

Chlorpyrifos (BSI, E-ISO, ANSI, ESA, BAN)

Molecular Weight

350.6

Empirical and Structural Formula

C₉H₁₁Cl₃NO₃PS

CAS Registry Number

2921-88-2

State

Crystalline solid

Color

White to tan

Odor

Mild mercaptan

Melting Point

41.5 – 42.5° C

Boiling Point

> 300° C

Vapor Pressure

3.35 mPa at 25° C

Density

1.51 g/ml at 21° C

Solubility, Mean

Acetone	>400 g/L at 20° C
Dichloromethane	>400 g/L at 20° C
Ethyl Acetate	>400 g/L at 20° C
Methanol	250 g/100mL at 20° C
Toluene	>400 g/L at 20° C
n-Hexane	>400 g/L at 20° C
Water	1.05 ppm (w/v at 25° C)

Partition Coefficient (n-octanol and water)

$K_{ow} = 50,000$

Stability

a) in sterile buffered water

pH 4.7 at 25° C: half-life of 63 days

pH 6.9 at 25° C: half-life of 35 days

pH 8.1 at 25° C: half-life of 23 days

b) in organic solvents

There have been no signs of degradation in xylene-range aromatic solvents used in formulations of chlorpyrifos.

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Degradation Pathway

Chlorpyrifos is a degradable compound, and a number of environmental forces may be active in its breakdown. In all systems (soil, water, plants and animals), the major pathway of degradation begins with cleavage of the phosphorus ester bond to yield 3,5,6-trichloro-2-pyridinol (TCP). This first step is a detoxification, as TCP has no insecticidal activity and is considered toxicologically insignificant by regulatory authorities. In soil and water, TCP is further degraded via microbial activity and photolysis to carbon dioxide and organic matter. In animals, TCP may be excreted directly or following conjugation; in plants TCP conjugates are sequestered.

Fate in Soil

Chlorpyrifos may enter the soil environment by direct application or through spray drift/foliar washoff. Laboratory soil studies demonstrate that chlorpyrifos is only moderately persistent and binds strongly to soil particles, preventing leaching to ground water.

When applied at normal agricultural rates, typical aerobic soil degradation half-lives are on the order of one to two months. Both microbial degradation and abiotic degradation (i.e., hydrolysis) are important factors in its dissipation from soil, with the latter being especially predominant in alkaline soils. At higher termiticidal application rates, the persistence of chlorpyrifos increases (half-lives of 6 months to four years), thus maintaining an effective termite barrier for several years.

Chlorpyrifos has a soil adsorption coefficient (K_{oc}) of greater than 5000, and so exhibits a strong tendency to be adsorbed by soil and soil organic matter. This places chlorpyrifos in the "immobile" leaching category and field-testing has confirmed the negligible downward mobility of chlorpyrifos. The strong adsorption to soil, together with the rapid degradation, results in limited surface runoff potential in agricultural settings. Large-scale field runoff studies have confirmed that even under relatively severe conditions (heavy rainstorms closely following application), generally less than 1 percent of the applied chlorpyrifos can move off the edge of treated fields through runoff water and eroding soil particles.

Fate in Aquatic Environments

Laboratory studies on the fate of chlorpyrifos in pure water indicate that hydrolysis and photolysis occur at moderate rates under neutral conditions. Hydrolytic and photolytic half-lives are both around a month, at neutral pH 25° C. Under more alkaline conditions, hydrolysis proceeds more rapidly, with half-lives of around two weeks observed at pH 9. In natural water samples, however, degradation often proceeds significantly faster; a 16-fold enhancement of hydrolysis rate has been observed in pond and canal water samples. Results of field-testing conducted in aquatic ecosystems corroborate the rapid dissipation of chlorpyrifos from natural waters. Half-lives in the water column of less than one day are typical, due to a combination of degradation, volatilization and partitioning into sediments. Dissipation rates in sediment are similar to those observed in soil.

Plant Fate and Metabolism

Results of greenhouse and field research studies show no tendency for chlorpyrifos soil residues to be taken up into plants through growing plant roots; chlorpyrifos is non-systemic in nature. On the surface of plant foliage, rapid dissipation of residue occurs. The most important route of dissipation is volatility, with photodegradation being somewhat less important. Typical foliar dissipation half-lives of 1 to 7 days have been observed. Dissipation rates from turfgrass and thatch are often slightly longer, with 7 to 10 day half-lives most common. Following foliar application, small quantities of chlorpyrifos are absorbed into plant tissue and are readily metabolized/detoxified into TCP conjugates.

From the standpoint of biological availability, dislodgeable foliar residues of chlorpyrifos comprise a rather small proportion of the total residue present and decline even more rapidly than total residues. Dislodgeable residues typically represent less than 10 percent of total residues, and half-lives of 0.5 to 3 days are common.

Aquatic Organism Bioaccumulation and Metabolism

Trace amounts of chlorpyrifos can be absorbed from surrounding water by fish and other aquatic organisms. Reported aquatic bioconcentration factors (BCF) for fish have ranged from 100 to 5,100, which reflects a propensity for chlorpyrifos to partition from water into tissues. Importantly, the residues absorbed by fish and other aquatic organisms are rapidly detoxified and excreted and, as a result, chlorpyrifos is not a bioaccumulative compound and does not increase in concentration by transfer up the food chain. Elimination half-lives of 0.6 to 3.4 days have been observed in fish and of 1.6 to 2.2 days for oysters. Fish biotransform chlorpyrifos to a variety of metabolites, including TCP and glucuronide conjugates of TCP. The TCP and conjugates formed are then excreted into the surrounding water.

Terrestrial Animal Fate and Metabolism

Chlorpyrifos is readily taken up from food, and absorption efficiencies of 41 to 72 percent have been observed. Dermal uptake of chlorpyrifos, however, has been found to vary significantly across species. Absorption efficiencies in mammals via the dermal route have been observed as low as 1 percent for man and as high as 60 percent for rats. In contrast, cuticular uptake by target insects may approach 90 percent efficiency. Mammals, birds and insects readily transform and metabolize chlorpyrifos. The primary metabolite, TCP, is readily excreted itself or in its conjugated form. Chlorpyrifos metabolism in animals is a dynamic process, and this is exemplified by the observed elimination half-life of 17 hours in the rat following an oral dose.

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Toxicological Properties of Chlorpyrifos

Mechanism of Action

Chlorpyrifos is one of the many organophosphate insecticides. Like other organophosphates, chlorpyrifos' insecticidal activity is caused by the inhibition of the enzyme acetylcholinesterase which results in the accumulation of the neurotransmitter, acetylcholine, at the nerve endings. This results in excessive transmission of nerve impulses, which causes mortality in the target pest. This reaction is also the mechanism by which high levels of organophosphate insecticides can produce toxic effects in mammals.

In mammals, acetylcholinesterase can be found in both nervous tissue and in red blood cells. However, the red blood cell enzyme is not associated with nerve conduction, and its depression alone is not associated with toxicity.

Mammals possess yet another enzyme known as plasma butyryl-cholinesterase, or pseudocholinesterase, which is also inhibited by organophosphate insecticides. It is an entirely different enzyme compared with the acetylcholinesterase found in nervous tissue and red blood cells. Pseudocholinesterase has no known function and its activity can be depressed without adverse effect.

Of the three cholinesterase enzymes, the plasma-derived pseudocholinesterase is generally the most sensitive to inhibition by commonly used organophosphate insecticides. This is especially true for chlorpyrifos-induced inhibition. The acetylcholinesterase enzymes found in red blood cells and nervous tissue also show large differences in sensitivity to chlorpyrifos; with the enzyme found in red blood cells being much more sensitive. Consequently, significant depression of both pseudocholinesterase and red blood cell acetylcholinesterase can occur without evidence of toxicity.

Furthermore, animal studies demonstrate that modest reductions in brain acetylcholinesterase activity in response to the administration of chlorpyrifos fail to elicit toxic effects. In these studies, observable signs of toxicity required a greater than 60 percent reduction in brain acetylcholinesterase activity. These data provide strong evidence that, with respect to chlorpyrifos, significant depression of brain acetylcholinesterase is required to cause toxicity in mammals.

Toxicology Testing

The potential for technical chlorpyrifos and chlorpyrifos-containing formulations to cause adverse health effects has been extensively examined in approved regulatory studies using laboratory animals. This information is supplemented by results of well-controlled, voluntary clinical studies.

Toxicity testing in animals is performed with the active ingredient and with formulations. Animal studies often involve use of exaggerated doses to fully explore toxic potential.

Acute Toxicity

Short-term (acute) exposure studies are mainly intended to determine the harmful effects that could occur due to an accident, misuse or deliberate ingestion of a large quantity of the product (e.g., suicide attempt). They may also attempt to predict the likelihood of skin and eye irritation and skin sensitization.

Oral and Dermal Toxicity

Chlorpyrifos is of only moderate toxicity by the acute oral and dermal routes of exposure in numerous animal studies.

The acute toxicity of formulated chlorpyrifos is generally less than that of technical chlorpyrifos. Toxicity also varies with formulation. Microencapsulated formulations and granules are less toxic than emulsifiable concentrates (EC).

Skin and Eye Irritation

Skin and eye irritation studies evaluate possible irritant or corrosive effects of a compound. These studies are also considered in classifying the acute toxicity of a compound. Skin and eye irritation studies are graded along certain norms:

- non-irritating
- positive indicates irritation, but no degree of severity
- slight, moderate, severe and corrosive indicate degrees of irritation
- reversible indicates initial irritation, the effects of which were reversed after a specific period of time.

Chlorpyrifos is not considered a skin irritant or skin sensitizer. However, prolonged or repeated exposure to emulsifiable concentrate (EC) formulations may cause skin burns. Granular (G), wettable powder (WP), microencapsulated and finished dilutions (e.g., ready to use) formulations are not likely to cause significant skin irritation.

Chlorpyrifos is poorly absorbed through the human skin, with dermal penetration measured at 1 to 3 percent. A single prolonged exposure of an EC concentrate might result in the material being absorbed in harmful amounts. A single prolonged exposure to G, WP and microencapsulated concentrates or finished dilutions of 1 percent or less are not likely to result in the material being absorbed through skin in harmful amounts.

Inhalation Toxicity

Due to the low vapor pressure of chlorpyrifos, acutely toxic levels of vapors cannot be attained at room temperature. A repeated inhalation study was conducted in which rats received nose-only exposures to chlorpyrifos vapors 6 hours/day, 5 days/week for 13 weeks, at concentrations of 0, 75, 147 or 296 $\mu\text{g}/\text{m}^3$ of air (0, 5, 10 or 21 ppb, respectively). No signs of toxicity were observed in any animals throughout the test. No effects were observed on plasma, red blood cell or brain cholinesterase, or on any other parameters evaluated. The experimental level of 296 $\mu\text{g}/\text{m}^3$ was a level that approached complete saturation of the air, a nearly impossible condition except under controlled

laboratory conditions.

Chronic Toxicity

Repeated oral studies of chlorpyrifos have shown the only effects to be those associated with the inhibition of cholinesterase enzymes. No effects were observed on any organs or tissues. Chlorpyrifos is not carcinogenic in lifetime animal studies. A long-term dietary study in rats showed the No Observable Effect Level (NOEL) to be 0.1 mg/kg body weight/day. No significant depression of plasma or red blood cell cholinesterase occurred at this dosage. Even in rats receiving 3.0 mg/kg/day of chlorpyrifos, no adverse effects were observed during the two-year test period.

Carcinogenicity

Chlorpyrifos was not carcinogenic in two-year dietary studies done with both rats and mice.

Mutagenicity

A number of mutagenicity tests have been conducted on chlorpyrifos - both *in vivo* (whole animal) and *in vitro* (test tube). The results indicate that chlorpyrifos has minimal mutagenic potential.

Teratogenicity

Chlorpyrifos is not considered teratogenic.

Human Toxicity

▪ **Voluntary Clinical Studies**

Chlorpyrifos is rather unique in that, in addition to the wealth of animal testing data, information from voluntary clinical studies is also available. Human volunteers ingesting either a single dose or daily repeated doses of chlorpyrifos showed that plasma butyryl-cholinesterase levels may be depressed by over 60 percent with no effect on red blood cell acetylcholinesterase levels. Moreover, in these same studies, no signs or symptoms of toxicity were observed. The test material was rapidly metabolized, with excretion of the principal metabolite (TCP) in the urine. The half-life for elimination of the principal metabolite from the body was 27 hours, which means that essentially all (>90 percent) of an oral dose of the chemical would be eliminated in 4 days. In the same study, chlorpyrifos, applied to the forearm of volunteers was shown to be absorbed through the skin in only limited amounts (1 to 3 percent of that applied).

▪ **Symptoms of Intoxication**

Signs and symptoms of organophosphate insecticide poisoning in humans may be headache, dizziness, loss of coordination, muscle twitching, tremors, nausea, abdominal cramps, diarrhea, sweating, pinpoint pupils, blurred vision, salivation, tearing, excessive urination and tightness in the chest. Obviously, many of these symptoms are nonspecific and are not unique to organophosphate poisoning. Measurement of plasma butyryl-cholinesterase enzyme via a simple blood test may differentiate exposure to organophosphate insecticides from other potential sources of aforementioned symptoms.

Immediate medical treatment should be sought if any of the above-mentioned signs become

apparent after exposure is known to have occurred. If you have additional health or safety questions regarding this molecule, consult your country's Material Data Safety Sheet (MSDS) as it will have local numbers and information. Within the United States, please call the PROSAR International Poison Center at 1-800-369-4352. Within Europe, please call 01553 76 1251 (UK)

Because chlorpyrifos acts on the enzymes in the blood, an antidote is available in cases of accidental or intentional overexposure. A health care professional should determine serum and/or red blood cell cholinesterase levels prior to administration of the antidote. Atropine by injection is the preferable antidote. Oximes, such as 2-PAM/protopam, may be therapeutic if used early. However, oximes should be used only in conjunction with atropine. Treatment is based on the judgment of the physician in response to actions of the patient. In all but exceptional cases, persons seriously poisoned with chlorpyrifos recover rapidly with appropriate treatment leaving no long-term effects. In case studies, persons showing mild symptoms of poisoning show a rapid and complete recovery even if antidote therapy is not used.

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Exposure, Risk, and Safety Information

Routes of Exposure and Potentially Exposed Populations

Exposure to chlorpyrifos may occur as a result of ingestion, skin contact, or inhalation of vapor or spray mist. These exposures may be associated with occupational use of chlorpyrifos via activities associated with the manufacture or through its handling and use by professional pesticide applicators or farmers. Non-dietary exposure of consumers may result following reentry into chlorpyrifos-treated areas of homes or yards. Due to the wide variety of agricultural uses of chlorpyrifos, dietary ingestion of trace chlorpyrifos residues in food also represents a potential route of exposure for consumers. Information for all these routes of exposure has been generated. Completion of risk and safety assessments involves a comparison of the magnitude of exposure with some toxicological endpoint (e.g., No Observable Effect Level), usually with inclusion of a safety factor. For chlorpyrifos, toxicological endpoints have been set based on studies in both animals and humans.

Occupational Exposure

- **Agricultural Workers**

Chlorpyrifos formulations may be applied to a myriad of agricultural crops by ground boom spray application, airblast application, aerial application, or soil incorporation. Studies have been conducted to assess exposures to mixer/loader operator, applicators and workers responsible for reentry into treated crops. All the agricultural worker scenarios tested have indicated that the No Observable Effect Level (NOEL) based on red blood cell acetylcholinesterase inhibition will not be exceeded when used according to the label.

- **Urban Pest Control Workers**

Chlorpyrifos formulations are applied by professional pest control and lawn care applicators in a variety of urban pest control scenarios, both indoors and outdoors. The most common urban uses involve indoor crack and crevice sprays, outdoor turfgrass spray and granule applications and application to the soil around and beneath structures for termite control. Several studies have been conducted to assess exposures to the applicators involved in these types of applications, and in all cases results have indicated that the NOEL based on red blood cell acetylcholinesterase inhibition will not be exceeded for labeled applications.

Non-Dietary Consumer Exposure

A number of exposure evaluations have been conducted to determine potential non-dietary exposures to consumers. These studies include evaluations performed within homes following the use of a chlorpyrifos-containing product and residue data collected from field trials. Based on studies that were conducted to evaluate exposures to chlorpyrifos during and following labeled uses, it is not expected that such use would cause adverse effects to the homeowner. Airborne concentrations of chlorpyrifos measured within homes following crack and crevice, spot and termite applications using a chlorpyrifos-containing formulation are low. Several studies have demonstrated that indoor airborne levels are consistently below the lifetime exposure guideline proposed by the National Academy of Sciences of 10 µg/m³.

Dietary Consumer Exposure

Use of chlorpyrifos products may result in the presence of trace residues in the harvested portions of various agricultural commodities for primary or secondary human consumption. Controlled field trials are conducted to determine maximum residue levels to which consumers may be exposed. For chlorpyrifos, more than 300 of these types of trials have been completed and the resulting database supports use of chlorpyrifos on more than 100 crops worldwide. In addition, actual market-basket data for residues present in agricultural products on supermarket shelves have been collected. This information indicates that actual dietary exposure levels are several orders of magnitude below those estimated from controlled residue trials.

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Wildlife and Other Non-Target Species

Chlorpyrifos and chlorpyrifos-containing products are toxic to fish and wildlife. Laboratory studies indicate moderate to very high toxicity to birds, fish, and terrestrial and aquatic invertebrates. Incorporation of granular formulations into soil mitigates risk to terrestrial organisms by reducing exposure and to aquatic organisms by reducing runoff. Care must be taken when using sprayable formulations to avoid inadvertent contamination of aquatic and off-site terrestrial habitats. The following is a summary of the ecotoxicological properties of chlorpyrifos. The qualitative statements characterizing toxicity are standard United States Environmental Protection Agency terminology.

Birds

Technical chlorpyrifos is moderately toxic to the mallard duck (*Anas platyrhynchos*), house sparrow (*Passer domesticus*) and starling (*Sturnus vulgaris*), highly toxic to the red-winged blackbird (*Agelaius phoeniceus*) and bobwhite quail (*Colinus virginianus*) and very highly toxic to the ringed-neck pheasant (*Phasianus colchius*) when administered as a single oral dose. Chlorpyrifos is moderately to highly toxic when fed to birds in their diet.

Aquatic Organisms

Technical chlorpyrifos is very highly toxic to fish and aquatic invertebrates. Acute LC₅₀ values range from less than 1 mcg/L to greater than 200 mcg/L. Therefore, Best Management Practices (BMP) should be followed to prevent the movement of chlorpyrifos into aquatic systems.

Non-Target Insects

As an insecticide, it is not unexpected that chlorpyrifos is toxic to non-target insects. Applications procedures should be used that will mitigate exposure.

Earthworms

Chlorpyrifos presents a low risk to earthworms. At typical application rates, chlorpyrifos should have little impact on earthworms.

Microorganisms

Chlorpyrifos exhibits little or no toxicity to microorganisms.

Terrestrial Plants

As an insecticide, chlorpyrifos is not expected to exhibit herbicidal activity.

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Ecotoxicology

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Fate in Aquatic Environments

Laboratory studies on the fate of chlorpyrifos in pure water indicate that hydrolysis and photolysis occur at moderate rates under neutral conditions. Hydrolytic and photolytic half-lives are both around a month, at neutral pH 25° C. Under more alkaline conditions, hydrolysis proceeds more rapidly, with half-lives of around two weeks observed at pH 9. In natural water samples, however, degradation often proceeds significantly faster; a 16-fold enhancement of hydrolysis rate has been observed in pond and canal water samples. Results of field-testing conducted in aquatic ecosystems corroborate the rapid dissipation of chlorpyrifos from natural waters. Half-lives in the water column of less than one day are typical, due to a combination of degradation, volatilization and partitioning into sediments. Dissipation rates in sediment are similar to those observed in soil.

Plant Fate and Metabolism

Results of greenhouse and field research studies show no tendency for chlorpyrifos soil residues to be taken up into plants through growing plant roots; chlorpyrifos is non-systemic in nature. On the surface of plant foliage, rapid dissipation of residue occurs. The most important route of dissipation is volatility, with photodegradation being somewhat less important. Typical foliar dissipation half-lives of 1 to 7 days have been observed. Dissipation rates from turfgrass and thatch are often slightly longer, with 7 to 10 day half-lives most common. Following foliar application, small quantities of chlorpyrifos are absorbed into plant tissue and are readily metabolized/detoxified into TCP conjugates.

From the standpoint of biological availability, dislodgeable foliar residues of chlorpyrifos comprise a rather small proportion of the total residue present and decline even more rapidly than total residues. Dislodgeable residues typically represent less than 10 percent of total residues, and half-lives of 0.5 to 3 days are common.

Aquatic Organism Bioaccumulation and Metabolism

Trace amounts of chlorpyrifos can be absorbed from surrounding water by fish and other aquatic organisms. Reported aquatic bioconcentration factors (BCF) for fish have ranged from 100 to 5,100, which reflects a propensity for chlorpyrifos to partition from water into tissues. Importantly, the residues absorbed by fish and other aquatic organisms are rapidly detoxified and excreted and, as a result, chlorpyrifos is not a bioaccumulative compound and does not increase in concentration by transfer up the food chain. Elimination half-lives of 0.6 to 3.4 days have been observed in fish and of 1.6 to 2.2 days for oysters. Fish biotransform chlorpyrifos to a variety of metabolites, including TCP and glucuronide conjugates of TCP. The TCP and conjugates formed are then excreted into the surrounding water.

