

February 11, 2008

221524

The Honorable Anne K. Quinlan
Acting Secretary
Surface Transportation Board
395 E Street, SW
Washington, D.C. 20423



RE: Docket No. NOR 42100, *E.I. du Pont de Nemours and Company v. CSX Transportation, Inc.*

Dear Secretary Quinlan:

On February 4, 2008, E.I. du Pont de Nemours and Company filed Opening Evidence in the above referenced proceeding. In the Public Version of the Opening Evidence, certain Highly Confidential information was inadvertently not redacted. Please find enclosed an original and ten (10) copies of DuPont's Opening Evidence (Public Version) to replace the copies that were filed on February 4, 2008.

If you have any questions, please do not hesitate to contact the undersigned.

Sincerely,

Nicholas J. DiMichael
Jeffrey O. Moreno

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**BEFORE THE
SURFACE TRANSPORTATION BOARD**

221524

E I. DUPONT DE NEMOURS AND COMPANY)

Complainant,)

v)

CSX TRANSPORTATION, INC.,)

Defendant)

Docket No. NOR 42100



COMPLAINANT'S OPENING EVIDENCE

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February 4, 2008

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**BEFORE THE
SURFACE TRANSPORTATION BOARD**

E.I. DUPONT DE NEMOURS AND COMPANY	)	
	)	
Complainant,	)	
	)	
v	)	Docket No. NOR 42100
	)	
CSX TRANSPORTATION, INC ,	)	
	)	
Defendant.	)	

COMPLAINANT'S OPENING EVIDENCE

Complainant E.I. du Pont de Nemours and Company ("DuPont" or "the Company") hereby submits its Opening Evidence in this proceeding. DuPont is a manufacturer of chemicals, additives, plastics, coatings and agricultural products, with numerous production facilities throughout the continental United States and around the globe. DuPont is a major user of rail service to transport commodities that it consumes and produces around the globe. This Opening Evidence consists of three parts: (a) an Argument that summarizes the evidence submitted and discusses the legal standards to be applied in this case; (b) the Verified Statements and accompanying exhibits of: (1) Ms. Mary Pileggi, North American Region Logistics Manager, DuPont Logistics, Global Sourcing and Logistics ("Pileggi V.S."); and, (2) Mr. Thomas D. Crowley, President, L.E. Peabody and Associates ("Crowley V.S."); and (c) various exhibits from discovery of CSXT in this proceeding.

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**BEFORE THE
SURFACE TRANSPORTATION BOARD**

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E.I. DUPONT DE NEMOURS AND COMPANY	)	
	)	
Complainant,	)	
	)	
v.	)	Docket No. NOR 42100
	)	
CSX TRANSPORTATION, INC.,	)	
	)	
Defendant.	)	
_____	)	

PART I—ARGUMENT

Under 49 U.S.C. 10701, where a railroad has "market dominance," its transportation rates for common carrier service must be "reasonable." The determination of "reasonableness" is a matter exclusively within the jurisdiction of the Board, 49 U.S.C. 10501, whose decisions are reviewable under the standards of the Administrative Procedure Act. Under 49 U.S.C. 10707, "market dominance" is defined as the "absence of effective competition" from other rail carriers or modes of transportation for the movement to which a rate applies

In order for the Board to find that a rail carrier lacks "effective competition," the Board must find that the rate exceeds the so-called "jurisdictional threshold," that is, the revenues produced by the challenged rate are equal to or greater than 180% of the carrier's variable cost of providing the service. In determining whether there is "effective competition," the Board may only consider competition from other rail carriers or other transportation modes (e.g., motor or water carriers); it may not consider competition from other products or from the same product produced in other geographic regions. See, *Market Dominance Determinations – Product and*

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Geographic Competition, 3 S.T.B. 937, 949 (1998), *aff'd Association of American Railroads v STB*, 306 F.3d 1008 (D.C. Cir. 2002).