Terrestrial Animal Fate and Metabolism

Chlorpyrifos is readily taken up from food, and absorption efficiencies of 41 to 72 percent have been observed. Dermal uptake of chlorpyrifos, however, has been found to vary significantly across species. Absorption efficiencies in mammals via the dermal route have been observed as low as 1 percent for man and as high as 60 percent for rats. In contrast, cuticular uptake by target insects may approach 90 percent efficiency. Mammals, birds and insects readily transform and metabolize chlorpyrifos. The primary metabolite, TCP, is readily excreted itself or in its conjugated form. Chlorpyrifos metabolism in animals is a dynamic process, and this is exemplified by the observed elimination half-life of 17 hours in the rat following an oral dose.

The conclusions that are contained within this chlorpyrifos.com web site relating to toxicological and/or environmental properties and effects are based on research and studies conducted by Dow AgroSciences or third parties. All such conclusions and findings are considered to be the opinions of Dow AgroSciences. Data substantiating these conclusions are available upon request.

Chlorpyrifos FAQs

Frequently Asked Questions about Chlorpyrifos

[What is chlorpyrifos?](#)

[How and when was chlorpyrifos discovered?](#)

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[Has chlorpyrifos been researched and tested?](#)

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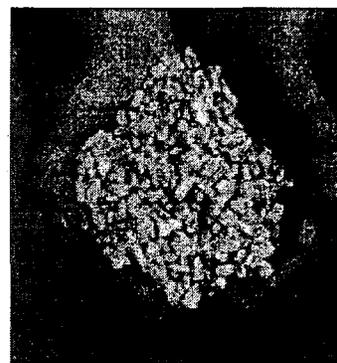
[There has been a chlorpyrifos spill. What should I do?](#)

[Does chlorpyrifos cause cancer?](#)

What is chlorpyrifos?

Chlorpyrifos, a member of the organophosphate family, is the active ingredient in a wide range of agricultural and urban pest products, including Lorsban* and Dursban* insecticides. Unless controlled, these insect pests cause billions of dollars of damage each year. Household pests can also transmit dangerous diseases and promote allergic reactions through stings and bites. The agricultural formulations are used extensively to minimize insect damage to corn, cotton, wheat, alfalfa, sugarbeets, peanuts, tree fruits, nut crops, and many vegetables.

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How and when was chlorpyrifos discovered?

Chlorpyrifos was first discovered by The Dow Chemical Company in 1962. Synthetic research with phosphorus-containing insecticides began in 1947. The most promising of this series was designated as Dowco* 179. The broad-spectrum insecticidal properties of this compound, later designated "chlorpyrifos," indicated that it possessed commercial potential. In the forty years since the discovery of chlorpyrifos, its broad-spectrum insecticidal activity has been put to use against a wide variety of insect pests through a number of commercialized products.

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How does chlorpyrifos function?

Chlorpyrifos, is a member of the organophosphate family. Like other organophosphates, its

insecticidal action is due to the inhibition of the enzyme acetylcholinesterase resulting in the accumulation of the neurotransmitter, acetylcholine, at nerve endings. This results in excessive transmission of nerve impulses, which causes mortality in the target pest.

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Has chlorpyrifos been researched and tested?

Chlorpyrifos, the active ingredient in Dursban and Lorsban insecticides, has been widely used and extensively studied for three decades, and manufacturers continue to update those tests with new technology each year. More than 3,600 studies and reports have been conducted examining the uses and impacts of chlorpyrifos on human health and the environment. No other pest control product has been researched more thoroughly.

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Where is chlorpyrifos labeled for use?

Currently, chlorpyrifos is labeled for use in 98 countries around the world. Most developed nations in the world count chlorpyrifos in their insect-fighting arsenal. There are 350 different labels in use worldwide, with 142 used in agriculture alone. It is also used to control over 250 non-agricultural pests such as termites, cockroaches, fleas, and ants found in and around our homes, buildings and lawns. With over two dozen different formulations (i.e. granular, sprayable liquid), chlorpyrifos can be used most effectively

by delivering the product in the best possible manner to the needed area.

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How is chlorpyrifos used?

The efficacy of chlorpyrifos has been tested under both laboratory and field conditions using a variety of formulations. The chemical is effective primarily at contact but may also kill target pests through ingestion and by vapor action. Chlorpyrifos has generally exhibited short residual activity on plant foliage, but it can be effective for several weeks in turfgrass thatch and on surfaces not exposed to direct sunlight. In addition, chlorpyrifos has been shown to be effective for up to several months to years in soil, depending on the rate applied.

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What happens to chlorpyrifos in the environment?

Based on extensive research and environmental safety assessments, the fate of chlorpyrifos in the environment is well understood. It is a degradable molecule and breaks down in the environment when exposed to microorganisms, chemical reactions and sunlight. Chlorpyrifos does not readily move from the site of application once dry.

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Why was chlorpyrifos reviewed under the US Food Quality Protection Act (FQPA)?

Since the passage of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) amendments in 1988, the US EPA has been conducting a comprehensive review of older pesticides (those initially registered before November 1, 1984) to consider their health and environmental effects and to make decisions about their future use. EPA examines health and safety data for these pesticide active ingredients and determines whether they are eligible for reregistration. To be "eligible," a pesticide must have a substantially complete database and must not cause unreasonable risks to human health or the environment when used in accordance with its approved label directions and precautions.

FIFRA as amended in 1996 by the Food Quality Protection Act (FQPA) requires that all pesticides meet new safety standards. EPA must be able to conclude with "reasonable certainty" that "no harm" will come to infants, children, or other sensitive individuals exposed to pesticides. All pesticide exposures -- from food, drinking water, and home and garden use -- must be considered in determining allowable levels of pesticides in food. The cumulative effects of pesticides and other compounds with common mechanisms of toxicity also must be considered.

Since chlorpyrifos was originally registered before 1984, reregistration was required under these regulations.

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I've heard that the use of chlorpyrifos around homes in the USA for termite control has been banned. Is this correct and if so, why is chlorpyrifos still being used in other countries?

This is not correct. It is very important to remember that in 1996, the US Environmental Protection Agency (US EPA) fundamentally changed pesticide regulation with the Food Quality Protection Act (FQPA). As part of FQPA the US EPA changed several key science policies and applied standards far more restrictive than those historically established by the scientific community and other competent regulatory authorities around the world, including Australia and the European Union.



Because of the FQPA, the rules changed, but the studies done with chlorpyrifos have not changed. The resulting limitations on uses in the US are not the result of any new data on chlorpyrifos but are the result of changes in the EPA's interpretation of the risk assessments. More than 3,600 studies and reports have been conducted examining critical aspects of chlorpyrifos products, making chlorpyrifos one of the most scientifically examined molecules.

The new regulatory standards now being implemented by US EPA made it necessary for the registrants of chlorpyrifos to make a difficult business decision that they could no longer continue to support the registration of a number of chlorpyrifos uses in and around homes. Thus the registrants of chlorpyrifos took the decision to voluntarily phase-out these uses.

The use of chlorpyrifos for termite control continues in the USA and has not been banned as reported in many popular press articles. Chlorpyrifos will remain available in the US for use as a termiticide for new residential construction (pre-treat) until December 31, 2005. This date may be extended, however, based on the results of an exposure study specific to this application.

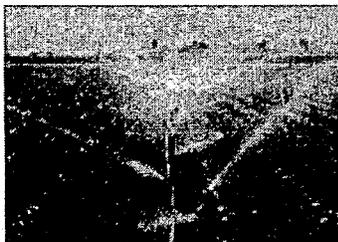
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I'm concerned about chlorpyrifos residues on my fruits and vegetables. What can I do?

Government studies, specifically those involving residue testing, continue to show that food quality and purity are being protected. For example, the US Food and Drug Administration (FDA) collects and analyzes almost 10,000 samples of fruits and vegetables yearly for pesticide residues. Since 1987, when the Administration began reporting the results of its monitoring program annually, more than 99 percent of domestic fruit and vegetable samples and more than 95 percent of imported samples have been found free of illegal pesticide residues or had low-level residues that fell within established tolerances.

Some have other concerns about unwashed produce as well (bacteria, waxy coatings, etc.). As a general practice, it is a good idea to always wash all fruits and vegetables before eating or cooking them. Produce that will not be peeled, such as strawberries or green onions, can be washed in plain warm water. If necessary, use a vegetable brush to remove surface dirt. Wash lettuce leaves individually. Produce that will be peeled or eaten off the rind, such as oranges or cantaloupes, should be washed on the outside with soapy water and rinsed well. Wash cutting boards with hot water, soap and a scrub brush to remove food particles. It is best to keep a separate cutting board for raw produce. However, if using one board, always wash the board and knives after cutting raw meat, poultry or seafood and before cutting another food to prevent cross-contamination.

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I'm concerned about chlorpyrifos residues in my drinking water. How do I know chlorpyrifos will not be found in my drinking water?

Drinking water exposure to pesticides can occur through ground water and surface water contamination. According to the United States Environmental Protection Agency (US EPA), the available environmental fate data suggest that chlorpyrifos has a low potential

to leach to groundwater in measurable quantities from most typical agricultural uses. For acute risk, the potential drinking water exposure derived from either ground or surface water is not of concern.

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What happens when people come in contact with chlorpyrifos?

It depends on the level of exposure. Based on studies that were conducted to evaluate potential exposure to labeled uses of chlorpyrifos, consumer exposure would be far too low to inhibit acetylcholinesterase, the target enzyme for its insecticidal activity. Gross exposure to chlorpyrifos, which would involve an intentional act or serious misuse of the product, could result in the inhibition of acetylcholinesterase enzyme and, possibly, clinical symptoms. Always read the product label carefully and follow instructions when using products containing chlorpyrifos.

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What kind of clinical symptoms are associated with overexposure of organophosphate insecticides?

Signs and symptoms of organophosphate insecticide poisoning in humans may be headache, dizziness, incoordination, muscle twitching, tremors, nausea, abdominal cramps, diarrhea, sweating, pinpoint pupils, blurred vision, salivation, tearing, excessive urination and tightness in the chest. In extreme cases (e.g., suicide attempts), exposure to organophosphate insecticides can result in respiratory paralysis and death.

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What should I do if I think I've been overexposed to chlorpyrifos?

If you think you have been overexposed to chlorpyrifos or have additional health questions regarding this molecule, consult your country's Material Safety Data Sheet (MSDS) as it will have local numbers and information. Within the United States, please call the PROSAR International Poison Center at 1-800-369-4352. Within Europe, please call 01553 761251 (UK).



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There has been a chlorpyrifos spill. What should I do?

If there has been a chlorpyrifos spill, or you have additional environmental questions regarding this molecule, consult your country's Material Safety Data Sheet (MSDS) as it will have local numbers and information.

Within the United States, please call the PROSAR International Poison Center at 1-800-369-4352. Within Europe, please call 01553 761251 (UK).

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Does chlorpyrifos cause cancer?

Chlorpyrifos shows no indication of causing cancer. Animal testing shows that chlorpyrifos is not harmful to DNA. Tests required by the United States Environmental Protection Agency (US EPA) for carcinogenic, mutagenic and teratogenic activities were all negative. Chlorpyrifos is not listed by the US EPA as a human carcinogen.

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The conclusions that are contained within this chlorpyrifos.com web site relating to toxicological and/or environmental properties and effects are based on research and studies conducted by Dow AgroSciences or third parties. All such conclusions and findings are considered to be the opinions of Dow AgroSciences. Data substantiating these conclusions are available upon request.



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Our Commitments Issues & Challenges

Great Lakes Water Quality Agreement

Great Lakes Water Quality Agreement (Agreement): This Agreement was put in place between Canada and the United States to develop cooperative actions to restore and maintain water quality in the Great Lakes Basin Ecosystem. The Agreement states that the best means to preserve the aquatic ecosystem and achieve improved water quality throughout the Great Lakes System is by adopting common objectives, developing and implementing cooperative programs and other measures, and assigning special responsibilities and functions to the International Joint Commission.

The Agreement's objective has been to preserve the aquatic ecosystems and it seeks to address the impact of persistent toxic substances, invasions of non-native species such as the zebra mussel, and shoreline and watershed development. Of particular importance to Dow is the focus on persistent toxic substances and the goals of virtual elimination. Dow has been supportive of emission reduction programs for persistent toxic substances as part of the Bi-national Toxics Strategy, a multi-stakeholder initiative created to pursue the objectives of the Agreement. Dow's worldwide voluntary commitment to reduce the release of priority compounds (Persistent, Toxic, Bioaccumulative compounds, known human carcinogens, selected ozone depleting substances, and high-volume toxic compounds) to air and water by 75% between 1995 and 2005 and to reduce the releases of dioxins by 90% in this same 10 year period, is indicative of our commitment around the globe to reducing the production and release of byproduct chemicals that are persistent in the environment.

For more on the Agreement and our industry position on this issue, please use the links below:

- [CGLI](#)
- [EPA "Great Lakes Water Quality Agreement"](#)
- [Environment Canada "Great Lakes Water Quality Agreement"](#)

Site Navigation:



[Dow Home: Our Commitments: Issues & Challenges:](#)
[Dioxin: Great Lakes Water Quality Agreement](#)

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Our Commitments Issues & Challenges

Current Regional Issues

For information regarding specific Dow sites where questions about dioxins have been raised, please refer to:

- [Michigan Operations – Midland, Michigan](#)
- [New Plymouth, New Zealand](#)

What Do You Think?

Dioxin

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[NPRI Dioxin Reporting \(Canada\)](#)
[Current Regional Issues](#)
[Midland, Michigan](#)
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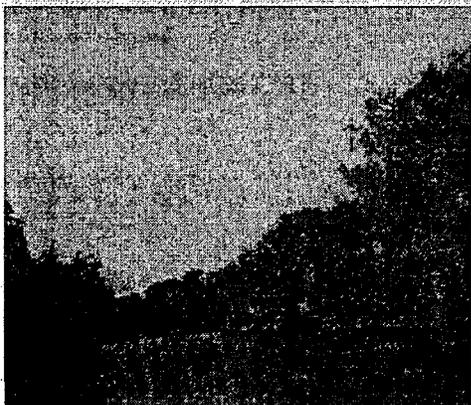
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Mid-Michigan Dioxin/Furan Situation

Dioxin/Furan Situation



The dioxin/furan situation along the Tittabawassee River and in Midland continues to progress. The best way to develop mutually agreeable solutions is by keeping the lines of communication open. Our aim is to keep you informed about progress on the matters that affect you.

Overview

What Are Dioxins

Work Scopes and

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Mid-Michigan Dioxin/Furan Situation Overview



The dioxin/furan situation along the Tittabawassee River and in Midland continues to progress, as Dow and the Michigan Department of Environmental Quality (MDEQ) work with the community to find solutions.

The best way to develop mutually agreeable solutions is by keeping the lines of communication open, and working collaboratively with the community to address issues and concerns. We're always

updating our website to keep you informed about progress and encourage you to visit often.

If you already have given us your feedback, thank you. Keep your comments coming, and please contact us any time by sending us an [e-mail](#) or calling 989-636-9323.

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[Mid-Michigan](#): [Dioxin/Furan Situation](#): [Overview](#)

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Mid-Michigan Dioxin/Furan Situation What Are Dioxins and Furans?

What Are Dioxins and Furans?

"Dioxins and furans" refer to a group of chemical compounds that share certain similar chemical structures and biological characteristics. Dioxins and furans are an unwanted byproduct of combustion, both from natural sources like forest fires and from man-made sources like power plants, backyard burn barrels and industrial processes.

In this section

[History of Dioxins and Furans in the Tittabawassee River Parts Per Trillion](#)

According to the EPA, dioxins and furans released into the air during combustion can be carried long distances before settling to the earth's surface. As a result, they are found almost everywhere at low levels. Dioxins and furans are produced by both natural and man-made processes and have therefore existed for centuries. The term "current background" is used to refer to the levels of dioxins and furans in the environment today.

Dioxins and furans falling to land from air emissions tend to bind tightly to vegetation and soil. When dioxins and furans are released into water, they tend to settle into sediments where they can become trapped and stationary, or be ingested by fish and other aquatic organisms. Dioxins and furans trapped in sediment can be further transported during activities that dislodge sediment, such as flooding or dredging.

In the United States, the primary way people are exposed to dioxins and furans is through eating meat and dairy products. The animals we eat are exposed to background levels of dioxins and furans in the soil, on vegetation and in some commercial animal feeds. Eating meat or dairy products exposes us to these low levels of dioxins and furans. Over time, we accumulate dioxins and furans in the fatty tissues of our own bodies.

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Mid-Michigan Dioxin/Furan Situation Work Scopes and Plans



"Scope of Work" refers to Dow's plans to address the local dioxin/furan situation. It is a high-level outline that defines the approach for the Tittabawassee River and for Midland soils. Dow has submitted two Scope of Work documents to the Michigan Department of Environmental Quality (MDEQ), as required in the

In this section

[Freeland Festival Park](#)
[Imerman Memorial Park](#)
[West Michigan Park](#)
[Center Road Boat Launch](#)
[Wild Game Sampling Study](#)

Michigan Operations 10-year operating permit.

Download the full Scope of Work Documents:

[Tittabawassee River and Floodplain \(9.2 MB PDF\)](#)

[Midland Area Soils \(2.7 MB PDF\)](#)

The Scope of Work includes short- and long-term plans. Short-term plans are also called Interim Response Actions (IRAs). IRAs are actions based on existing data and are activities designed to reduce potential exposure to dioxins or furans.

The first step in the long-term plan is called the Remedial Investigation (RI). The Remedial Investigation includes several studies and activities, and includes an ecological risk assessment, as well as collection and evaluation of samples to characterize the areas to be studied.

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New Zealand Responsible Care

Dow AgroSciences (NZ) Limited - Current Issues and Challenges

The Dow AgroSciences plant located in New Plymouth, New Zealand, previously manufactured various phenoxy herbicides including 2,4,5-T. The manufacture of 2,4,5-T at the New Plymouth site occurred from 1962 until 1987 when it was voluntarily withdrawn from the market in favour of a replacement product. Public and regulator attention has been focused over the years on claims of alleged ill-health as a result of these historic operations.

The New Zealand Government has undertaken extensive studies of background levels throughout the country of a range of organochlorines including dioxin. These broad national studies include testing air, soil, rivers, estuaries, blood serum, breast milk and food which have all confirmed very low levels of dioxin in the New Zealand environment compared to other countries.

The Government has commissioned local air, groundwater, soil and blood serum testing in the community around the plant. In addition the authorities have undertaken a detailed community health record review and have exhaustively pursued public claims of improper waste disposal. Although some local dioxin levels are elevated relative to typical New Zealand values, none of these national or local studies has indicated significant cause for concern.

The company has also commenced its own study to evaluate the health status of its past and present employees.

These many studies are referred to in the "Frequently Asked Questions" section of this site, as are the other key subjects of public debate. The company is committed to full and proper discussion and consultation with its employees, the community and with regulatory authorities and the extensive detail on this site reflects that commitment.

For further information:

[Dow AgroSciences Frequently Asked Questions \(FAQ\)](#)

[New Zealand Government FAQ on Dioxin](#)

[New Zealand Government report on the health risk of Dioxin \(767 KB PDF\)](#)

Publications about organochlorines in New Zealand are listed alphabetically in this Ministry for the Environment bibliography
[Organochlorines Research in New Zealand - A Bibliography](#)

[Do You Have Questions ?](#)

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SANFORD J. LEWIS, ATTORNEY

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2005 FEB -9 PM 4:34
OFFICE OF CHIEF COUNSEL
DIVISION OF CORPORATION FINANCE

February 7, 2005

Office of the Chief Counsel
Division of Corporation Finance
Securities and Exchange Commission
450 Fifth St., N.W.
Washington, D.C. 20549

Re: Shareholder Proposal Submitted to Dow Chemical Corporation
On Behalf of Daniel Clowes (Report Regarding Certain Toxic Substances From
Dow Chemical Products Widely Detected in Humans)

Dear Sir/Madam:

Daniel Clowes (the Proponent) is a beneficial owner of common stock of Dow Chemical Company who has submitted a shareholder Proposal to Dow Chemical Company (the Company) through his representative, Trillium Asset Management Corporation. We have been asked by the proponent to respond to the letter dated January 4, 2005, sent to the Securities and Exchange Commission by Gibson, Dunn & Crutcher, LLP, on behalf of the Company. In that letter, the Dow Chemical Company contends that the proponent's shareholder Proposal may be excluded from the Company's 2004 proxy statement by virtue of rules 14a-8(i)(7) and 14a-8(i)(10).

We have reviewed the Proponent's shareholder Proposal, as well as the letter sent by the Company, and based upon the foregoing, as well as the relevant rules, it is our opinion that the Proponent's shareholder Proposal must be included in Dow Chemical's 2004 proxy statement and that it is not excludable by virtue of those rules.

SUMMARY

The Company asserts that the Proposal is excludable as involving ordinary business in a variety of ways including that the request is for too detailed a report, that it impermissibly calls for an assessment of risk, it attempts to control lobbying, or to otherwise micromanage the management's responsibilities for selection and marketing of product lines. The Company also contends that it has substantially implemented the request.

The resolution is not excludible as ordinary business because it is focused on a fundamental public policy issue, the production of persistent bioaccumulative pollutants, facing the Company. In particular, it is evident that the resolution is not a request for a highly detailed report, but rather requests a level of summarization needed to illuminate trends related to the public policy issues facing the Company. It does not attempt to require or prescribe financial risk assessment, but instead requests information needed by shareholders on which product lines are targeted by impending public policies. In addition, the requested reporting does not amount to an attempt to control lobbying but

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instead, is a simple request for the Company to discuss with its shareholders how various European regulatory proposals may or may not impact the Company. Similarly, the Proposal does not seek to dictate marketing strategy, but appropriately calls for the company to either consider phasing-out the production of persistent bioaccumulative pollutants consistent with public policies, or explain why it is not doing so. Finally, the actions requested in the resolution have not been substantially implemented by the Company because the core concerns raised by the resolution have not been reasonably and substantively addressed by the Company. In fact several of the statements which the company purports to implement the resolution are materially misleading.

BACKGROUND

The proponent's shareholder proposal pertains to the Company's policies on the use and production of chemicals which persist in the environment and build up in living things - persistent bioaccumulative pollutants - including dioxins. This relatively small group of compounds is under heightened scrutiny by international, federal, state and local policymakers, who have been targeting many of them for elimination.

Because the Company's product lines arguably makes it one of the world's leading producers of products that can be linked to formation and emission of persistent bioaccumulative substances at some point during their life cycle, the trends calling for elimination or strict authorization of these compounds pose a major public policy and marketplace challenge to the Company.

- In recent years, the Company was immersed in large controversies concerning specific products and sites. For instance, in 2003 the US Supreme Court opened the door to a new round of lawsuits by Viet Nam veterans and their families due to exposures related to the herbicide produced by Dow and other companies, Agent Orange. Also in 2003-2004, the controversy surrounding the contamination of almost 50 miles downstream of Dow's headquarters with dioxin heated up further. The state of Michigan commissioned a study showing serious threats to wildlife in the region, and also warned residents to avoid contact with the contaminated soil. Pilot residential sampling conducted thus far has shown elevated levels of dioxin in the yards tested. There are an estimated 2,000 properties in the floodplain. In addition, the state is poised to release results from a pilot sample of blood from residents in the contaminated area to determine if they have elevated levels of the contaminant in their bodies. Preliminary evidence suggests the residents tested may have a range of levels that are higher than the average population. In addition, Dow is funding a \$15 million study to determine blood levels of dioxin in area residents.

- Body burden testing – the testing of human tissues for the presence of synthetic chemicals, has proliferated in recent years and led to growing attention on the role of Dow Chemical in exposing the public to toxic chemicals. The Centers for Disease Control conducting tissue testing which showed that one particular Dow product, chlorpyrifos, is found in 93% of the population, and that the average child aged 6-11 was found to have exposure at four times the level the USEPA considers acceptable for long term exposure. This type of testing is changing the policy landscape in which the company functions.

- Dow Chemical is the world's leading producer of vinyl chloride monomers, one of two key building blocks in the production of PVC plastics. PVC has come under fire as a 'worst in class plastic' for many reasons, including its link to persistent bioaccumulative toxicants. A report published by the Global Development and Environment Institute at Tufts University in December 2003 reviewed the economics of alternatives to PVC as well as the array of environmental policies being adopted by various governments and institutions to encourage that shift. The report notes widespread action to move away from PVC around the world. The report also found that less toxic alternatives are successfully competing with PVC in many applications and markets. It also concluded that a PVC phase-out is now "achievable and affordable." **Though a PVC phase-out may be achievable on a societal basis, and the advocacy for such phase-out is mounting primarily due to dioxin-generation concerns, the impacts on Dow and its shareholders may be substantial.**

- The European Union, through the European Commission, in 2003 proposed a new Europe-wide chemical regulation program, known as REACH. REACH stands for Registration, Evaluation, and Authorization of Chemicals. Registration requires companies to provide data on their products including toxicity and information about how humans or the environment might be exposed to them. This will place the responsibility and cost for information about the industry's products on the industry. Evaluation will be required for chemicals produced in large amounts or chemicals that are especially toxic. One consequence of evaluation might be to ban certain uses of a chemical. The most toxic chemicals would require authorization. These chemicals could include carcinogens, mutagens, reproductive toxicants, and chemicals that persist and accumulate in the environment. One potential outcome of the authorization requirement can be an outright ban on a chemical in favor of a safer alternative.

The focus of policy instruments at every level is increasingly on giving priority to the elimination of production of persistent bioaccumulative substances, because policymakers have concluded that as long as these products are marketed, they will

eventually enter and pollute the environment either as products, as byproducts of their production, or in the form of pollutants that result from disposal of the products. Therefore, several of the products that the Company is producing are likely to be impacted by the groundswell of policy seeking phase-outs of problematic products.

The Company, however, is focusing on controlling pollutants emitted from its facilities, rather than moving away from toxic-generating product lines such as vinyl chloride. As a result, the proponents believe that the Company may be on a collision course with public policy – failing to change its product lines to track the emerging direction of public policy.

History of the Shareholder Resolution

For the 2003 shareholder meeting, proponent Daniel Clowes filed a resolution similar to the present one. The 2003 resolution asked for the company to issue a report “summarizing the company’s plans to remediate existing dioxin contamination sites and to phase out products and processes leading to emissions of persistent organic pollutants and dioxins.” The company asserted that the resolution encroached upon excludible matters of “ordinary business,” but the SEC staff rejected that argument.

For the 2004 shareholder meeting the proponent submitted a revised resolution, which requested that the company fill gaps in transparency, namely:

- How public policies may impact the company’s product lines, including the Stockholm POPs treaty, Great Lakes Water Quality Agreement and the proposed European REACH program.
- The list of Dow Chemical products anticipated to require specific authorization or be restricted under the proposed European “REACH” program.
- A company plan and timeline for phase-out of each product involving a persistent, bioaccumulative chemical or byproduct, or an explanation of why alternatives cannot be substituted, explaining how the company will respond to rising regulatory, competitive and public pressure.
- A listing of the reasonable range of projected costs of remediation or liability anticipated for (a) Midland, Michigan, (b) Agent Orange, and (c) each of the other potentially material toxic sites and issues facing the company.

The SEC staff agreed with the company's assertion that the resolution was excludible because it encroached on the ordinary business of the company. The staff letter focused on the fact that the resolution for 2004 requested a report including "a range of projected costs of remediation or liability" for Midland, Michigan, Agent Orange, and each of the other material toxic sites facing the company. The staff letter stated that there was some basis for finding that the resolution related to ordinary business (i.e. "evaluation of risks and liabilities").

Because the profile of these issues as public policy matters has only grown in the subsequent year, the proponents have revised and refiled the Proposal, omitting the clause regarding "a listing of the reasonable range of projected costs of remediation or liability," and only asking the management to issue a report filling the following gaps in transparency:

- Analyze implications for the Company of the human blood testing trend, including the CDC tests showing pervasive exposures to chlorpyrifos;
- Describe how public policies may restrict markets for each category of Dow product lines, including under the Stockholm POPs treaty, emerging state programs, and the proposed European REACH program.
- List Dow products anticipated under the proposed European "REACH" program to require specific authorization or be restricted.
- Provide a plan and timeline for phase-out of each product involving a PBT chemical or byproduct, or an explanation of why alternatives cannot be substituted, explaining how the Company will respond to rising regulatory and market pressures to eliminate these substances.

Dow Chemical, through its attorneys, asserts first that the resolution relates to ordinary business. Secondly, the Company also asserts that the resolution has been substantially implemented. We disagree with the Company, and provide our analysis below.

I. The resolution is not excludible as ordinary business because its focus is on fundamental public policy issues facing the Company.

A Proposal cannot be excluded by Rule 14a-8(i)(7) if it focuses on significant policy issues. As explained in *Roosevelt v. E.I. DuPont de Nemours & Company*, 958 F. 2d 416, (DC Cir. 1992) a Proposal may not be excluded under clause (c)(7) if it has "significant policy, economic or other implications". *Id.* at 426. Interpreting that standard, the court spoke of actions which are "extraordinary, *i.e.*, one involving 'fundamental business

strategy' or 'long term goals.'" *Id.* at 427.

In order for a shareholder proposal to be excludable under Rule 14a-8(i)(7), the proposal must not only relate to a matter of ordinary company business, but it must also fail to focus on a significant policy issue. As explained in the Commission's most recent interpretive release on the matter:

The general underlying policy of this exclusion is consistent with the policy of most state corporate laws: to confine the resolution of ordinary business problems to management and the board of directors, since it is impracticable for shareholders to decide how to solve such problems at an annual shareholders meeting.

The policy underlying the ordinary business exclusion rests on two central considerations. The first relates to the subject matter of the proposal. Certain tasks are so fundamental to management's ability to run a company on a day-to-day basis that they could not, as a practical matter, be subject to direct shareholder oversight. Examples include the management of the workforce, such as the hiring, promotion, and termination of employees, decisions on production quality and quantity, and the retention of suppliers. However, proposals relating to such matters but focusing on sufficiently significant social policy issues (e.g., significant discrimination matters) generally would not be considered to be excludable, because the proposals would transcend the day-to-day business matters and raise policy issues so significant that it would be appropriate for a shareholder vote.

The second consideration relates to the degree to which the proposal seeks to "micro-manage" the company by probing too deeply into matters of a complex nature upon which shareholders, as a group, would not be in a position to make an informed judgment. This consideration may come into play in a number of circumstances, such as where the proposal involves intricate detail, or seeks to impose specific time-frames or methods for implementing complex policies. . . .

Timing questions, for instance, could involve significant policy where large differences are at stake, and proposals may seek a reasonable level of detail without running afoul of these considerations.

Interpretive Release 34-40018 (May 21, 1998)

It is evident from the Interpretive Release that there are two prongs to the analysis 1) subject matter and 2) level of detail. Looking first to the subject matter inquiry, it is

important to observe that even if the proposal relates to the day-to-day operations of the company, it is still permissible if it focuses on sufficiently significant policy issues. Similarly with the second inquiry, the proposal is permissible if the level of detail it seeks is "reasonable" and "involve(s) significant policy issues."

What is thereby apparent from the Interpretive Release is that that the fundamental consideration is whether the proposal focuses on and involves a significant policy issue. If the subject matter and the level of detail are sufficiently linked to the significant policy issue, the company cannot exclude it. Thus even though a proposal may relate to day-to-day tasks of the company and probe into those matters with some detail, as long as the proposal focuses in a reasonable fashion on a sufficiently significant policy issue it is permissible under the Commission's Interpretive Release and Rule 14a-8(i)(7).

Although the Company implicitly acknowledges that the Proposal raises public policy issues, it contends that the details suggested in the supporting statement delve into excludable ordinary business matters rather than major policy issues. As we will explain below, in this instance the items requested in the proposed report are at a level of summarization needed to illuminate trends related to the public policy issues facing the Company. Therefore the Proposal may not be excluded, because it deals exclusively with major policy matters.

A. Summary of the public policy challenges to the Company posed by its product lines.

1. Dioxins

Dioxins are a general scientific term for a group of chlorinated substances -- dioxins and furans -- which all exhibit similar chemical and physical properties. Seventeen members of this group are considered most toxic. USEPA, Draft Exposure and Human Health Reassessment of 2,3,7,8-Tetrachlorodibenzo-*p*-Dioxin (TCDD) and Related Compounds, September 2001.

Dow produces an array of products which can lead to the emission of dioxins. According to industry data, dioxins are produced and emitted in the production of vinyl chloride monomers (VCM's), for instance. Dow is one of the world's largest producers of these feedstocks -- materials that are the components of polyvinyl chloride plastics. When polyvinyl chloride products are disposed after use, their incineration is also believed by many experts to lead to the generation of dioxin, for instance, in municipal incineration or in house, car, or landfill fires. While the amount of dioxins released depends most importantly on combustion conditions and control technologies, dioxin is indisputably released. USEPA, Draft Exposure and Human Health Reassessment of 2,3,7,8-

Tetrachlorodibenzo-*p*-Dioxin (TCDD) and Related Compounds, September 2001.

Dow also produces a variety of chemicals that can be associated with dioxin formation either during manufacture, or during use or disposal if incinerated. Those chemicals include chlorinated pesticides, chlorinated solvents, and elemental chlorine. The environmental advocacy group Greenpeace has targeted Dow as one of the leading root sources of dioxin given the Company's product line and an assessment of dioxin formation associated with the entire life cycle of the Company's products. Greenpeace, *Dow Brand Dioxin*, 1995.

The Environmental Protection Agency issued its Updated Draft Reassessment of Dioxin in 2001. The in-depth scientific review, the most exhaustive review of a single compound ever undertaken by the agency, affirmed and amplified the already known hazards of dioxins. The biggest change in the new draft is that EPA has found that the cancer risk from exposure to dioxin is 10 times greater than reported in 1994. The new review also underscores concerns about the developmental and reproductive effects of dioxin exposure in children indicating that children, particularly developing infants, are highly sensitive and vulnerable to the toxic effects of dioxin. The review concludes that impacts on development, the reproductive system and metabolism—may be occurring in people who are exposed to the high end of the general population's "background" levels.

There is also human evidence that dioxin is toxic in tiny amounts, and can disrupt many systems of the body. The large body of evidence on dioxin has demonstrated effects including cancer, reproductive and developmental harm, disruption of normal hormone functions, skin rashes (chloracne), immune suppression, endometriosis, diabetes and liver damage.

During 2003, the Dow Chemical Environment, Health and Safety team heard a presentation from the USEPA regarding the dioxin reassessment. Linda Birnbaum, Director of the EPA's Environmental Toxicology Division, Health Effects Research Laboratory, informed Dow officials that the information used by EPA in assessing cancer risks is based on human evidence, and shows that any exposure to dioxin poses an added cancer risk.

2. Persistent Bioaccumulative Toxics (PBT's)

Persistent bioaccumulative toxics (PBT's) are substances that are known to persist in the environment, accumulate and bioconcentrate in the food chain, and cause threats to life as a result of their presence. Because of these characteristics, even small amounts of PBT's, if released over time, have the potential to concentrate in the food chain, posing risks to consumers.

Numerous public policy bodies and instruments are targeting products that lead to PBT's and dioxins as a priority public health and environmental concern.

In 1993, the American Public Health Association, the largest association of public health professionals in the US, with over 50,000 members, endorsed a phase-out of chlorine and chlorinated compounds in industry processes, in part, because of the link between PBT formation and chlorinated products. The proposed phase-out would only allow exceptions if an industry could show that an individual use is safe.

In 1992 and again in 1994, the International Joint Commission on the Great Lakes recommended that the United States and Canada develop a timetable to sunset the use of chlorine and chlorine-containing compounds in industrial feedstocks because of potential PBT formation during manufacture, use and disposal. Their recommendation was based on their reading of the Great Lakes Water Quality Agreement, an agreement negotiated between the US and Canada.

In Europe, the Paris Commission on the Northeast Atlantic and the Barcelona Convention on the Mediterranean Sea and several other informational forums have called for the total elimination of chlorine in manufacturing processes.

The Stockholm Convention on Persistent Organic Pollutants, which entered into force on May 2004, states in its Annex C, which addresses dioxins, that:

Priority should be given to the consideration of approaches to prevent the formation and release of the chemicals Useful measures could include:

- (a) The use of low-waste technology;
- (b) The use of less hazardous substances;
- (c) The promotion of the recovery and recycling of waste and of substances generated and used in a process;
- (d) Replacement of feed materials which are persistent organic pollutants or where there is a direct link between the materials and releases of persistent organic pollutants from the source;
- (e) Good housekeeping and preventive maintenance programmes;
- (f) Improvements in waste management with the aim of the cessation of open and other uncontrolled burning of wastes, including the burning of landfill sites. When considering Proposals to construct new waste disposal facilities, consideration should be given to alternatives such as activities to minimize the generation of municipal and medical waste, including resource recovery, reuse, recycling, waste separation and promoting products that generate less waste. Under this approach, public health concerns should be carefully considered;

- (g) Minimization of these chemicals as contaminants in products;
- (h) Avoiding elemental chlorine or chemicals generating elemental chlorine for bleaching.

It also states that:

When considering Proposals to construct new facilities or significantly modify existing facilities using processes that release chemicals listed in this Annex, priority consideration should be given to alternative processes, techniques or practices that have similar usefulness but which avoid the formation and release of such chemicals.

In 2003 the European Union, through the European Commission, proposed a new Europe-wide chemical regulation program, known as REACH. REACH stands for Registration, Evaluation, and Authorization of Chemicals. Registration requires companies to provide data on their products including toxicity and information about how humans or the environment might be exposed to them. This places the responsibility and cost for information about the industry's products on the industry. Evaluation is required for chemicals produced in large amounts or chemicals that are especially toxic. One consequence of evaluation might be to ban certain uses of a chemical. The most toxic chemicals would require authorization. These chemicals could include carcinogens, mutagens, reproductive toxicants, and chemicals that persist and accumulate in the environment. One potential outcome of the authorization requirement can be an outright ban on a chemical in favor of a safer alternative.

As indicated by these examples, the focus of policy instruments at every level is increasingly on giving priority to the *elimination of production* of persistent bioaccumulative substances, because policymakers have concluded that as long as these products are marketed, they will eventually enter and pollute the environment through products and disposal pathways. Therefore, several of the products that the Company is producing are not only targeted by public policy for emissions reduction at the site of production but they are also targeted for phase-outs of product sales and distribution.

3. Body Burden Testing

Within the last two years, new public policy attention has been focused on the human "body burden" of dioxin, chlorpyrifos and other persistent toxics. See Appendix 1. Body burden testing is increasingly the focus of policymakers for evaluating the public concern posed by chemicals, by measuring the amount of the chemical found in the tissues of humans.

Body burden testing presents a specific and formidable public policy challenge -- the Company's public visibility, and negative publicity, has been increased by the emergence of government and NGO activities that have begun to focus on the availability of new technologies for testing of presence of chemicals in human bodies, which is leading to a national international trend that increasingly points the way towards culpability regulation and potential liability of Dow Chemical. For example, the Pesticide Action Network North America, a nongovernmental organization, has estimated in its report "*Chemical Trespass: Pesticides in Our Bodies and Corporate Accountability*" based on market data that the Dow Chemical Co. contributed at least 80 percent of the chlorpyrifos exposure in the US. The Centers for Disease Control, a government agency, has concluded that 93 percent of Americans have the chemical chlorpyrifos in their bodies and most notably that the average child aged 6-11 was found to have exposure at four times the level the USEPA considers acceptable for long term exposure. See articles, Appendix 1. The appendix includes some of the following outbreak of media coverage on the body testing issue and its role in public policy:

7/12/2004, The Montreal Gazette, *The worst families of environmental contaminants*
6/21/2004, Ventura County Star, *Bill would allow testing for pollution in humans*
5/31/2004, Mercury News, *Legislation seeks to measure levels of pollutants in people*
5/12/2004, The Charlotte Observer, *Buy organic to limit exposure to pesticides*
5/11/2004, Associated Press, *Study: American Pesticide Levels Are High*
4/16/2004, Inside EPA, *State Biomonitoring Efforts Seen As Leading To More Chemical Bans*
3/28/2004, San Francisco Chronicle, *Toxic America: Tracking the hazardous chemicals that seep stealthily*
3/22/2004, The Register-Guard, *Biomonitoring reveals chemicals within bodies*
2/24/2004, The Oakland Tribune, *State proposes 'bio-monitoring' plan*
2/23/2004, Baltimore Sun, *What's in you that shouldn't be*
2/17/2004, The Washington Post, *The Body Chemistry Cocktail*
2/17/2004, WebMD, *What Chemicals Are Lurking Inside Your Body?*
1/20/2004, The Wall Street Journal, *Toxins in Breast Milk*
12/31/2003, DOW JONES, *Your Body, Your Superfund Site*
12/24/2003, Associated Press, *Scientists begin measuring pollution in human bodies*

4. Summary: Public Policy Converges on Dow Product Phaseouts

The resolution is not excludable because the issues that proponents focus upon in this resolution represent the most formidable policy issues facing the Dow Chemical Co. today. As a maker of persistent bioaccumulative toxic substances the Company is being

challenged on numerous policy fronts to eliminate many of its product lines. The rapid emergence of body burden test data which finds Dow products and byproducts such as chlorpyrifos and dioxin in human tissues may accelerate the pressures for elimination of some Dow product lines. There can be no more formidable policy challenge to a Company then when public policies are converging to question the very product lines that the Company bases its business upon.

B. The Proposal does not “micromanage” but rather requests a level of summarization needed to illuminate trends related to the public policy issues facing the Company.

The Company asserts that the Proposal does not address any general policy issue, but rather seeks to micromanage disclosures by the Company on toxics by delving into details related to the Company's ordinary business operations. To make this argument the Company asserts that this resolution is like the nearly identical resolutions in *Ford Motor Co.* (March 2, 2004) and *General Motors* (April 7, 2004).

These resolutions are completely different from the Proposal. In the *Ford* and *General Motors* Proposals the proponents requested a detailed assessment by the company as to **whether global warming exists and prescribed a series of scientific criteria which the companies should utilize to make that assessment.** In particular Ford argued that, in order to meet the terms of the resolution, the company would have had to expend a tremendous amount of capital to hire a team of scientists, purchase scientific instruments, and conduct a myriad of tests in order to determine whether or not global warming or cooling exists. It would have required company staff to evaluate the current annual global production of carbon dioxide into the atmosphere from a myriad of sources; current annual global absorption of carbon dioxide from the atmosphere by several sources; the effects of the percent increase/decrease in radiation from the sun on global warming and cooling; and determine the relevant costs and benefits of global warming and cooling. **Because this Proposal called for, again in the words of the Staff, “the specific method of preparation and the specific information to be included in a highly detailed report” it was excluded.**

In contrast to the Ford and General Motors resolutions, here the Proponent is not asking the company to undertake any new scientific studies, but simply to report on the implications of what is happening in the company's policy environment – namely the proliferation of studies and tests being conducted by others regarding human exposures to chlorpyrifos and other Dow products and byproducts, new and emerging European regulation of Dow products, and phase-out of PBT chemicals be addressed in an annual report. The Proposal is not in any way seeking information that requires an advanced technical evaluation by the company – such as the atmospheric gases, data on carbon dioxide absorption, or analysis of sun effects that were sought in the Ford and GM

resolutions. The Proposal is of a completely different species – seeking a general report on an important public policy issue.

What partly distinguishes the current resolution from the ones that cross the line into ordinary business is the lack of focus on the means by which the Company will fill the transparency gaps. The present resolution leaves the Company great flexibility in determining how to best address the issues. Contrary to the Company's assertion that the request seeks to micromanage, the proponents leave the Company flexibility in determining how will go about reporting on these issues.

The Company says that because the proponents focus on the issue of body burden testing as a focus for Dow Chemical's responses, the Proposal goes into too much detail to specify how the Company should engage in its disclosure practices. But as noted above, body burden testing is one of the most important public policy developments in the company's operating environment, and has implicated specific Dow products and activities.

The current controversy between the proponents and the management contrasts with the resolution in the *E.I. Du Pont De Nemours and Co.* (March 8, 1991) in which proponents argued over the difference of a few months in the company's CFC phase-out timeline. Rather than arguing over a few technical details as the company suggests to be the difference between the resolution and the company's practices, in reality there is a broad gap between information that is relevant to investors and sought by the proponents, and the information that the Company is choosing to disclose.

It also appears that the Company intended to cite *E.I. Du Pont De Nemours and Co.* (February 13, 1990) but mistakenly identified it as *E.I. Du Pont De Nemours and Co.* (February 8, 1991).¹ The *E.I. Du Pont De Nemours and Co.* (February 13, 1990) Proposal dealt with the clean up and remediation of a uranium mill site in Texas. The site was in the process of being cleaned up and was under the supervision of the appropriate government agencies. There was no dispute that the problem needed to be addressed and remediated, rather the resolution in *Du Pont* sought to impose specific clean up methods and goals. That is very different from this Proposal. The Proponents are not seeking to dictate the manner or method of addressing the issues, rather are requesting a level of summarization needed to illuminate trends related to the public policy issues facing the Company and how the company's responses address those trends.

C. The Proposal does not call for an improper risk or liability assessment.

¹ This error is evident from the fact that the company discusses a Du Pont case concerning uranium milling and *Du Pont* (February 8, 1991) does not cover that subject while *Du Pont* (February 13, 1990) does.

The Company cites the resolution's language to argue that it impermissibly encroaches upon the ordinary business of the Company to assess how existing, emerging, and proposed regulations may restrict its markets, and requires an assessment of risk related to environmental or health regulations.

However, in reality the resolution merely requires the company to develop a report providing investors with the basic information needed to assess how the company will respond to certain trends and pressures. Taking each of the gaps in transparency identified in the resolution one by one:

- Analyze implications for the Company of the human blood testing trend, including the CDC tests showing pervasive exposures to chlorpyrifos;

This requires an appraisal of how the human tissue testing trends may affect the environment in which the company does business – its reputation, prospects for future regulation, increased negative attention on its product lines, etc.

- Describe how public policies may restrict markets for each category of Dow product lines, including under the Stockholm POPs treaty, emerging state programs, and the proposed European REACH program.

This requires the company to state which of its product lines are implicated under which of the emerging public policies. It anticipates a simple listing of public policies that are emerging, and links to the various product lines that are being targeted for phaseout by those policies.

- List Dow products anticipated under the proposed European "REACH" program to require specific authorization or be restricted.

As with the above list, this listing would be developed by comparing the current European REACH program with the chemicals produced by Dow, to indicate to investors which product lines may be subject to authorization or elimination in European markets. As noted by Insight Investments, Appendix 2, as many as 20% of chemicals may be phased out by REACH.

- Provide a plan and timeline for phase-out of each product involving a PBT chemical or byproduct, or an explanation of why alternatives cannot be substituted, explaining how the Company will respond to rising regulatory and market pressures to eliminate these substances.

In light of the various public policies that are calling for phaseout of PBT product lines, this clause asks the company to either provide its plans for phaseout of the products, or an explanation of how the company intends to otherwise weather the growing pressures to eliminate the substances.

When a resolution may require some assessment of economic impacts of environmental and regulatory risks on the Company, this fact has not historically made the resolution excludable. For example, in *Occidental Petroleum Corp.* (February 2, 2001) the resolution explicitly called for “a report on the **financial and legal risks and liabilities** of the company's operations in Northeastern Colombia.” (Emphasis added.)

In *Phillips Petroleum Co.* (March 13, 2002) the Proposal requested that the company's board of directors prepare a report on the potential environmental damage that would result from the company drilling for oil and gas in the coastal plain of the Arctic National Wildlife Refuge, including the **financial costs of the plan and the expected return**. The staff found that the resolution was not excludible as “ordinary business.”

In *Wal-Mart* (March 14, 2003) the shareholder proposal requested that the company's board review the company's policies for food products containing genetically engineered ingredients and report to shareholders on the risks, financial costs, benefits and environmental impacts of using these ingredients in items sold or manufactured by the company. The supporting statement for the resolution is particularly relevant to this discussion because much of it concerned new and emerging regulation of genetically engineered ingredients. Specifically, it pointed out the following:

- the European Union has proposed regulations to phase out by 2005 antibiotic-resistant marker genes, widely used to develop GE seeds
- Upon ratification by 50 countries, the Biosafety Protocol, signed by over 100 countries, will require that genetically engineered organisms (GEOs) intended for food, feed and processing must be labeled "may contain" GEOs. Countries can decide whether to import those commodities based on a scientific risk assessment;
- Countries around the world, including Brazil, Greece, and Thailand, have instituted moratoriums or banned importation of GE seeds and crops;
- Labeling of GE foods is required in the European Union, Japan, New Zealand, South Korea and Australia,

Finally, the resolution concluded by urging that this report identify the scope of the Company's products that are derived from/contain GE ingredients.

It is evident from this language that the resolution was focused on asking the company to describe the impact of existing, recent, and emerging regulations on the company. In this respect the *Wal-Mart* resolution is virtually identical to the Proposal.

Also it is clear from many recent cases that it is completely appropriate for a resolution to ask a company how it will respond to rising regulatory pressure on its product lines, or how emerging public policies are likely to impact those products.

For instance, in *Anadarko Petroleum Corporation* (February 4, 2004), *Apache Corporation* (February 6, 2004), *Unocal Corporation* (February 23, 2004), *Valero Energy Corp* (February 6, 2004), *Reliant Resources Inc.* (March 5, 2004) the Staff concluded that the Proposals properly asked the company to prepare a report on how “the company is responding to rising regulatory, competitive, and public pressure to significantly reduce” greenhouse gas emissions. In all five of those cases the companies made essentially the same argument that the Company is making here, i.e. that an evaluation of competitive advantages and risks related to regulations is a fundamental part of ordinary business operations. All five, like the Company, based their argument on *Xcel Energy Inc.* (April 1, 2003). However, in these cases the Staff rejected the companies’ arguments in favor of the proponents’ arguments.² Specifically, the proponents argued (1) that “it is hard to imagine any Proposal involving significant policy issues that does not involve one or more regulatory, litigation or reputational risks” and (2) “[w]ere the Staff to agree with Unocal's argument, it would effectively be repealing (in violation of the Administrative Procedure Act) the Commission's determination of what the Rule is intended to mean [that asking for a report on significant public policy challenges does not constitute excludible ordinary business], which determination itself constitutes a part of the Rule.” Citing *ACTWU v. Walmart*, 821 F.Supp. 877 (S.D.N.Y. 1993), *aff'd* 54 F.3d 69 (1995).

Those regulatory cases are analogous to the Proposal in two ways. One, the Proposal’s language asking how “the company will respond to rising regulatory and market pressures to eliminate these substances” is virtually identical to the language in *Anadarko*, *Apache*, *Unocal*, *Valero*, and *Reliant* which asked how the company would “respond to rising regulatory, competitive and public pressure to significantly reduce greenhouse gas emissions.”

In *Occidental Petroleum Corp.* (February 2, 2001) the resolution expressly called for “a

² In *Valero Energy Corp* (February 6, 2004) and *Reliant Resources Inc.* (March 5, 2004), the proponents elected not to respond to the companies’ request for a no-action letter. Even under those circumstances the Staff still rejected the companies’ arguments.

report on the **financial and legal risks and liabilities** of the company's operations in Northeastern Colombia." (Emphasis added.) In *Phillips Petroleum Co.* (March 13, 2002) the proposal requested that the company's board of directors prepare a report on the potential environmental damage that would result from the company drilling for oil and gas in the coastal plain of the Arctic National Wildlife Refuge, including the **financial costs of the plan and the expected return.**

Those cases, like the present resolution, provided examples of a generalized request for information. They required more in depth financial information and risk assessment than is anticipated in the current resolution. These cases did not require a particular accounting methodology, or level of detail. Rather, they appropriately requested a generalized level of financial information related to a significant policy issue confronting the Company.

Also, in *Maxxam Inc.* (March 26, 1998) the Staff concluded that a proposal requesting the company to prepare a report on strategies for ending all operations that cut, damage, remove, mill or otherwise involve old growth trees was not ordinary business. The staff noted that it was not ordinary business because it related to the adoption of a policy "designed to address a major ecological and environmental matter."

It is also important to point out that this resolution is unlike those that have been rejected by the SEC staff as focusing on specific methods and issues of risk accounting that encroached upon the ordinary business of the company. This case stands in stark contrast to cases the Company cited -- *Newmont Mining Company* (February 4, 2004), *The Dow Chemical Company* (February 13, 2004), *Xcel Energy Inc.* (April 1, 2003), *Cinergy Corp.* (December 23, 2002), *Willamette Industries, Inc.* (March 20, 2001), and *The Mead Corporation* (January 31, 2001) because in those cases the proposals made specific reference to methods of accounting for risk or liability, which the staff deemed to be micromanagement of the practices reserved to the management.

The present Proposal is in no way analogous to the cases cited by the Company. Those proposals delved into the methodology of evaluation of certain risks and liabilities and thereby sought to intrude into the minutia and detail of the company's ordinary business of accounting. This Proposal seeks a general report disclosing information regarding a significant policy issues and there is no implication of methodology of assessment of financial or economic impact. There is no attempt to dictate the methodology used to collect or evaluate the information, the framework for reporting requirements, or what precise information is required.

In *Xcel Energy* and *Cinergy* a nearly identical resolution was proposed which would have required reporting on global warming impacts on the company. The resolution was

notable in its breadth and vagueness—attempting to prescribe a standard for ongoing risk reporting for the long term—something that a company already does or should be doing in its annual 10 K reports and as part of the management discussion and analysis. Similarly, in the *Willamette* case, shareholder proponents attempted to prescribe a framework for reporting of environmental liabilities, namely an estimate of worst case financial exposure due to environmental issues for the next ten years. In *Mead* the shareholder was requesting that the company report on the company's "liability projection methodology . . . and an assessment of other major environmental risks, such as those created by climate change." (emphasis added). Finally, in *Dow* the proposal expressly called for the company to identify and publish the "reasonable range of costs of remediation or liability."

It is useful to note the successful arguments made in the *Unocal* (February 23, 2004) case, in which the proponent argued that "it is hard to imagine any proposal involving significant policy issues that does not involve one or more regulatory, litigation or reputational risks. Were the Staff to agree with Unocal's argument, it would effectively be repealing (in violation of the Administrative Procedure Act) the Commission's determination of what the Rule is intended to mean, which determination itself constitutes a part of the Rule." Proponent letter dated February 11, 2004 citing *ACTWU v. Walmart*, 821 F.Supp. 877 (S.D.N.Y. 1993).

Other recent examples supporting the present resolution include, *General Electric Co.* (February 2, 2004) in which the permitted resolution requested that the company's board of directors report on expenditures relating to the health and environmental consequences of PCB exposures and the early version of the current resolution in *Dow Chemical Co.* (March 7, 2003) which requests that the company's board of directors issue a report summarizing the company's plans to remediate existing dioxin contamination sites and to phase out products and processes leading to emissions of persistent organic pollutants and dioxins. See also e.g. *Freeport-McMoRan Copper & Gold Inc.* (February 10, 1997); *Unocal Corp.* (March 6, 1996); and *Amoco Corp.* (February 1, 1996).

D. Requested reporting on policy developments does not amount to an attempt to control lobbying so as to be excludible "ordinary business."

The request to report on various policy developments in no way represents an excludible attempt by the proponent to dictate the Company's lobbying practices. **Although the resolution asks for reporting regarding some issues of public policy that are in current deliberation, the resolution does not ask for the Company to take any particular position in the context of lobbying.** Moreover, even if it did, there is precedent for allowing such concerns and requests as part of resolutions addressing larger public policy issues.

With respect the cases cited by the Company, *International Business Machines Corporation* (March 2, 2000), *Electronic Data Systems Corporation* (March 24, 2000), *Niagara Mohawk Holdings, Inc.* (March 5, 2001), and *Brown Group, Inc.* (March 29, 1993), these resolutions were excluded because they appeared “directed at involving (the company) in the political or legislative process relating to an aspect of (its) operations.” That is simply not the intention, nor would it be the effect, of this Proposal. The present resolution does not attempt to dictate the company’s political activities or lobbying. It is not prescriptive in defining any lobbying perspectives or actions to be taken in the course of, or after, preparing the requested report. Rather, it simply asks the Company to discuss with its shareholders how various European Proposals may or may not impact the Company. Consequently, the cases cited by the Company or not relevant to this discussion.

With regard to resolutions on lobbying and political matters, if anything the commission Staff has grown more lenient in recent years. For instance, staff did not treat as ordinary business a resolution asking *Bank of America* (December 30, 1999) to adopt a policy that it not make or solicit any political contributions. And it did not treat as ordinary business a resolution directed toward *General Electric* (December 20, 1999) requiring a summary of GE’s federal and state campaign finance contributions, policies on allocation of shareholder funds for political purposes, or lobbying position on campaign finance reform. See also *Citigroup, Inc.* (January 27, 2004) (shareholder Proposal, which requests that this company prepare and submit to shareholders an annually updated report addressing the company’s policies on political contributions) and *Time Warner Inc.* (February 11, 2004) (substantially the same).

Proponent believes that the Company is keeping shareholders in the dark on information that, taken together, may demonstrate the material impacts of the Company’s materials policies.

In the *Coca-Cola Company* (February 2, 2000), the resolution called for the board to require Coca-Cola to promote the retention and development of bottle deposit systems and laws and to cease efforts to replace deposit and return systems in developing countries. The company argued that the Proposal would be excludible as ordinary business because it would necessitate lobbying for, and not against, laws requiring bottle deposit systems. The proponent prevailed after arguing that the Proposal concerns broad social issues; more specifically, the need to alter economic actions in order to meet the needs of (ecological and social) sustainable development.

In *General Electric Company* (February 9, 1998), the resolution called for the Company to develop and report on criteria for military contracting, the company argued that two-

thirds of the proposed criteria listed in the supporting statement are clearly generic business issues (e.g., ethical business practices; environmental impact; stability of employment; lobbying and marketing; competitive bidding; prison, child, or forced labor). The Proponent prevailed, however, by arguing that the subparagraph of the Proposal dealing with lobbying and marketing is intended to raise the military related issue of whether the company generates demand for armaments, either in foreign countries or here in the United States. Because the Proposal specifically concerns "military criteria," it was not excludable by virtue of (c)(7).

In *Chevron Corporation* (March 23, 1987), the resolution called for the corporation to 1) state publicly to the Angolan Communist government that it will terminate operations in Angola unless the government takes [a series of step listed] and 2) expend no resources to influence the policy of the U.S. government concerning Angola, Namibia, Zaire, and South Africa. The Company argued that the Proposal would interfere with Chevron's ability to exercise its business judgment in the selection, operation, and closing of corporate facilities and in the conduct of lobbying activities in an area directly related to the Corporation's ordinary business. The SEC Staff rejected this argument because even though lobbying of the Angolan government might have been affected, the resolution related to a major public policy issue.

E. Requests for a report on whether and when the Company will phase out products and processes leading to emissions of persistent organic pollutants and dioxins are major policy questions rather than ordinary business.

The resolved clause of the shareholder resolution asks the Company to issue a report summarizing its response to public policies calling for the Company to phase out products and processes leading to emissions of persistent organic pollutants and dioxins. In light of the above background discussion, the issue of phase-out of products and processes is clearly a major public policy issue and reflective of major, long term strategic questions facing the Company.

Thus, the part of the resolution that asks for a plan and timeline for a phase-out of P.B.T. products is consistent with many other resolutions that have been cleared by SEC Staff based on similar public policy challenges facing companies. This included *Dow Chemical* (March 7, 2003). In that resolution, as in this year's, the primary focus was on the need for reporting on the Company's responses to public policies calling for the phase-out of certain product lines that result in the generation of persistent toxic substances.

A long line of SEC Staff precedents regarding product and materials phase-outs supported the Staff's decision that the Dow resolution in 2003 was not excludable as

ordinary business.

For example, in the *HCA/Columbia* and *Universal Health Services* decisions (both available March 30, 1999), health care providers were asked to phase out the use of polyvinyl chloride in medical devices. Also, a similar resolution was found not to intrude on ordinary business, focusing on medical device manufacturer *Baxter International* (March 1, 1999) calling for the company's phase-out of PVC in medical devices. PVC is one of the key substances produced by Dow that would also be a target of the present resolution.

In *Time Warner Inc.* (available February 19, 1997) a resolution on the phase out of the use of chlorinated paper by the publisher, as a paper user, was found to not be ordinary business. In *Union Camp Corporation* (February 12, 1996) a resolution asked the company to "establish a schedule for the total phaseout of processes involving the use of organochlorines in its pulp and paper manufacturing" (due to dioxin concerns). The Staff ruled that it could not be excluded as relating to ordinary business. In *Chevron Corporation* (February 11, 1998) a requirement to report on toxic compounds, including dioxin, released from refineries, was found not to be ordinary business.

Also relevant are tobacco cases such as those involving Philip Morris and Loews Corporation (parent of tobacco company Lorillard). In *Philip Morris Companies, Inc.* (March 14, 1990) the Proposal requested the company to amend its Articles of Incorporation to provide a prohibition against the company engaging in the tobacco business after a specified date. It was found not excludable as ordinary business. In *Loews* (February 22, 1990) a shareholder Proposal for eventual cessation of manufacture of tobacco products, the company unsuccessfully argued that directing it to phase out its focus on particular products involves "ordinary business operations". The Proposal is also consistent with a previously allowed *Dow Chemical* resolution (February 11, 1980) which requested the company to:

establish a review committee to examine and evaluate the existing and potential health consequences of 2,4,5-T, Silvex and their derivatives, and to make recommendations to the Board relating to the economic justification of continued production of these herbicides. The committee shall have the following structure and duties;

- 1) The committee shall be no less than seven persons and shall include outside directors and representatives of management, employees and non-company persons expert in environmental science, medicine and public health;
- 2) Release its report on the public health consequences of these herbicides to the board and shareholders within 6 months of the 1980 annual meeting;

3) Funds to be expended by the committee shall be limited to reasonable amounts as determined by the board.

Be it further resolved that the shareholders request that Dow Chemical place a moratorium on all production destined for export of these herbicides until publication of the review committee report.

In that matter, Staff responded that the resolution was not directed to Dow's ordinary business operations despite its consideration of the consequences and economic justification of individual products.

More than twenty years after that Staff decision, the Company is deeply enmeshed in and affected by the public policy issues related to its production, sales and release of products which can lead to the generation of persistent toxic substances including dioxins. Dioxin contamination as a result of historic and ongoing operations by the Company remains an important issue. Dow's operations, at their global headquarters in Michigan, are thought to be responsible for contamination of an entire watershed downriver from its plant. The Company may face substantial liability in that matter. The 1980 resolution is environmentally relevant today, because dioxin generated as part of 2,4,5-T production may have added to the dioxin loading in the region now looming as a substantial liability. Dow's operations at other plant sites may well also have resulted in some contamination of the local environment.

As public policy increasingly moves towards greater concern and control of dioxin and other PBT's, the issue only grows in importance and relevance for the Company and its shareholders.

The proponent believes that if the Company does not heed public policies calling for the speedy phase out of dioxins and persistent toxic compounds, and products which significantly generate these compounds during their life cycle, it will also be vulnerable to additional liability suits which could negatively impact shareholder value. It may also be vulnerable to loss of market share due to downward pressure on product sales and production worldwide.

The issues involved are not ordinary business because they address "a major ecological and environmental matter." In *Maxxam Inc.* (March 26, 1998) the Staff concluded that a proposal requesting the company to prepare a report on strategies for ending all operations that cut, damage, remove, mill or otherwise involve old growth trees was not ordinary business. The Staff noted that it was not ordinary business because it related to the adoption of a policy "designed to address a major ecological and environmental matter."

Finally, the two cases cited by the Company regarding product marketing policies, *Johnson & Johnson* (January 12, 2004) and *Pfizer Inc.* (January 25, 2004), are inapplicable to the present circumstances. In *Johnson & Johnson*, the overwhelming focus of the resolution was on “pricing and marketing policies.” The resolution had asked the company to “Create and implement a policy of price restraint on pharmaceutical products for individual consumers and institutional purchasers, utilizing a combination of approaches to keep drug prices at reasonable levels and report to shareholders by September 2000 on changes in policies and pricing procedures for pharmaceutical products. The supporting statement made it clear how the resolution sought to establish a policy to “include a restraint on each individual drug and that it not be based on averages which can mask tremendous disparities: a low price increase for one compound and a high price increase for another; one price for a “favored customer” (usually low) and another for the retail customer (usually high).” This is in contrast to the language of the present proposal which is primarily focused on a phase-out of materials targeted by public policies.

The *Pfizer* proposal called for the company to establish procedures “to provide needed and necessary information to (Lipitor) study participants when their participation (in the study) is terminated.” In this instance the resolution was attempting to dictate the terms and procedures of how the company conducted its product testing pursuant to FDA procedures. This attempted to interpose procedures into an area of FDA regulated procedure, and to dictate the details of product testing procedures that were both within the FDA’s rules and the management’s ordinary business duties. Thus the *Pfizer* resolution involved prescribing the details of the company’s own scientific study protocols and ethics in the course of its marketing efforts. That is not even remotely comparable to the issues addressed in the Proposal such as the need for the company to report to investors on the implications of evaluations and studies *being conducted by others*.

II. The actions requested in the resolution have not been substantially implemented by Dow Chemical Management.

Dow claims that its publications, principally on its web pages, “substantially implement” the reporting requested by the Proposal. The Company has published information that mentions some of the issues in the resolution. But to determine “substantial implementation” one must ask whether the core concerns of shareholders raised by the resolution have been reasonably and substantively addressed by the Company. Proponents assert that those concerns have not been effectively addressed, and further,

that several of the statements on the Dow website are actually materially misleading to investors and other readers.

In our view, the Company has not substantially implemented the Proposal for two separate reasons:

- First, it has not provided the substantive information requested by the Proposal.
- Secondly, we believe the information that the Company does provide is often materially misleading. Publication of information that may itself pose violations of SEC rules 14a-9 and 10(b)(5) because it is materially misleading cannot, in our opinion, be a substantial fulfillment of a shareholder resolution requesting disclosure on major public policy issues by the Company.

In the following analysis we will walk through the items listed by Dow and show why the Company's publications do not fill the informational gaps targeted by the shareholder resolution.

A. Human exposures to chlorpyrifos and body burden testing.

The Company's public disclosures regarding the health and environmental impacts of its organophosphate insecticide chlorpyrifos is incomplete and in some instances misleading. Furthermore, Dow's disclosures do not adequately address recent "biomonitoring" (body burden) data indicating widespread human exposure to chlorpyrifos.

The Company states on its public chlorpyrifos website that:

Chlorpyrifos products have been extensively researched and tested over many years. More than 3,600 studies and scientific reports have been provided to the agencies that regulate crop protection around the world. These data support the continued registration of chlorpyrifos.³

Dow presents its view of the chemical's technical properties, environmental and terrestrial animal fate, environmental impacts and impacts to people through occupational, dietary and non-dietary exposure. The overall picture offered is that chlorpyrifos is a benign, adequately studied and non-controversial substance used safely worldwide in a wide range of agricultural and other settings, especially the home.⁴ To draw these conclusions, Dow only provides a small and select group of scientific studies, which are misleading in that they neglect reports reflective of an array of adverse affects

³ <http://www.dowagro.com/chlorp/science/index.htm>.

⁴ See, for example, <http://www.dowagro.com/chlorp/about/index.htm>.

known to be related to chlorpyrifos exposure. Many other studies of chlorpyrifos not cited by Dow raise questions about the safety of chlorpyrifos-based products – questions that have led the EPA to ban the use of the product in residential uses.

The following are just a few examples of recent investigations that Dow has chosen not to mention:

- Lee WJ, Blair A, Hoppin JA, Rusiecki JA, Sandler DP, Dosemeci M, Alavanja MCR: This study shows a exposure-response relationship between pesticide applicators in Iowa and North Carolina exposed to chlorpyrifos and cancers observed. For lung cancer, applicators in the highest 25% of chlorpyrifos use had a 2.18 times greater risk for getting lung cancer than a control group.⁵
- Meyer A, Seidler FJ, Cousins MM, Slotkin TA: This paper indicates that in addition to chlorpyrifos being a cholinesterase inhibitor it has other neurotoxic activity, including developmental neurotoxic effects, that can occur at lower levels of exposure than required for cholinesterase inhibition.^{6,7}
- Thrasher JD: This study shows that exposure to acutely toxic levels of chlorpyrifos can cause multiple chemical sensitivity.⁸

There are many other studies regarding human exposure and more that the Company has selected not to provide to the public.⁹ For one literature survey, see: Chlorpyrifos, Part 2:

⁵ Cancer Incidence Among Pesticide Applicators Exposed to Chlorpyrifos in the Agricultural Health Study. J National Cancer Institute 2004; Vol 96, No. 23: 1781-1789.

⁶ Developmental Neurotoxicity Elicited by Gestational Exposure to Chlorpyrifos: When is Adenylyl Cyclase a Target? Environ Health Perspect 111: 1871-1876 (2003).

⁷ See also Slotkin TA. Developmental Cholinotoxicants: Nicotine and Chlorpyrifos. Environ Health Perspect 107 (Suppl 1): 71-80 (1999).

⁸ Immunological abnormalities in humans chronically exposed to chlorpyrifos. Arch Environ Health 2002; 57:181-7.

⁹ Some of these are:

- Meyer, F.J. Seidler, J.E. Aldridge, et al., Critical periods for chlorpyrifos-induced developmental neurotoxicity: Alterations in adenylyl cyclase signaling in adult rat brain regions after gestational or neonatal exposure, Environ Health Perspect, 2004, 112(3): 295-301, <http://ehis.niehs.nih.gov/members/2003/6755/6755.html>
- S.J. Garcia, F.J. Seidler, and T.A. Slotkin, Developmental neurotoxicity elicited by prenatal or postnatal chlorpyrifos exposure: Effects on neurospecific proteins indicate changing vulnerabilities, Environ Health Perspect, 2003, 111(3): 297-303, <http://ehis.niehs.nih.gov/members/2003/5791/5791.html>
- D. Qiao, F.J. Seidler, C.A. Tate, et al., Fetal chlorpyrifos exposure: Adverse effects on brain cell development and cholinergic biomarkers emerge postnatally and continue into adolescence and adulthood, Environ Health Perspect, 2003, 111(4): 536-44, <http://ehis.niehs.nih.gov/members/2003/5828/5828.html>

Human Exposure. *Journal of Pesticide Reform* 1995; 15(1). Many of these studies do *not* support continued regulatory approval of chlorpyrifos and raise significant issues regarding the risks of using chlorpyrifos-based products, particularly in residential settings.

As a result of those and other studies, the EPA significantly changed its position on chlorpyrifos, establishing a near complete ban on residential uses of the chemical.¹⁰ Instead of reporting to its investors and stakeholders on the residential ban and its impacts on the company, the company flipped this issue on its head, misleadingly describing this reevaluation by declaring that in 2001 “pesticides containing the active ingredient chlorpyrifos passed a major regulatory milestone when the USEPA [determined] that all current agricultural uses of chlorpyrifos in the United States will be maintained.”¹¹ In actuality, in 2000, EPA reached agreement with Dow and other producers of technical chlorpyrifos to cancel or phase out virtually all residential uses and further restrict others, setting the stage for the agency’s subsequent decision. Moreover, as the Company notes in passing, EPA’s “eligibility decision” is an interim determination. In reevaluating pesticides such as chlorpyrifos, the agency is required under the Food Quality Protection Act of 1996 to consider exposure to and cumulative risk from other pesticides with a common mechanism of toxicity. Thus regulatory approval for chlorpyrifos, a member of the organophosphate class, is still pending and depends on additional assessments.

The on-going controversy regarding chlorpyrifos was made very clear when the Company (as allowed by the interim eligibility decision) recently submitted data to EPA in support of eliminating the phase out of preconstruction uses of the chemical as a termiticide. **In late December 2004, EPA told the Company that the data are not sufficient to allow an extension or elimination of the phase out.**¹²

People are exposed to chlorpyrifos by touching treated or contaminated surfaces, breathing air near application sites and eating food contaminated with chlorpyrifos

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- J.E. Aldridge, F.J. Seidler, A. Meyer et al., Serotonergic systems targeted by developmental exposure to chlorpyrifos: Effects during different critical periods, *Environ Health Perspect*, 2003, 111(14): 1736-43, <http://ehp.niehs.nih.gov/members/2003/6489/6489.html>
 - D. Qiao, F.J. Seidler, and T.A. Slotkin, Developmental neurotoxicity of chlorpyrifos modeled in vitro: Comparative effects of metabolites and other cholinesterase inhibitors on DNA synthesis in PC12 and C6 cells, *Environ Health Perspect*, 2001, 109(9): 909-13
 - G.A. Buznikov, L.A. Nikitina, V.V. Bezuglov, et al., An invertebrate model of the developmental neurotoxicity of insecticides: Effects of chlorpyrifos and dieldrin in sea urchin embryos and larvae, *Environ Health Perspect*, 2001, 109(7): 651-61.

¹⁰ U.S. Environmental Protection Agency, Interim Registration Eligibility Decision (IRED) for Chlorpyrifos, September 2001, see http://www.epa.gov/oppsrrd1/REDs/chlorpyrifos_ired.pdf.

¹¹ <http://www.dowagro.com/chlorp/na/rpa/rereg.htm>.

¹² Juliet Eilperin, “Dow Chemical Is Told to Curtail Pesticide Sales,” *Washington Post*, 29 December 2004.

residues. These exposures take place in pesticide production plants, agricultural fields, factories, homes, schools, parks and other settings. Symptoms of exposure include excessive salivation, uncontrolled urination, weakness, nausea, diarrhea, headaches, confusion, convulsions and respiratory paralysis.¹³

The Centers for Disease Control made public data from its testing of 9,282 people for the presence in their bodies of 116 chemicals, including 34 pesticides. One independent analysis of this data, by Pesticide Action Network North America (PANNA), showed that chlorpyrifos metabolites were found in 93% of people tested, a higher percentage than for any other pesticide except the DDT breakdown product, DDE. Unlike DDT, chlorpyrifos is excreted within 48 hours of entering the body, so the fact that so many people were found to have chlorpyrifos metabolites in their bodies indicates that most people in the U.S. are being exposed to this chemical on a daily basis. The levels of chlorpyrifos metabolites revealed by the CDC data were also significantly above established safety thresholds, with chronic exposure levels more than four times the level considered "acceptable" for young children. The PANNA analysis also concludes that Dow Chemical is responsible for 80% of chlorpyrifos exposures in the United States.¹⁴ A new round of CDC data will reveal to what degree chlorpyrifos exposures are continuing following EPA's residential ban. PANNA has indicated that it intends to produce a follow-up analysis based on the new data. CDC and other organizations will likely also further analyze the findings.

Rather than address the implications of chlorpyrifos biomonitoring data for the Company and its shareholders (which it does not do at all), Dow's web publications attempt to downplay the significance of this research trend:

[Biomonitoring studies] do not tell us where the chemical came from (natural or synthetic source), the trend (increasing or decreasing) of exposure over time, or if there will be any adverse health effects associated with the level reported.¹⁵

Yet even this general information about biomonitoring is misleading. In many cases, as in the case of chlorpyrifos, the chemical in question is not a naturally occurring compound. Longitudinal studies are beginning to indicate exposure trends. Regarding adverse health effects, exposure levels are being compared to agency reference doses (i.e., "safe" levels).

¹³ Agency for Toxic Substances and Disease Registry. *ToxFAQs™ for Chlorpyrifos*, September 1997. Available at <http://www.atsdr.cdc.gov/tfacts84.html> accessed 1/17/03.

¹⁴ Pesticide Action Network North America, "Chemical Trespass: Pesticides in Our Bodies and Corporate Accountability," May 2004, available at <http://www.panna.org>.

¹⁵ <http://www.dow.com/commitments/debates/biomonitoring/>.

The proponents assert that Dow should provide a nonmisleading report, analyzing and disclosing implications for the Company of the biomonitoring trend, including CDC research showing pervasive chlorpyrifos exposures in excess of the levels deemed acceptable by the EPA.

B. Stockholm Convention on Persistent Organic Pollutants.

The Dow Chemical web page on Persistent Organic Pollutants and the Stockholm Convention Treaty¹⁶ acknowledges the growing public policy attention to these pollutants. However, thereafter it describes the issues in a way that is quite misleading by omitting and obscuring the core issue of how the treaty may restrict markets for the Company's product lines.

While the management is entitled to report that its focus has been and continues to be on reducing emissions of these products, it fails to provide a reasoned appraisal as to whether such an approach is responsive to the Treaty, and most importantly, what the impact will be on the Company if it continues to hew to this strategy.

The web page noticeably fails to note that public policy is pointing towards product phaseouts. It even notes quite misleadingly "Some might argue that the generation of unwanted byproducts should be the signal that we should no longer make particular materials." Accordingly, it notes that "Dow's focus has been and continues to be on reducing emissions of these PBTs, rather than phasing out of products . . ." The first statement, which is highly misleading, neglects to note that the very treaty that they are referencing contains Article 5 which states that Each Party shall at a minimum ... (paragraph c) "Promote the development and where it deems appropriate, require the use of substitute or modified materials, products and processes to prevent the formation and release of chemicals listed ..."

The Stockholm Convention also (in Annex C, part V, section A) states that "Priority should be given to the consideration of approaches to prevent the formation and release of the chemicals listed ... Useful measures could include:" (paragraph d) "Replacement of feed materials which are persistent organic pollutants or where there is a direct link between the materials and the release of persistent organic pollutants from the source."

There has been a scientific and policy debate for more than a decade on whether or not a "direct link" can be demonstrated between dioxin releases and the production and disposal of chlorinated organic chemicals and materials. In North America, this debate

¹⁶ <http://www.dow.com/environment/dioxin/treaty.htm>

was first seriously engaged in the early 1990's when the International Joint Commission on the Great Lakes (IJC) first reached this conclusion in its Sixth Biennial Report (March 1992). Given that the Stockholm Convention is a more global policy instrument than is the Great Lakes Water Quality Agreement (from which the IJC derives its relevant Terms of Reference), one must assume that this debate will gain momentum in coming years in the context of the implementation of this global, legally binding instrument. The outcome of this public policy debate could substantially effect the longer-term viability of many Dow products and sunk capital investments.

The focus of policy instruments at every level is increasingly on giving priority to the elimination of production of persistent bioaccumulative substances, because policymakers have concluded that as long as these products are marketed, they will eventually enter and pollute the environment through products and disposal pathways. Therefore, several of the products that the Company is producing are not only targeted by public policy for emissions reduction at the site of production but they are also targeted for phase-outs of product sales and distribution. **The International Joint Commission, in implementing the Great Lakes Water Quality Agreement, has repeatedly called for a phase-out of production and products that lead to persistent bioaccumulative compounds, especially chlorine products.**

Partly in response to the POPs treaty and the IJC's recommendation, numerous communities and states have adopted resolutions or laws seeking to end the purchase or production of dioxin-generating products. In addition, institutional purchasers are also moving away from such products. For example:

- Oregon Executive Order NO. EO-99-13 charges the Oregon Department of Environment Quality to lead a statewide effort to eliminate the release of PBTs into the environment, and among other things utilize education, technical assistance, pollution prevention, economic incentives, government procurement policies, compliance, and permitting activities to eliminate PBTs.
- The EPA and the American Hospital Association signed an MOU committing the nation's hospitals to the reduction of PBT's. Several of the largest healthcare institutions and the purchasing organizations that supply them have articulated policies to prefer non-PVC products. They are leading efforts in other industry sectors to move away from PVC because of the products' link to PBTs.
- On October 29, 2003 the Boston City Council unanimously passed a Dioxin Resolution, calling for the City Council to encourage "elimination of dioxin emissions through its procurement practices wherever possible." The Council is working with the Purchasing Department to create a framework for substituting alternatives to dioxin

emitting products whenever economically feasible.

- In January, 2005 the city of Buffalo passed a resolution calling for the city to buy PBT-free products in its purchasing practices.

Dow's reports state that the reason Dow has chosen to focus its efforts on dioxin emissions to air and water (from Dow *facilities*) in goal setting is because these emissions "ultimately end up in the environment." This is a distortion of the actual situation, which is that quite a lot of dioxins end up in the environment as a result of the **use and disposal of Dow products**. The planned reductions do not take into account real world use of Dow products, and the many public policy developments confronting the company's products.

Dow Chemical states that "in managing risk, we consider everything from byproduct minimization and emissions reduction, to elimination of those products or uses that poses a significant risk to human health and the environment." The fact that they "consider" the options is unresponsive to the proponents' request for transparency -- apparently very little actual phase-out of particular products occurs using this rationale, and the company provides little explanation of the rationale or the potential impact on the company. **The resolution asks Dow to go beyond this, however, to either provide a timetable for phaseouts, or explain why they are not phasing out the toxic products and replacing them with safer alternatives. Dow has done nothing in its reporting to respond substantively to that request.**

C. Great Lakes Water Quality Agreement

The Dow Chemical web page discussing the Great Lakes Water Quality Agreement (GLWQA)¹⁷ notes that the GLWQA has a **goal of "virtual elimination"** of persistent toxic substances. The Company then goes on to say that Dow Chemical is **"supportive of emission reduction programs"** for persistent toxic substances as part of the bi-national toxics strategy. The placement of these two statements in this sequence is highly misleading to visitors to this Dow web site, including shareholders, because it fails to note that the policies adopted under the Great Lakes Water Quality Agreement by the International Joint Commission to implement the goal of virtual elimination **includes the elimination of certain Dow products – not just Dow emissions**. In 1992 and again in 1994, the International Joint Commission (IJC) on the Great Lakes recommended that the United States and Canada develop a timetable to **sunset the use of chlorine and chlorine-containing compounds in industrial feedstocks**. The IJC recommendation

¹⁷ www.dow.com/environment/debate/d12.html

was based on their reading of the Great Lakes Water Quality Agreement.¹⁸

Thus, while the Company points to its efforts to reduce the production and release of byproduct chemicals, it fails to assess or apprise the reader of the impact of the emerging policies seeking to **eliminate or alter Dow Chemical products themselves**. Similarly, it fails to discuss how the Agreement may restrict markets for the Company's product lines – an explicit request in the Proposal.

C. Impacts of Proposed European REACH Program

The Dow Chemical web page on the European REACH program,¹⁹ vaguely mentions that:

- the Company and the European Chemical Industry Association are engaged in

¹⁸ The Seventh Biennial Report on Great Lakes Water Quality issued by the International Joint Commission pursuant to the US-Canada Great Lakes Water Quality Agreement, addressed the topic of why persistent toxic substances such as dioxin cannot be safely regulated and must be phased out.

The idea of a non-zero assimilative capacity in the environment or in our bodies (and hence allowable discharges) for such chemicals is no longer relevant. The Great Lakes Water Quality Board supports this view, concluding that there is no acceptable assimilative capacity for persistent, bioaccumulative toxic substances. It states, therefore, that the only appropriate water quality objective is zero....

Within the environment's carrying capacity for human activity, there is no space for human loadings of persistent toxic substances. Hence, there can be no acceptable loading of chemicals that accumulate for very long periods, except that which nature itself generates. Moreover, conventional scientific concepts of dose-response and acceptable risk can no longer be defined as good scientific and management bases for defining acceptable levels of pollution. They are outmoded and inappropriate ways of thinking about persistent toxics...

The production and release of these substances into the environment must, therefore, be considered contrary to the agreement legally, unsupportable ecologically and dangerous to health generally. Above all, it is ethically and morally unacceptable. The limits on allowable quantities of these substances entering the environment must be effectively zero, and the primary means to achieve zero should be the prevention of their production, use and release rather than their subsequent removal. International Joint Commission, *7th Biennial Report*, 1994.

¹⁹ www.dow.com/environment/debate/d13.html

- advocacy efforts, to attempt to soften the impact of the proposed program.
- prudence dictates that (unnamed) preparations be undertaken within Dow to eventually implement the requirements of the program.
 - the Company anticipates increased (but unquantified) costs for product testing, risk characterization, and preparation of reports under the REACH program.
 - some Dow products may be subject to the EU authorization process,
 - Dow believes it will be able to demonstrate adequate risk management for the use and application of the majority of such substances.

It would be impossible for shareholders visiting the Dow site to assess how impactful the pending REACH program may be on the Company. According to Dow's reporting to shareholders, 33% of 2002 revenues were derived from Europe, and 31% of revenues from its Chemicals and Performance Chemicals businesses.²⁰ The likely adoption of REACH may present a clear challenge to its business strategy worldwide, but there is not enough information provided by Dow on the product lines targeted by the REACH program to assess the company's strategy.

According to one assessment, Appendix 2, as many as 20% of the chemical industry's products could be phased out by the law. Steve Waygood, London Based director for Investor responsibility at Insight Investments, *the asset management arm of the UK's HBOS banking group*, wrote on Sept 6, 2004 that with regard to REACH:

“three things are already clear: this is one of the most far-reaching pieces of legislation under consideration in Europe, and probably the most important public policy chemicals initiative for three decades; it is likely to have substantial financial implications for the industry; and many companies appear unprepared for its introduction... However, industry is concerned that the costs of the proposal will be prohibitive – with the more realistic direct costs to industry from the proposed testing regime alone estimated to be between €1.45 billion (\$1.78 billion) and €7.2 billion over a decade. **Some industry associations suggest that up to 20% of chemicals on the market would have to be discontinued....**”

Insight investments conducted a survey of impacted companies:

“Our initial assessment is that, while there were a few outstanding exceptions, many companies appeared unprepared for the introduction of REACH. Most were not in a position to give estimates of the financial impact but, nonetheless, many expressed confidence that the impact would not be material.”

²⁰ CEO William Stavropoulos, Presentation to the Smith Barney Citigroup "14th Annual Chemical Conference" Dec. 3, 2003.

The proposed authorization process focuses on carcinogens, mutagens, substances toxic to reproduction, and persistent organic pollutants and has the potential to prohibit the use of chemical. These properties are well-represented in Dow's product lineup. The proponent believes that shareholders have the right to know which chemicals might be impacted (i.e. exported to the EU), current sales to the EU of these products, and potential financial impact on the Company. Dow glosses over this by implying that few, if any, of their products will be constrained by EU authorization requirements.

The Dow website misleadingly implies that demonstrating "adequate risk management" will allow Dow products to persevere through the proposed EU system to authorization.

"Some Dow products may be subject to the authorization process under EU REACH, but it is expected that Dow will be able to demonstrate adequate risk management for the use and application of the majority of such substances."

In Europe, as in the POPs treaty and the GLWQA discussed above, policymakers have been concluding that it is necessary to eliminate products that lead to persistent, bioaccumulative toxicants, because they persist and magnify when they enter the environment and work their way up the food chain, therefore making the regular release of even small amounts dangerous because of their tendency to build up in living things. So it is unclear how Dow will be able to use "risk management" measures to address the role of its products in causing these effects.

Dow Chemical's reporting does not provide any real assessment of the impacts of the possible REACH program -- the number of Dow products targeted by requirements for reporting, testing and authorization and the cost of these requirements, the relative significance of those products within the Dow product family or the implications of the Company's commitments to "risk management" of toxic product lines. Instead of providing a reasonable assessment of the range of potential impacts of the program, and the product lines at stake, the Dow website reporting provides a uselessly distorted view based on Dow's hopes to modify the proposed program. Without providing shareholders with a realistic assessment of the potential impacts of the REACH program, the shareholders are unable to assess issues relative to the large policy challenges looming on the horizon.

F. Deciding that Dow's reporting does not amount to substantial implementation is consistent with SEC Staff precedents.

Often companies have argued that the limited reporting that they have done is substantial implementation, and SEC Staff has concluded it was not. For example, in *Raytheon* (Feb.

26, 2001) the proposal requested that the board conduct a special executive compensation review to "look for ways to link a portion of executive compensation to measures of employee satisfaction," and summarize the results of this review in the Compensation Committee's report to shareholders. Raytheon argued that it regularly conducts an executive compensation review across a variety of factors. The proponent prevailed by arguing that, "from the information provided in the Committee's report to shareholders in last year's proxy statement and from Raytheon's letter to the SEC it is not clear that the inclusion of 'people-related incentives' is anything more than an aspirational platitude." This is very similar to the present case, where the Company's statement that it considers phasing out products is not backed up with reporting on what will be phased out by when.

In *ExxonMobil* (March 24, 2003) the proposal asked the board to report on the effect of the health pandemic on Exxon's operations in Sub-Saharan Africa and its response to the pandemic. Exxon claimed it had reported extensively on the topic, including reports to shareholders as well as others. SEC Staff disagreed that the reporting amount to substantial implementation.

In *ExxonMobil* (March 17, 2003) the proposal requested Exxon to prepare a report describing any operating, financial and reputational risks to it associated with climate change and explaining how Exxon will mitigate those risks. Exxon argued its extensive previous reporting to shareholders and the public on climate change issues and the Company's approach to these issues more than satisfies the Proponent's request. SEC Staff disagreed.

In *Johnson and Johnson* (Feb. 25, 2003) the proposal requested J&J's Compensation Committee to consider advances in the areas of equal employment opportunity and work place diversity when determining compensation for senior executives, and report to shareholders on implementation of this policy. J&J argued that it already considers progress toward meeting goals for equal opportunity in employment, development and advancement in its executive compensation and has already made this information publicly available to shareholders through information in its 2002 proxy statement. The SEC Staff disagreed.

A proposal to *American Electric Power* (Feb. 18, 2003) required the board to issue a report disclosing: (a) the economic risks associated with the company's past, present, and future emissions of carbon dioxide, sulfur dioxide, nitrogen oxide and mercury emissions, and the public stance of the company regarding efforts to reduce these emissions; and (b) the economic benefits of committing to a substantial reduction of those emissions related to its current business activities. AEP argued that by complying with its federally mandated disclosure obligations by substantially duplicating its disclosure required by Items 303 and 101(c)(xii) of Regulation S-K and including it in its Annual Report on

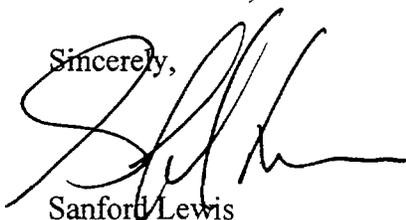
Form 10-K in Appendix A to the Proxy Statement, AEP already substantially implemented the proposal. Furthermore, AEP had much of the information available on its website. The proponent prevailed, arguing that a review of the Company's public filings, including its annual report filed on Form 10-K and its proxy statements, shows that the Company has in fact not provided the information requested in the proposal.

Similarly, in *Kohl's* (March 31, 2000) the proposal requested the board report on Kohl's vendor standards and compliance mechanisms in the countries where it sources. Kohl's argued that because it responds to inquiries from customers, shareholders and others explaining the Policy and the Company's inspections and evaluation procedures of its Vendor Partners, it substantially implements the proposal's request for a report to shareholders. The proponent prevailed by asserting that assurances of "paper guidelines" are insufficient when "the proposal is addressed to the question of whether those guidelines are being implemented and enforced as opposed to being mere pieces of paper." Also, claiming that the information is available to shareholders without informing them of this possibility "is no report at all."

In conclusion, we request the Staff to inform the Company that the SEC proxy rules require denial of the Company's no-action request. In the event that the Staff concludes that certain parts of the document may require revision, please be advised of the willingness of the proponent to make needed modifications. Also, we respectfully request an opportunity to confer with SEC Staff in the event that the Staff should decide to concur with the Company.

Please call Sanford Lewis at (413) 549-7333 with respect to any questions in connection with this matter, or if the Staff wishes any further information.

Sincerely,



Sanford Lewis
Attorney at Law

Jonas Kron
Attorney at Law

cc:

Ronald O. Mueller, Esq. Gibson, Dunn & Crutcher
Shelley Alpern, Trillium Asset Management
Tina S. Van Dam, Corporate Secretary, The Dow Chemical Company

APPENDIX 1
BODY BURDEN ARTICLES



Media contact:
Kelly Campbell
Pesticide Action Network North America
415-981-1771 ext. 350
Satellite feed available

Embargoed for Release:
12:01 a.m. (EDT), Tuesday May 11, 2004

NEWS RELEASE

Many U.S. Residents Carry Toxic Pesticides Above "Safe" Levels

Report shows Children, Women and Mexican Americans Shoulder Heaviest "Pesticide Body Burden"

SAN FRANCISCO—Many U.S. residents carry toxic pesticides in their bodies above government assessed "acceptable" levels, according to a report released today by Pesticide Action Network North America (PAN). *Chemical Trespass: Pesticides in Our Bodies and Corporate Accountability*, makes public for the first time an analysis of pesticide-related data collected by the Centers for Disease Control and Prevention (CDC) in a study of levels of chemicals in 9,282 people nationwide. The report reveals that government and industry have failed to safeguard public health from pesticide exposures.

"None of us choose to have hazardous pesticides in our bodies," said Kristin Schafer, PAN Program Coordinator and lead author of the report. "Yet CDC found pesticides in 100% of the people who had both blood and urine tested. The average person in this group carried a toxic cocktail of 13 of the 23 pesticides we analyzed."

Many of the pesticides found in the test subjects have been linked to serious short- and long-term health effects including infertility, birth defects and childhood and adult cancers. "While the government develops safety levels for each chemical separately, this study shows that in the real world we are exposed to multiple chemicals simultaneously," explained Margaret Reeves, Ph.D., Senior Scientist at PAN. "The synergistic effects of multiple exposures are unknown, but a growing body of research suggests that even at very low levels, the combination of these chemicals can be harmful to our health."

Chemical Trespass found that children, women and Mexican Americans shouldered the heaviest "pesticide body burden." For example, children—the population most vulnerable to pesticides—are exposed to the highest levels of nerve-damaging organophosphorous (OP) pesticides. The CDC data show that the average 6 to 11 year-old sampled is exposed to the OP pesticide chlorpyrifos at four times the level U.S. Environmental Protection Agency considers "acceptable" for a long-term exposure. Chlorpyrifos, produced principally by Dow Chemical Corporation and found in numerous products such as Dursban™, is designed to kill insects by disrupting the nervous system. Although US EPA restricted chlorpyrifos for most residential uses in 2000, it continues to be used widely in agriculture and other settings. In humans, chlorpyrifos is also a nerve poison, and has been shown to disrupt hormones and interfere with normal development of the nervous system in laboratory animals.

The report also found that women have significantly higher levels of three of the six organochlorine (OC) pesticides evaluated. This class of pesticides is known to have multiple harmful effects when they cross the placenta during pregnancy, including reduced infant birth weight and disruption of brain development, which can lead to learning disabilities and other neurobehavioral problems. This ability of organochlorine pesticides to pass from mother to child puts future generations at serious risk.

PAN's analysis found that Mexican Americans carry dramatically higher body burdens of five of the 17 evaluated pesticides in urine samples, including a breakdown product of methyl parathion, a neurotoxic, endocrine-disrupting, insecticide. Mexican Americans also had significantly higher body burdens of the breakdown products of the insecticides lindane and DDT than those found in other ethnic groups.

Chemical Trespass argues that pesticide manufacturers are primarily responsible for the problem of pesticide body burden. "The pesticides we carry in our bodies are made and aggressively promoted by agrochemical companies," stated Skip Spitzer, Corporate Accountability Program Coordinator at PAN. "These companies also spend millions on political influence to block or undermine regulatory measures designed to protect public health and the environment."

The report introduces the Pesticide Trespass Index (PTI), a new tool for quantifying responsibility of individual pesticide manufacturers for their "pesticide trespass." Using the PTI, the report estimates that Dow Chemical is responsible for at least 80% of the chlorpyrifos breakdown products found in the bodies of those in the U.S.

"The fact that our children carry dangerous pesticides in their bodies represents a dramatic failure in the way our government protects us from toxic pesticides," said Monica Moore, PAN Program Director. "We must stop this toxic trespass by shifting the burden from our bodies back to the corporate boardroom where it belongs."

Chemical Trespass provides recommendations for government, industry and the public including:

- US Congress should conduct a thorough and independent investigation into corporate responsibility and liability for pesticide body burdens, and establish financial mechanisms to shift health and environmental costs of pesticides to the corporations that produce them.
- US EPA should ban use of pesticides known to be hazardous and pervasive in the environment and our bodies, and should immediately phase out all uses of chlorpyrifos and lindane.
- US EPA should require that manufacturers bear the burden of proof for demonstrating that a pesticide does not harm human health before it can be registered, and should work with USDA to actively promote least-toxic pest control methods.
- Individuals should pressure government officials and corporations to implement these changes, seek alternatives to pesticide use and buy organic products whenever possible.

SATELLITE FEED:

FIRST FEED

DATE: Tuesday, May 11, 2004

TIME: 13:30-13:45 ET

SATELLITE: AMC 9

Transponder 22

SATELLITE TYPE: C Band

ORBITAL POSITION: 85 Degrees

West

DOWNLINK POLARITY:

Horizontal

DOWNLINK FREQUENCY: 4140

AUDIO: 6.2/6.8

SECOND FEED

DATE: Tuesday, May 11, 2004

TIME: 16:30-16:45 ET

SATELLITE: AMC 9

Transponder 22

SATELLITE TYPE: C Band

ORBITAL POSITION: 85 Degrees

West

DOWNLINK POLARITY:

Horizontal

DOWNLINK FREQUENCY: 4140

AUDIO: 6.2/6.8

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To obtain a copy of Chemical Trespass, call 415-981-1771 or download from www.panna.org

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THE SEATTLE POST-INTELLIGENCER

January 24, 2005, Monday FINAL

SECTION: LIFE AND ARTS, Pg. D1

LENGTH: 992 words

HEADLINE: CANCER STUDY YIELDS DISTURBING NUMBERS FOR THE STATE

BYLINE: BOB CONDOR

BODY: SAVE THE "INSTANT" label for your morning oatmeal or lottery scratch ticket. Figuring out the precise links between environmental toxins and health problems is going to take a while.

That's one message from Kate Davies, a health researcher at Antioch University Seattle. She is lead author of a newly released data analysis study showing our state has the highest rates of breast cancer and female melanoma cases in the United States.

Washington also has one of the highest rates of childhood asthma.

"In our culture and society we like certainty," said Davies. "We like to know that 'x' cases cause 'y' disease. But real life is not as simple."

Davies said there are "lots of different reasons" why Washington has such high cancer rates (including a No. 3 rank for women's cancer cases). She is quick to say our state is not necessarily any more contaminated than other states. Nonetheless, she said, the new report shows toxins play a definite role in the adverse statistics.

Other reasons include the higher collective socioeconomic status of the state's women (documented as a risk factor) and a larger number of women who delay childbearing or don't have kids at all (another risk indicator).

Davies' report is part of a larger effort by the Collaborative on Health and the Environment Northwest, a regional group representing more than 270 researchers, health-care providers, activist organizations and others to proactively record and examine links between chronic health problems and environmental hazards. Those hazards cover a range of toxins, whether it's pollutants in wild-catch fish or the Teflon in your non-stick pans (the Environmental Protection Agency announced just last week that it will be pursuing a full investigation about whether the synthetic coating poses a significant health threat).

Davies' effort is based on the most current government data and scientific studies. It is part of a larger effort by the Collaborative on Health and the Environment - Northwest, a regional network of more than 270 researchers, health-care providers and other groups to catalog links between chronic health problems and their environmental contributors. The report is based on the most current government data and scientific studies. Davies cataloged the link between environmental toxins and health as either "strong" or "good" evidence. Moreover, she determined local exposure to environmental toxins as related to national benchmarks.

For instance, the hazardous air pollutants in King County put residents at 100 times the risk for cancer when compared to the goal set by the U.S. Clean Air Act. In a 2004 "Cascadia Report Card" from the local Northwest Environment Watch, one explanation behind this stat is Seattle drivers drive solo in their cars more than other Pacific Northwest metropolitan on average, plus cover more miles when commuting by auto. There's irony (a word I don't use much to keep its power) in our Great Outdoors mentality and how much we use cars first and think about public transportation or carpooling or telecommuting later, if ever.

Davies' effort is important because it provides some hard (and disturbing) numbers about statewide cancer cases and the connection to environmental toxins. Davies and other public health experts rightly point out that we need more legislative action and political power to add to Washington's tracking of environmental toxins.

Some examples: We are one of the few states without a birth defects registry, which is woeful. On the other hand, the state health department has devised a cutting-edge "body burden" plan to allow residents to determine their personal levels of toxicity (testing for mercury, PCBs, etc.) but no one has convinced the federal Centers for Disease Control and Prevention to provide necessary funding. The body burden concept is one you can explore at the private watchdog organization Environmental Working Group Web site (www.ewg.org). It focuses on the individual rather than the more complex issue of what toxins cause what disease.

"We are learning, and this is important," said Davies, "that it is not just the amount of exposure to a toxin that matters but the timing of the exposure. We used to think the proportion of the dose was the most important, now it might be more when you are exposed." For instance, fetuses are most vulnerable to toxic intervention causing defects or disease. A particular birth defect occurs during a certain time, even down to an identified few days, in the pregnancy term. If a baby is exposed during that "window," tragic consequences can result.

For more insight, check the Internet site for the locally based Institute for Children's Environmental Health (www.iceh.org). Its director, Elise Miller, is a driving force behind the growing synergy between local environmental activist groups and the organized collaborative. Miller and others, such as Greg Small at Washington Toxics Coalition, are urging state legislators to pass a law phasing out three types of toxic flame-retardants called PBDEs now rather than wait years for conclusive (and, in some cases, deadly) evidence. These neurotoxic chemicals were recently found in the breast milk of all 40 women tested in a study by Northwest Environment Watch.

Phasing out PBDEs is part of the state's broader policy to phase out persistent toxic chemicals, which build up in wildlife, our bodies and our food supply. Last week, the Departments of Ecology and Health called for a ban on all PBDEs. There are people doing the right thing in our state and we clearly need the actions to get ourselves off the wrong sorts of top 10 lists.

"The cornerstone of public health is prevention," said Miller. "We can make better choices to protect our children and future generations by passing state legislation to phase out these toxic flame-retardants and all chemicals that may persist and build up in our environment and in our bodies."

NOTES:

LIVING WELL

Bob Condor writes every Monday about health and quality of life. He is editor of the Seattle-based Evergreen Monthly, which covers health, environment, food, social good, spirituality and personal growth (visit www.evergreenmonthly.com). Send e-mails to bobcondor@aol.com with any questions or ideas for the Living Well column.

LOAD-DATE: January 25, 2005

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Ventura County Star (California)

June 21, 2004 Monday

SECTION: MAIN NEWS; Pg. 1

LENGTH: 1492 words

HEADLINE: Bill would allow testing for pollution in humans

BYLINE: Timm Herdt

BODY:

therdt@VenturaCountyStar.com

SACRAMENTO -- Chances are you know whether your blood contains A, B or Rh antigens. If you're middle-aged or older, you may also be aware of how much cholesterol, good and bad, is coursing through your veins.

But how's your methylmercury count? Got any traces of tetradioxin?

You don't know, and no blood test your doctor ever ordered has attempted to detect the presence of these chemicals that have been associated, respectively, with damage to fetal brain development and cancer.

While public health experts routinely test for pollutants in those things that people ingest-- drinking water, meat, produce, even air -- there remains a new, largely untested toxicological frontier: the pollution that has accumulated in human bodies.

That science is called biomonitoring -- the measuring of pollution in people -- and, under a bill that is expected to face a difficult test in the Legislature on Tuesday, California could become the first state to conduct widespread, ongoing monitoring of residents who agree to be tested. The first subjects would be new mothers in three communities across the state, whose breast milk would be examined for an array of chemical contaminants.

Subsequent phases would expand the program to additional communities and include the testing of blood and other biological specimens.

The data would be collected in the aggregate and broken down into subgroups by region, ethnicity and gender. Individual results would also be available to those who want to know what toxic chemicals have accumulated inside them.

The bill, SB 1168, by Sen. Deborah Ortiz, D-Sacramento, is supported by a coalition of health, labor and environmental groups that argues the information collected through biomonitoring could alert health officials to potentially worrisome trends, create a database that could be helpful in explaining high incidences of certain diseases in specific populations, and generally broaden the knowledge base about the interaction between people and the hundreds of chemicals they are exposed to every day.

"It's an amazing educational opportunity," said Sonia Lunder, an environmental analyst in the Oakland office of the Environmental Working Group. "You'd be opening a dialogue on something that's already going on and bring that issue out into the daylight."

Ortiz said her bill addresses a growing public concern.

"I think more and more Californians believe there is a connection between exposure to environmental pollutants and our health," she said. "All of us are living in a world with diseases that cannot be explained by lifestyle or genetic factors."

Oponents include the American Chemistry Council and trade associations representing manufacturers of a number of chemical-based products such as paint, cosmetics, detergents and plastics. They are joined by some breast-cancer support organizations that worry many new mothers would wrongly react to the data and decide against breast-feeding their babies, despite the proven nutrition benefits for infants and likely reduction in breast cancer risk for mothers.

'A great deal of concern'

Chemistry Council lobbyist Tim Shestek said the proposed shotgun approach to biomonitoring would likely instill undue public fears and inevitably create political pressure to take actions that are not scientifically sound.

"The underlying premise of the data collection is the idea that mere detection is going to trigger some government activity," he said. "The potential misuse of that information has given us a great deal of concern."

Prof. Robert Krieger, a toxicologist at the University of California, Riverside, puts the point more bluntly: "This creates a database in search of a finding. It just keeps the hobgoblins active. We generally develop a lot of public anxiety about risks relative to low-level exposures. The adverse effect of that is fear."

Moderate Democrats are key

The bill passed the Senate last month on a 23-14, party-line vote, with majority Democrats in support. In the Assembly, however, a group of moderate Democrats often splits from the party line on bills opposed by business interests, and SB 1168 has been placed on the state Chamber of Commerce's hit list of "job-killer" bills.

In an attempt to blunt the opposition, Ortiz last week made two major amendments. She deleted a proposed fee that would have been assessed on companies that make or sell toxic chemicals and instead will hope for private or federal funding to pay the estimated \$5 million annual cost of the first phase of the program. She also removed a specific list of 58 chemicals to be tested, and instead

placed that decision in the hands of scientific panel members. The changes have not removed industry opposition, but Ortiz hopes they will be enough to persuade a majority of the Assembly Health Committee to support the bill at a hearing Tuesday afternoon.

Biomonitoring is a relatively new field, made possible by technologies that allow scientists to analyze such biological specimens as blood or breast milk for large numbers of chemicals even in trace amounts. For example, the laboratory at the National Center for Environmental Health, a part of the Centers for Disease Control and Prevention, can measure 200 environmental chemicals.

It has not been used on a large scale in the United States, but the Environmental Working Group study two years ago, called the Body Burden project, drew widespread attention to the possibilities. Nine individuals, including PBS commentator Bill Moyers, were tested for 167 chemicals known or suspected to cause adverse health effects at high exposures. An average of 91 of the chemicals was found in the blood of each test subject.

Supporters say biomonitoring can be a useful public health tool, and they frequently cite ongoing studies of breast milk in Sweden and Germany that resulted in detection of high levels of chemicals used in fire retardants called PDBEs that can be damaging to fetal development even in small amounts.

That led to a ban in much of Europe, which was followed last year in California after a U.S. study, led by Lunder, discovered PDBE levels in American women higher than those revealed in the European studies.

Lunder said she believes broader testing would produce more beneficial results. "The weakness in our study," she said, "is that we looked only for fire retardants."

The focus on breast milk has led to a split among breast-cancer support groups, partly out of concern that it could lead to a reduction in breast-feeding.

Sandy Walsh, president of the California Breast Cancer Organizations, said "to tell women that their breast milk contains environmental toxins, and then telling them that breast-feeding is best for their children, we think it would have a detrimental effect."

The association includes the American Cancer Society, but that organization on its own has not taken a position on the bill.

The San Francisco-based Breast Cancer Fund is the sponsor of the bill. Spokeswoman Erin Malec acknowledges that it will be "a tightrope message," but the intent of supporters is "to emphasize to women that breast-feeding is by far the healthiest choice for infants."

Looking for what?

The CDC's biomonitoring programs include testing people in specific areas when there is an outbreak of a disease and an emergency response is needed, looking for potential chemical exposures that might help explain clusters of certain cancers or birth defects, or testing workers who may have been exposed to high doses of a chemical. Such applications of biomonitoring make good scientific sense, said Krieger, the UC Riverside toxicologist who opposes SB 1168.

To use biomonitoring to investigate cancer clusters, Krieger said, "makes elegant sense. You go in and you measure something that you think is related to that cluster. This proposal is the ETKM approach -- measuring everything known to man. That's not the way that epidemiology should be approached."

Ortiz said the argument that biomonitoring is good but her approach is not is mostly a chemical industry smoke screen.

"You don't get the science unless you collect the data," she said.

If it were to turn out that high amounts of a toxic chemical are found in a geographic population disproportionately afflicted with cancer or other disease, she said, her bill does not "presuppose sanctions or remedies. Credible science doesn't automatically assume they're associated. There is a whole standard of scientific review that would kick in to determine if there is a link."

Ortiz said that biomonitoring would become another tool to help the state fulfill the public health functions it already performs. The California Environmental Protection Agency and the Department of Health Services, she notes, are already charged with determining what levels of exposure to, say, Chromium 6 or perchlorates are safe.

"That is what the state does," Ortiz said. "It is absolutely appropriate. This is just a new means of data collection."

LOAD-DATE: December 15, 2004

Related News Coverage

This is the most comprehensive study ever conducted of multiple chemical contaminants in humans.

Related to EWG's report *BodyBurden: The Pollution in People*

State Biomonitoring Efforts Seen As Leading To More Chemical Bans

By: Staff
Inside EPA
April 16, 2004

Successful biomonitoring programs across the country may lead to a significant number of state chemical bans, supporters and opponents of the efforts agree, prompting fears from the chemical industry which is trying to mobilize scientists and lobbyists to challenge any proposed bans or reviews that it believes will be based on unsound science or unproven assumptions.

State biomonitoring efforts coincide with a push by environmentalists who realize the difficulties in garnering strong support from Congress and the Bush administration to ban chemicals and instead are targeting local officials, hoping that cities and states will enact strict standards to cover a host of the nation's chemical operations.

Several states, such as California, Washington, Maine, New Hampshire, Massachusetts and New York, are mulling a variety of different ways to deal with common chemicals, including biomonitoring, health tracking and increasing scientific data, an effort that state officials, health and environmental advocates and industry officials say could lead to bans on a substantial number of chemicals that are used in industrial processes and individual products.

The California legislature is leading the way in targeting specific substances to be banned, partly based on biomonitoring, which tests for the presence of chemicals in human blood and urine. Last year, California became the first state to ban two types of polybrominated diphenyl ethers (PBDEs), which are used in common household products to prevent fires. This year, the state may also ban a third fire retardant chemical, known as deca-BDE, and is considering a landmark bill that targets about 90 chemicals for sampling and potential regulatory action to limit exposure, based on biomonitoring results.

Maine and Washington also are at the forefront of states pushing for biomonitoring and attempting to phase out commonly used chemicals. In Washington, the state's environment agency has established a program to track several persistent bioaccumulative toxins (PBTs) -- including mercury and some PBDEs. This effort, which sources expect will result in administrative actions or legislation to ban or phase out certain products, may also lead to increased scrutiny on polyvinyl chloride (PVC), which is contained in a number of products used every day.

But sources say any regulatory action to phase out PVC is likely to trigger an uproar in the business community.

The Washington program may also target dioxins for sampling and potential regulation, based on information collected by regulators through industrial air and water permits, sources say. This could lead to chemicals being banned in industrial processes, rather than banning chemicals from being used in individual products. Washington has already passed legislation banning mercury in certain products effective between 2005 and 2007.

In Maine, regulators are working on a similar PBT initiative and the legislature last week

deca-BDE substance. The Maine legislation calls for a review of suitable alternatives to deca, which could lead to the nation's first ban on the substance.

In response to these efforts, the American Chemistry Council (ACC) and several other industrial groups have mobilized against a number of the proposed actions, including California biomonitoring legislation (SB 1168) that was authored by Sen. Deborah Ortiz, (D). The groups argue that the measure makes unfounded assumptions about the targeted chemicals that are neither logical nor based on science. "SB 1168's assumption that presence of a chemical is synonymous with risk is contrary to the long-standing medical and scientific principles," according to an ACC statement on the legislation.

Some of the other industrial groups listed as opposed to the California legislation are: the American Forest and Paper Association, Burlington Northern/Santa Fe Railroad, Consumer Specialty Products Association, Chlorine Chemistry Council, Grocery Manufacturers of America and the Soap and Detergent Association. "This is the first bill I'm aware of that specifically requires the state to sample a portion of its citizens and then, in the bill itself, demands certain health responses, which makes no sense because you can't equate presence of a chemical with health effects," an ACC spokesperson says. The groups are also frustrated that the bill only targets industrial chemicals, "where there are hundreds and thousands of naturally occurring chemicals that are not looked at," the ACC spokesperson adds.

ACC and other industry scientists and lobbyists are also challenging the Washington state efforts to ban PBTs. ACC points out that the Centers for Disease Control and Prevention (CDC) "have consistently stated that 'the measurement of an environmental chemical in a person's blood or urine does not by itself mean that the chemical causes disease.'" The industry groups also argue that biomonitoring does not show where certain chemicals measured in the body originated.

But sources in favor of the state efforts say biomonitoring will ease the burden on the government to determine which chemicals are harmful. "Any chemicals introduced on the market before 1980 don't have to go under [substantial] testing, which means the burden is high on EPA," says a source with the Natural Resources Defense Council (NRDC), who says the problem is compounded since the agency is forced to show that a serious risk exists before reviewing a chemical further or imposing strict regulations.

For PBDEs, it was obvious years ago based on tests of women's breast milk and in babies that the toxic chemical was high in some people and causing negative health effects, the NRDC source says.

Other states with advanced biomonitoring programs that may lead to chemical bans include New Hampshire, which is one of only three states that received a follow-up grant from CDC in September 2003 to implement its biomonitoring plans. That state's Health Department and Environmental Services Department are currently laying out plans to track arsenic, mercury, PBDEs and phthalates in human beings. In the case of arsenic and mercury, those plans include pinpointing specific communities to test residents for levels of the contaminants in their urine.

In New York, which received approximately \$350,000 in follow-up CDC biomonitoring last year, officials are targeting specific populations for: cotinine, which is a nicotine metabolite in saliva, focusing on direct and indirect tobacco smoke exposure; PBDEs in blood, from residents in the New York City area who eat fish in the region; and mercury in the blood and urine of ethnic populations who may be exposed to mercury.

Massachusetts lawmakers are considering more aggressive legislation, targeting 10 chemicals in consumer products for study of less-toxic alternatives. The bill, S. 1268, endorsed by the Alliance for a Healthy Tomorrow, directs lawmakers to reduce chemical exposure before biomonitoring and environmental health tracking projects are complete. A source with the group says the measure is a tough sell and may take another year to work its way through the legislature. The bill targets chemicals in pesticides, dry cleaning compounds and fire retardants, among others. If state officials find that reasonable, less-toxic alternatives exist, they are required to ban the use of the toxic chemicals, under the legislation. ACC says defeating that bill is at the top of its priority list.

Also, furthering the development of biomonitoring and establishing scientific links between environmental contaminants and human ailments is now a principal focus of the Environmental Council of the States (ECOS). ECOS is scheduled this month to gather experts from across the country to discuss the movement's opportunities and challenges. Substantially increasing the interaction between state environmental agencies and health departments is a central theme in the ECOS review.

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The Associated Press State & Local Wire

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May 10, 2004, Monday, BC cycle

SECTION: State and Regional

LENGTH: 739 words

HEADLINE: U.S. residents carry unhealthy levels of pesticides, study finds

BYLINE: By TERENCE CHEA, Associated Press Writer

DATELINE: SAN FRANCISCO

BODY:

Many U.S. residents carry unhealthy levels of pesticides in their bodies, with children, women and Mexican Americans disproportionately exposed to the toxic chemicals, according to a study to be released Tuesday.

The Pesticide Action Network analyzed data collected by the U.S. Centers for Disease Control and Prevention in a study of more than 2,648 people tested for levels of 34 pesticides, the environmental group said.

The PAN study - called "Chemical Trespass: Pesticides in Our Bodies and Corporate Accountability" - found that a large percentage of people who had their blood and urine tested carried pesticides above levels considered safe by government health and environmental agencies.

"The pesticide body burden data represents a failure of our approach to how we protect people from toxic pesticides," said Kristin Schafer, the study's lead author and PAN's program coordinator. "We really hope that it will help us move toward a different system of how we control pests in agriculture and all other areas."

San Francisco-based PAN, which advocates for alternatives to pesticide use for pest control, found that the average person in the study carried 13 of the 23 pesticides they evaluated. Many of

the pesticides have been linked to infertility, birth defects, cancer and other serious health ailments, said Margaret Reeves, a senior scientist at PAN.

"A growing body of research suggests that even at very low levels, the combination of these chemicals can be harmful to our health," Reeves said.

The PAN study found that children between 6 and 11 years old were exposed to the nerve-damaging pesticide chlorpyrifos at four times the level deemed acceptable by the U.S. Environmental Protection Agency. Chlorpyrifos is designed to kill insects by disrupting the nervous system.

"It does appear to have some validity," said Francis B. Suhre, of the EPA. "The crux of the matter is what does it all mean and is it reflecting past effects as opposed to current. At first blush, it requires further screening."

The study said one company - Dow Chemical Corp. - was responsible for 80 percent of the chlorpyrifos in Americans' bodies. The figure was derived from the amount of the chemical in the bodies of the people tested and a "conservative estimate of Dow's market share," said Skip Spitzer, a program coordinator for PAN and one of the study's authors.

Dow spokesman Garry Hamlin confirmed the company is the largest manufacturer of the pesticide in the country, but said the pesticide leaves the body quickly without doing harm. He said the CDC has noted that the measurement of an environmental chemical in a person's blood or urine does not mean that the chemical causes disease.

"Chlorpyrifos is widely used, and studies by the Centers for Disease Control suggest that people are exposed to chlorpyrifos at very tiny levels. ... When people are exposed, the product breaks down readily and is eliminated from the body in a matter of days," he said.

The report said that women carry "significantly" higher levels of three pesticides called organochlorines known to reduce birth weight and disrupt brain development in infants.

PAN's analysis also found that Mexican Americans carried higher levels of chemicals linked to the insecticides lindane, DDT and methyl parathion than other ethnic groups.

The PAN study didn't reveal why certain groups were more exposed to certain chemicals because the CDC data didn't include information about where the test subjects lived or what kinds of jobs they held. People are thought to ingest pesticides through air, water and food.

CDC spokeswoman Stephanie Creel said the center would not comment on the findings because it did not participate in the analysis.

PAN researchers believe pesticide makers should be held responsible for the "pesticide body burden" and its financial and health impacts.

"There's a case to be made that the primary responsibility for these pesticides in our bodies lies with the folks that manufacture and market them," Schafer said.

The study recommends that Congress investigate corporate responsibility for pesticide contamination, an EPA ban on using hazardous pesticides, and requiring manufacturers to demonstrate that a pesticide doesn't harm human health before using it.

On the Net:

Pesticide Action Network: <http://www.panna.org>

CropLife America: <http://www.croplifeamerica.org>

LOAD-DATE: May 12, 2004

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Plastics News

April 19, 2004, Monday

SECTION: Pg. 8

LENGTH: 490 words

HEADLINE: Get a head start on bioaccumulation

BODY:

Growing evidence that chemicals related to plastics are finding their way into humans and animals is an issue that should concern the plastics industry.

In Europe, awareness is growing about chemicals accumulating in animals and humans. It's an old issue - environmentalists warned about bioaccumulation of DDT and other chemicals a half century ago - but now with some new twists.

For one, they're personalizing the issue in a new way. Activists are taking samples of their own blood and having them tested for toxic chemicals. Then they report the findings to the media. The message to readers: If these people have toxins in their blood, then so do you. The next step will probably be lawsuits where activists sue manufacturers of certain chemicals for trespassing into their bodies.

The World Wildlife Fund, which closely watches the issue of endocrine disrupters in plastics additives, weighed in on a related topic with a Jan. 29 report, "Causes for Concern: Chemicals and Wildlife." The report specifically highlights chemicals with close ties to plastics: perfluorinated compounds (used in nonstick coatings such as Teflon), phthalates, phenolic compounds and brominated flame retardants. WWF claims the "body burden" of chemicals is getting worse, citing a study that found that in the 1960s, researchers found five organochlorine compounds and mercury in marine mammals, while today more than 265 organic pollutants and 50 inorganic chemicals have been found in these species.

WWF is pushing for stronger laws on chemical safety in the European Union, including strengthening of a proposal called Reach (Registration, Evaluation and Authorization of Chemicals), which would require manufacturers and importers to provide safety information on about 30,000 industrial chemicals.

This issue will likely come down to where regulators and legislators side on the so-called precautionary principle - the idea that if evidence suggests danger, then we should reduce our exposure to a chemical even if we lack indisputable scientific proof.

Traditionally, the chemical industry would prefer to weigh the potential danger with the cost of such a move.

This is one of those issues where plastics processors' interests may diverge from the interests of their suppliers. On one hand, you can argue that the plastics industry is one giant entity, and anything that affects suppliers is bound to trickle down and have an impact on processors. That's how the plastics industry typically responds to challenges, an attitude that says "we're all in the same boat."

But there's a problem: Every time the mainstream media reports on dangers of these chemicals, it (necessarily) puts them in a context that readers can understand, which frequently means connecting them to plastic products. So processors may be best served by removing as many of those negatives as possible, before they snowball into major issues.

LOAD-DATE: April 21, 2004

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Ventura County Star (California)

June 21, 2004 Monday

SECTION: MAIN NEWS; Pg. 1

LENGTH: 1492 words

HEADLINE: Bill would allow testing for pollution in humans

BYLINE: Timm Herdt

BODY:

therdt@VenturaCountyStar.com

SACRAMENTO — Chances are you know whether your blood contains A, B or Rh antigens. If you're middle-aged or older, you may also be aware of how much cholesterol, good and bad, is coursing through your veins.

But how's your methylmercury count? Got any traces of tetradioxin?

You don't know, and no blood test your doctor ever ordered has attempted to detect the presence of these chemicals that have been associated, respectively, with damage to fetal brain development and cancer.

While public health experts routinely test for pollutants in those things that people ingest—drinking water, meat, produce, even air — there remains a new, largely untested toxicological frontier: the pollution that has accumulated in human bodies.

That science is called biomonitoring — the measuring of pollution in people — and, under a bill that is expected to face a difficult test in the Legislature on Tuesday, California could become the first state to conduct widespread, ongoing monitoring of residents who agree to be tested. The first subjects would be new mothers in three communities across the state, whose breast milk would be examined for an array of chemical contaminants.

Subsequent phases would expand the program to additional communities and include the testing of blood and other biological specimens.

The data would be collected in the aggregate and broken down into subgroups by region, ethnicity and gender. Individual results would also be available to those who want to know what toxic chemicals have accumulated inside them.

The bill, SB 1168, by Sen. Deborah Ortiz, D-Sacramento, is supported by a coalition of health, labor and environmental groups that argues the information collected through biomonitoring could alert health officials to potentially worrisome trends, create a database that could be helpful in explaining high incidences of certain diseases in specific populations, and generally broaden the knowledge base about the interaction between people and the hundreds of chemicals they are exposed to every day.

"It's an amazing educational opportunity," said Sonia Lunder, an environmental analyst in the Oakland office of the Environmental Working Group. "You'd be opening a dialogue on something that's already going on and bring that issue out into the daylight."

Ortiz said her bill addresses a growing public concern.

"I think more and more Californians believe there is a connection between exposure to environmental pollutants and our health," she said. "All of us are living in a world with diseases that cannot be explained by lifestyle or genetic factors."

Opponents include the American Chemistry Council and trade associations representing manufacturers of a number of chemical-based products such as paint, cosmetics, detergents and plastics. They are joined by some breast-cancer

support organizations that worry many new mothers would wrongly react to the data and decide against breast-feeding their babies, despite the proven nutrition benefits for infants and likely reduction in breast cancer risk for mothers.

'A great deal of concern'

Chemistry Council lobbyist Tim Shestek said the proposed shotgun approach to biomonitoring would likely instill undue public fears and inevitably create political pressure to take actions that are not scientifically sound.

"The underlying premise of the data collection is the idea that mere detection is going to trigger some government activity," he said. "The potential misuse of that information has given us a great deal of concern."

Prof. Robert Krieger, a toxicologist at the University of California, Riverside, puts the point more bluntly: "This creates a database in search of a finding. It just keeps the hobgoblins active. We generally develop a lot of public anxiety about risks relative to low-level exposures. The adverse effect of that is fear."

Moderate Democrats are key

The bill passed the Senate last month on a 23-14, party-line vote, with majority Democrats in support. In the Assembly, however, a group of moderate Democrats often splits from the party line on bills opposed by business interests, and SB 1168 has been placed on the state Chamber of Commerce's hit list of "job-killer" bills.

In an attempt to blunt the opposition, Ortiz last week made two major amendments. She deleted a proposed fee that would have been assessed on companies that make or sell toxic chemicals and instead will hope for private or federal funding to pay the estimated \$5 million annual cost of the first phase of the program. She also removed a specific list of 58 chemicals to be tested, and instead placed that decision in the hands of scientific panel members. The changes have not removed industry opposition, but Ortiz hopes they will be enough to persuade a majority of the Assembly Health Committee to support the bill at a hearing Tuesday afternoon.

Biomonitoring is a relatively new field, made possible by technologies that allow scientists to analyze such biological specimens as blood or breast milk for large numbers of chemicals even in trace amounts. For example, the laboratory at the National Center for Environmental Health, a part of the Centers for Disease Control and Prevention, can measure 200 environmental chemicals.

It has not been used on a large scale in the United States, but the Environmental Working Group study two years ago, called the Body Burden project, drew widespread attention to the possibilities. Nine individuals, including PBS commentator Bill Moyers, were tested for 167 chemicals known or suspected to cause adverse health effects at high exposures. An average of 91 of the chemicals was found in the blood of each test subject.

Supporters say biomonitoring can be a useful public health tool, and they frequently cite ongoing studies of breast milk in Sweden and Germany that resulted in detection of high levels of chemicals used in fire retardants called PDBEs that can be damaging to fetal development even in small amounts.

That led to a ban in much of Europe, which was followed last year in California after a U.S. study, led by Lunder, discovered PDBE levels in American women higher than those revealed in the European studies.

Lunder said she believes broader testing would produce more beneficial results. "The weakness in our study," she said, "is that we looked only for fire retardants."

The focus on breast milk has led to a split among breast-cancer support groups, partly out of concern that it could lead to a reduction in breast-feeding.

Sandy Walsh, president of the California Breast Cancer Organizations, said "to tell women that their breast milk contains environmental toxins, and then telling them that breast-feeding is best for their children, we think it would have a detrimental effect."

The association includes the American Cancer Society, but that organization on its own has not taken a position on the bill.

The San Francisco-based Breast Cancer Fund is the sponsor of the bill. Spokeswoman Erin Malec acknowledges that it will be "a tightrope message," but the intent of supporters is "to emphasize to women that breast-feeding is by far the healthiest choice for infants."

Looking for what?

The CDC's biomonitoring programs include testing people in specific areas when there is an outbreak of a disease and an emergency response is needed, looking for potential chemical exposures that might help explain clusters of certain cancers or birth defects, or testing workers who may have been exposed to high doses of a chemical. Such applications of biomonitoring make good scientific sense, said Krieger, the UC Riverside toxicologist who opposes SB 1168.

To use biomonitoring to investigate cancer clusters, Krieger said, "makes elegant sense. You go in and you measure something that you think is related to that cluster. This proposal is the ETKM approach — measuring everything known to man. That's not the way that epidemiology should be approached."

Ortiz said the argument that biomonitoring is good but her approach is not is mostly a chemical industry smoke screen.

"You don't get the science unless you collect the data," she said.

If it were to turn out that high amounts of a toxic chemical are found in a geographic population disproportionately afflicted with cancer or other disease, she said, her bill does not "presuppose sanctions or remedies. Credible science doesn't automatically assume they're associated. There is a whole standard of scientific review that would kick in to determine if there is a link."

Ortiz said that biomonitoring would become another tool to help the state fulfill the public health functions it already performs. The California Environmental Protection Agency and the Department of Health Services, she notes, are already charged with determining what levels of exposure to, say, Chromium 6 or perchlorates are safe.

"That is what the state does," Ortiz said. "It is absolutely appropriate. This is just a new means of data collection."

LOAD-DATE: December 15, 2004

Toxins in Breast Milk

Studies Explore Impact of Chemicals on Our Bodies

By: Thaddeus Herrick
The Wall Street Journal
January 20, 2004

Last winter, Sharyle Patton got some startling medical-test results. But she's unsure what, if anything, they mean.

The 59-year-old environmental activist lives in a rural California community far from industrial centers. She eats organic food and tends to bike and walk as much as drive. Yet a screen of her blood and urine showed that her body carried 105 chemicals in measurable levels, including 46 different compounds of PCBs, industrial insulators that were banned in 1976.

Ms. Patton was part of small study testing subjects for the presence of industrial chemicals. Such research is part of a burgeoning movement called "biomonitoring," an effort to determine the extent of human exposure to synthetic chemicals, and to link these pollutants to diseases such as breast cancer.

It has become an integral part of public-health research in Europe, where some countries routinely screen citizens for industrial chemicals. In 1998, studies of Swedish breast milk showed that levels of flame retardants known as polybrominated diphenyl ethers, or PBDEs, were doubling every two to five years. As a result, Sweden banned PBDEs, and the EU has followed suit beginning this year.

Some research here in the U.S. has come up with disturbing numbers. A study of 20 first-time mothers commissioned by the Washington-based Environmental Working Group, released in September, found considerably higher PBDE levels in U.S. women than those recorded in Sweden.

Still, little is known about the implications of these chemicals, and research subjects who are told they have a high "chemical body burden" are unsure what to do about it.

One worry is that the findings will have their own side effects. Breast-feeding advocates fear that reports of chemicals being found in breast milk could discourage breast-feeding -- even though the Centers for Disease Control and Prevention says it has yet to see levels of chemicals in breast milk that would lead it to discourage breast-feeding.

The San Francisco advocacy group Breast Cancer Action withdrew its support of a California legislative bill last year to monitor chemicals in mother's milk, citing worries about the effect on breast-feeding. The move put it at odds with its longtime ally, the

Breast Cancer Fund, which supports biomonitoring. The bill is expected to be reintroduced this year.

Right now, commercial laboratories don't generally offer such tests, which would have to be custom-designed. And research projects are rare and expensive. The study Ms. Patton participated in, organized by advocacy groups Environmental Working Group and Commonweal, with Mount Sinai School of Medicine, cost researchers \$4,900 per person. Even then, the studies don't always share results with participants.

In Ms. Patton's study, in which researchers did agree to share their findings, an average of 91 industrial chemicals were found in the nine adults from six states, with a total of 167 different chemicals reported in the group. Yet few of the subjects have made many lifestyle adjustments. Ms. Patton has lived in Bolinas, Calif., north of San Francisco, for some 30 years and says she felt she was living a clean life. She has, however, given up nail polish because it often contains phthalates, chemicals used for their plasticizing and film-formation properties.

CLEAN LIVING

Here are some steps you can take to lower your exposure to toxic chemicals:

Stop smoking cigarettes, which contain nicotine-related chemicals, and reduce exposure to second-hand smoke.

Reduce consumption of predatory fish such as tuna to minimize exposure to mercury.

Remove any lead paint from your home.

Wash fruits and vegetables thoroughly, or eat organically grown food, to reduce exposure to pesticides.

Sources: Centers for Disease Control, Science and Environmental Health Network

"I'm outraged," she says. "I never gave permission to use my body as a toxic waste site."

There are many ways that chemicals can get into the body. Mostly it's through diet or environmental exposure. For example, PBDEs are used in foam for furniture, among other things. As the foam breaks down, PBDEs are thought to leach into the air and are then carried by the wind, rain and snow around the world.

The U.S. Environmental Protection Agency is funding local studies of breast milk in 120 women in three California communities to look at levels of PBDEs, and other chemicals. This year, the CDC released its most exhaustive biomonitoring survey yet, an attempt to compile a baseline for future efforts to identify and treat victims of exposure to toxic chemicals. The \$6.5 million study tested the blood and urine of 2,500 anonymous volunteers for 116 chemicals, with positive results found for 89 substances, including

polychlorinated biphenyls, or PCBs, dioxins, phthalates and pesticides. A follow-up is expected in 2005.

"We plan to be in it for a long, long time," says Jim Pirkle, deputy director for science at the CDC's Environmental Health Laboratory.

A few of the chemicals for which CDC tested -- including lead, tobacco, cadmium, mercury and some pesticides -- are known to be toxic to people; researchers found levels of lead and nicotine-related chemicals sharply reduced over the past decade. Many more of the chemicals in the study have been found to be toxic to laboratory animals, creating developmental or reproductive problems, or even cancer. But their effect on humans is still something of a guessing game. "We've got to expand our understanding," says Dr. Pirkle.

The larger goal is to see if there are links between industrial chemicals and an array of ailments in human beings. In part because chemicals often accumulate in the fatty tissue of breasts, as well as breast milk, biomonitoring has won particular support from breast-cancer advocacy groups, despite Breast Cancer Action's reservations. With as many as half of the breast-cancer cases unexplained, they see biomonitoring as an alternative to the traditional focus of detection, treatment and cure.

"It's an essential part of the research movement," says Jeanne Rizzo, executive director of the Breast Cancer Fund.

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THE SEATTLE POST-INTELLIGENCER

January 24, 2005, Monday FINAL

SECTION: LIFE AND ARTS, Pg. D1

LENGTH: 992 words

HEADLINE: CANCER STUDY YIELDS DISTURBING NUMBERS FOR THE STATE

BYLINE: BOB CONDOR

BODY: SAVE THE "INSTANT" label for your morning oatmeal or lottery scratch ticket. Figuring out the precise links between environmental toxins and health problems is going to take a while.

That's one message from Kate Davies, a health researcher at Antioch University Seattle. She is lead author of a newly released data analysis study showing our state has the highest rates of breast cancer and female melanoma cases in the United States.

Washington also has one of the highest rates of childhood asthma.

"In our culture and society we like certainty," said Davies. "We like to know that 'x' cases cause 'y' disease. But real life is not as simple."

Davies said there are "lots of different reasons" why Washington has such high cancer rates (including a No. 3 rank for women's cancer cases). She is quick to say our state is not necessarily any more contaminated than other states. Nonetheless, she said, the new report shows toxins play a definite role in the adverse statistics.

Other reasons include the higher collective socioeconomic status of the state's women (documented as a risk factor) and a larger number of women who delay childbearing or don't have kids at all (another risk indicator).

Davies' report is part of a larger effort by the Collaborative on Health and the Environment Northwest, a regional group representing more than 270 researchers, health-care providers, activist organizations and others to proactively record and examine links between chronic health problems and environmental hazards. Those hazards cover a range of toxins, whether it's pollutants in wild-catch fish or the Teflon in your non-stick pans (the Environmental Protection Agency announced just last week that it will be pursuing a full investigation about whether the synthetic coating poses a significant health threat).

Davies' effort is based on the most current government data and scientific studies. It is part of a larger effort by the Collaborative on Health and the Environment - Northwest, a regional network of more than 270 researchers, health-care providers and other groups to catalog links between chronic health problems and their environmental contributors. The report is based on the most current government data and scientific studies. Davies cataloged the link between environmental toxins and health as either "strong" or "good" evidence. Moreover, she determined local exposure to environmental toxins as related to national benchmarks.

For instance, the hazardous air pollutants in King County put residents at 100 times the risk for cancer when compared to the goal set by the U.S. Clean Air Act. In a 2004 "Cascadia Report Card" from the local Northwest Environment Watch, one explanation behind this stat is Seattle drivers drive solo in their cars more than other Pacific Northwest metropolitan on average, plus cover more miles when commuting by auto. There's irony (a word I don't use much to keep its power) in our Great Outdoors mentality and how much we use cars first and think about public transportation or carpooling or telecommuting later, if ever.

Davies' effort is important because it provides some hard (and disturbing) numbers about statewide cancer cases and the connection to environmental toxins. Davies and other public health experts rightly point out that we need more

legislative action and political power to add to Washington's tracking of environmental toxins.

Some examples: We are one of the few states without a birth defects registry, which is woeful. On the other hand, the state health department has devised a cutting-edge "body burden" plan to allow residents to determine their personal levels of toxicity (testing for mercury, PCBs, etc.) but no one has convinced the federal Centers for Disease Control and Prevention to provide necessary funding. The body burden concept is one you can explore at the private watchdog organization Environmental Working Group Web site (www.ewg.org). It focuses on the individual rather than the more complex issue of what toxins cause what disease.

"We are learning, and this is important," said Davies, "that it is not just the amount of exposure to a toxin that matters but the timing of the exposure. We used to think the proportion of the dose was the most important, now it might be more when you are exposed." For instance, fetuses are most vulnerable to toxic intervention causing defects or disease. A particular birth defect occurs during a certain time, even down to an identified few days, in the pregnancy term. If a baby is exposed during that "window," tragic consequences can result.

For more insight, check the Internet site for the locally based Institute for Children's Environmental Health (www.iceh.org). Its director, Elise Miller, is a driving force behind the growing synergy between local environmental activist groups and the organized collaborative. Miller and others, such as Greg Small at Washington Toxics Coalition, are urging state legislators to pass a law phasing out three types of toxic flame-retardants called PBDEs now rather than wait years for conclusive (and, in some cases, deadly) evidence. These neurotoxic chemicals were recently found in the breast milk of all 40 women tested in a study by Northwest Environment Watch.

Phasing out PBDEs is part of the state's broader policy to phase out persistent toxic chemicals, which build up in wildlife, our bodies and our food supply. Last week, the Departments of Ecology and Health called for a ban on all PBDEs. There are people doing the right thing in our state and we clearly need the actions to get ourselves off the wrong sorts of top 10 lists.

"The cornerstone of public health is prevention," said Miller. "We can make better choices to protect our children and future generations by passing state legislation to phase out these toxic flame-retardants and all chemicals that may persist and build up in our environment and in our bodies."

NOTES:

LIVING WELL

Bob Condor writes every Monday about health and quality of life. He is editor of the Seattle-based Evergreen Monthly, which covers health, environment, food, social good, spirituality and personal growth (visit www.evergreenmonthly.com). Send e-mails to bobcondor@aol.com with any questions or ideas for the Living Well column.

LOAD-DATE: January 25, 2005

APPENDIX 2
PUBLIC POLICY ARTICLES



United Nations Environment Programme

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PROGRAMME DES NATIONS UNIES POUR L'ENVIRONNEMENT • PROGRAMA DE LAS NACIONES UNIDAS PARA EL MEDIO AMBIENTE
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PRESS RELEASE

Stockholm Convention on POPs to become international law, launching a global campaign to eliminate 12 hazardous chemicals

Stockholm, 14 May 2004 – The 2001 Stockholm Convention on Persistent Organic Pollutants (POPs) enters into force on Monday, May 17, marking the start of an ambitious international effort to rid the world of PCBs, dioxins and furans, and nine highly dangerous pesticides.

"The Stockholm Convention will save lives and protect the natural environment – particularly in the poorest communities and countries – by banning the production and use of some of the most toxic chemicals known to humankind," said Executive Klaus Toepfer of the United Nations Environment Programme (UNEP), under whose auspices the Convention was adopted.

"Over the next several years national investments plus donor pledges of hundreds of millions will channel more than five hundred million dollars into an overdue and urgently needed initiative to ensure that future generations do not have to live as we do with measurable quantities of these toxic chemicals stored in their bodies," he said.

Much of this funding will be managed by the Global Environment Facility, which serves as the financial mechanism for the Convention on an interim basis.

Of all the pollutants released into the environment every year by human activity, POPs are amongst the most dangerous. For decades these highly toxic chemicals have killed and sickened people and animals by causing cancer and damaging the nervous, reproductive and immune systems. They have also caused uncounted birth defects.

Governments will seek a rapid start to action against POPs when they meet for the first meeting of the Conference of the Parties to the Convention (COP 1) in Punta del Este, Uruguay in the first week of May, 2005. They will fast-track efforts to:

- reduce or eliminate the carcinogenic chemicals known as dioxins and furans, which are produced unintentionally as by-products of combustion. Many of the required improvements in technologies and processes may prove expensive and technically challenging, particularly for developing countries.

- assist countries in malarial regions to replace DDT with the increasingly safe and effective alternatives. Until such alternatives are in place, the Convention allows governments to continue using DDT to protect their citizens from malaria – a major killer in many tropical regions.
- support efforts by each national government to develop an implementation plan. Already, over 120 developing countries have started to elaborate such plans with funds from the Global Environment Facility. The COP will also focus on channelling new funds into POPs projects.
- measure and evaluate changes in the levels of POPs in the natural environment and in humans and animals in order to confirm whether the Convention is indeed reducing releases of POPs to the environment.
- establish a POPs review committee for evaluating additional chemicals and pesticides to be added to the initial list of 12 POPs.
- finalize guidelines for promoting “best environmental practices” and “best available techniques” that can reduce and eliminate releases of dioxins and furans.

In addition to banning the use of POPs, the treaty focuses on cleaning up the growing accumulation of unwanted and obsolete stockpiles of pesticides and toxic chemicals that contain POPs. Dump sites and toxic drums from the 1950s, '60s, and '70s are now decaying and leaching chemicals into the soil and poisoning water resources, wildlife and people. The Convention also requires the disposal of PCBs and PCB-containing wastes.

Every human in the world carries traces of POPs in his or her body. POPs are highly stable compounds that can last for years or decades before breaking down. They circulate globally through a process known as the “grasshopper effect”. POPs released in one part of the world can, through a repeated process of evaporation and deposit, be transported through the atmosphere to regions far away from the original source.

Fortunately, there are alternatives to most POPs. The problem has been that high costs, a lack of public awareness, and the absence of appropriate infrastructure and technology have often prevented their adoption. Solutions must be tailored to the specific properties and uses of each chemical, as well as to each country's climatic and socio-economic conditions.

Note to journalists: For additional information, please contact Eric Falt, UNEP Spokesperson, at +254 20 623292, Mobile: +254 (0) 733 682656, or eric.falt@unep.org; Nick Nuttall, UNEP Head of Media at +254 20 623084, Mobile: +254 733 632755, or nick.nuttall@unep.org, or Michael Williams at +41-22-917 8242, +41-79-409 1528 (cell) or michael.williams@unep.ch. See also www.pops.int.

Source: Environmental Finance (July-August 2004)

Uncertainty persists on chemical equations

The EU's REACH directive is mired in controversy – and poses uncertain risks for the chemicals sector. But **Steve Waygood** argues chemical manufacturers should be doing more to prepare for its possible financial impacts.

The EU's proposals to introduce a new chemical testing regime have generated a storm of controversy – with chemicals companies warning of crippling costs, NGOs arguing that the proposals are already too watered down, and even the US government recently weighing in.

Such is the pitch of the debate that, despite the European Commission first issuing proposals last summer, the 'REACH' (Registration, Evaluation and Authorisation of Chemicals) directive is unlikely to come into force before the second half of next year.

Nonetheless, three things are already clear: this is one of the most far-reaching pieces of legislation currently under consideration in Europe, and probably the most important public policy chemicals initiative for three decades; it is likely to have substantial financial implications for the industry; and many companies appear unprepared for its introduction.

The REACH directive is designed to address growing concerns that the widespread use of certain chemicals can have serious impacts on human health and the environment. For example, Research by the EU has shown that it is probable that everyone now contains traces of persistent organic pollutants (POPs) in their body tissue.

Since 1988, the EU has been evaluating the impacts of all chemicals currently in use. It has determined that sufficient environmental and human health impact data does not exist for more than 90% of the approximately 80,000 chemicals that have been synthesised to date.

At present, public authorities carry the burden of proving that a chemical is hazardous. REACH is essentially a proposal to reverse the 'burden of proof', such that the chemicals industry would be responsible for generating and providing the necessary human and environmental health information to demonstrate that their products are safe.

However, industry is concerned that the costs of the proposal will be prohibitive – with the more realistic direct costs to industry from the proposed testing regime alone estimated to be between £970 million and £4.8 billion over a decade. Some industry associations suggest that up to 20% of chemicals currently on the market would have to be discontinued. In addition, other sectors such as pharmaceuticals, retailers and automotives all use chemical companies' products and will all be affected to some

degree.

There have been strong representations regarding the need to reduce bureaucracy and testing costs from, among others, the US, UK, French and German governments. While some amendments have been made, the current draft remains highly contentious, with companies, trade associations and NGOs all expressing significant disquiet.

Despite a lengthy assessment and consultation phase, a number of significant problems remain to be resolved. First, the current proposal for the prioritisation of chemicals for evaluation is contentious. Some would prefer to prioritise on a risk basis instead of the current proposal of focussing on high volume chemicals. Second, there are questions regarding how to apply REACH to chemical substances in imported products.

Third, due to the potential for significant regulatory efficiency gains associated with a 'one substance, one registration' proposal, it has been proposed that industry collaborate in consortia when testing chemicals. However, there are commercial tensions about the sharing of data in such consortia.

Given the continuing uncertainties, it is unclear how the regulation will play out in different sectors and which companies will be winners and which losers. There is little reliable data available on the potential financial impacts of alternative REACH scenarios. As a consequence, Insight surveyed 17 chemical companies in the UK and continental Europe, including BASF, Bayer, BOC Group, ICI, Victrex and Yule Catto, requesting information that will help us to assess how REACH may impact them financially.

Specifically, we asked them to tell us how well they were addressing the following four REACH-related issues, which we believe to be potential earnings drivers:

- Market loss – REACH proposes that, without acceptable data, chemicals cannot be marketed. Therefore, it is possible that certain key chemicals may have to be discontinued.
- Raw material loss – Companies that depend on the output of primary chemical manufacturers may find that essential raw ingredients are no longer available.
- Potential for innovation – A major aim of the EU policy is to stimulate the development of 'safer substitutes' to existing chemicals. When approving chemicals for specific use, strong preference will be given to less hazardous alternatives. As a result, REACH could benefit companies with research and development programmes that attempt to specifically identify such 'safer substitutes'.
- Litigation risk – REACH represents an increase in litigation risk as it proposes a greater level of public access to testing data.

Our initial assessment is that, while there were a few outstanding exceptions, many companies appeared unprepared for the introduction of REACH. Most were not in a

position to give estimates of the financial impact but, nonetheless, many expressed confidence that the impact would not be material.

Those few companies that did offer cost estimates varied significantly in their assessment of the likely impact (even when taking into account differing product types). Regrettably, many appeared not to recognise the opportunity to establish new market share based on innovation of substitute chemicals of high concern. However, there were notable exceptions – exceptions that help us to add-depth to our long-term investment view on specific company performance.

While recognising that there are a number of unknowns regarding the draft REACH proposal, given the scale of its potential impact it is reasonable for investors to expect implicated companies to have established some idea of the scale of costs based on different scenarios. It is surprising therefore that our research did not identify more companies that appeared to have done so.

We would expect the more nimble companies to be adopting a management approach that accepts that REACH is a reality. We would also expect them to be moving to reduce the potential costs of market loss, and innovating to realise the potential new markets arising from the principle of substitution. Experience with previous regulations has shown that first movers generally have the advantage.

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DIVISION OF CORPORATION FINANCE
INFORMAL PROCEDURES REGARDING SHAREHOLDER PROPOSALS

The Division of Corporation Finance believes that its responsibility with respect to matters arising under Rule 14a-8 [17 CFR 240.14a-8], as with other matters under the proxy rules, is to aid those who must comply with the rule by offering informal advice and suggestions and to determine, initially, whether or not it may be appropriate in a particular matter to recommend enforcement action to the Commission. In connection with a shareholder proposal under Rule 14a-8, the Division's staff considers the information furnished to it by the Company in support of its intention to exclude the proposals from the Company's proxy materials, as well as any information furnished by the proponent or the proponent's representative.

Although Rule 14a-8(k) does not require any communications from shareholders to the Commission's staff, the staff will always consider information concerning alleged violations of the statutes administered by the Commission, including argument as to whether or not activities proposed to be taken would be violative of the statute or rule involved. The receipt by the staff of such information, however, should not be construed as changing the staff's informal procedures and proxy review into a formal or adversary procedure.

It is important to note that the staff's and Commission's no-action responses to Rule 14a-8(j) submissions reflect only informal views. The determinations reached in these no-action letters do not and cannot adjudicate the merits of a company's position with respect to the proposal. Only a court such as a U.S. District Court can decide whether a company is obligated to include shareholder proposals in its proxy materials. Accordingly a discretionary determination not to recommend or take Commission enforcement action, does not preclude a proponent, or any shareholder of a company, from pursuing any rights he or she may have against the company in court, should the management omit the proposal from the company's proxy material.

February 23, 2005

Response of the Office of Chief Counsel
Division of Corporation Finance

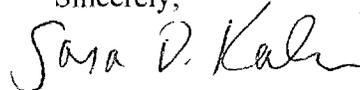
Re: The Dow Chemical Company
Incoming letter dated January 4, 2005

The proposal requests that the board of directors publish a report related to certain toxic substances, including the matters specified in the proposal.

We are unable to concur in your view that Dow Chemical may exclude the proposal under rule 14a-8(i)(7). Accordingly, we do not believe that Dow Chemical may omit the proposal from its proxy materials in reliance on rule 14a-8(i)(7).

We are unable to concur in your view that Dow Chemical may exclude the proposal under rule 14a-8(i)(10). Accordingly, we do not believe that Dow Chemical may omit the proposal from its proxy materials in reliance on rule 14a-8(i)(10).

Sincerely,



Sara D. Kalin
Attorney-Advisor