In determining the "reasonableness" of a challenged rate, the Board must be guided by the rail transportation policy in 49 U.S.C. 10101. In the context of this proceeding, important policies include 49 U.S.C. 10101(6) ("to maintain reasonable rates where there is an absence of effective competition and where rail rates provide revenues which exceed the amount necessary to maintain the rail system and to attract capital"); 10101(2) ("to require fair and expeditious regulatory decisions when regulation is required"), 10101(5) ("to foster sound economic conditions in transportation . . . "); and 10101(15) ("to provide for the expeditious handling and resolution of all proceedings required or permitted to be brought under this part").

Moreover, the Board is required to give consideration to the so-called "Long-Cannon" factors contained in 49 U.S.C. 10701(d)(2)(A)-(C). These include: (a) the amount of traffic which is transported at revenues which do not contribute to going concern value and the efforts made to minimize such traffic; and (b) the amount of traffic which contributes only marginally to fixed costs and the extent to which rates on such traffic can be changed to maximize the revenues from such traffic.

Also, the Board must recognize that the rail carrier should have the opportunity to earn an "adequate revenue," which is defined as revenue sufficient – under honest, economical and efficient management – to cover operating expenses, support prudent capital outlays, repay a reasonable level of debt, raise needed equity capital, and otherwise retain capital in amounts adequate to provide a sound rail transportation system. 49 U.S.C. 10704(a)(2)

Although the foregoing statutory provisions are familiar and long-standing, this proceeding is anything but ordinary.

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In response to the Congress' requirement for the "expeditious handling" of rate reasonableness cases, and Congress' order to the Board to "establish a simplified and expedited method for determining the reasonableness of challenged rail rates in those cases in which a full stand-alone cost presentation is too costly, given the value of the case," the Board in 1996 adopted guidelines for non-SAC cases that were set forth in *Rate Guidelines – Non-Coal Proceedings*, 1 S.T.B. 1004 (1996) ("*Rate Guidelines*"). However, a decade passed in which the non-SAC guidelines were completely unused by shippers. In 2006, the Board concluded that its *Rate Guidelines* needed significant changes to achieve the statutory goal of providing captive shippers with meaningful access to regulatory remedies for rail rates that are unreasonable. Accordingly, in September 2007 the Board adopted revised procedures that built upon the guidelines and standard adopted in 1996. Ex Parte 646 (Sub-No. 1), *Simplified Standards for Rail Rate Cases*, decision served September 7, 2007 (petition for reconsideration pending) ("*Simplified Standards*")

This case, and two other complaints filed by DuPont at the same time as this proceeding, is the very first case to be litigated under the Board's new *Simplified Standards* rules. This case, then, will set precedent for the next decade or more, and will help to determine whether the Board's new rules actually fulfill their promise of providing an expeditious, fair and effective check upon the abuse of rail market power

The Evidence and Argument of DuPont is in six parts. Part I sets forth the background to this case and the key facts that the Board must consider regarding the movements at issue. Part II discusses the legal standards and evidence relating to market dominance, i.e., whether there is "effective competition" from other carriers or modes of transportation to which the rates apply, including whether the challenged rates exceed the jurisdictional threshold. Part III discusses

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criteria employed by DuPont relating to the "R/VCcomp" factor and the initial "comparison group" that advocates should be used to determine the presumptively unreasonable rate.

Simplified Standards, p. 21. Part IV will also discuss the application of both the "expansion ratio," *i.e.*, the ratio of the RSAM factor – R/VC>180 factor, as well as the confidence interval around the mean, in order to develop the presumed maximum reasonable rate *Id.* at 21-22 Part V will discuss evidence on "other relevant factors," as set forth in *Simplified Standards*, p. 22. Finally, Part VI will discuss the application of the policies in the statute to the evidence DuPont has tendered and the conclusions it has drawn

I. INTRODUCTION

This case is extraordinarily important to DuPont, which is facing competitive pressures from foreign suppliers on the operation of its production facilities within the United States. Congress has mandated that rail rates be "reasonable" where a carrier is market dominant because rail rates have an important impact on real shippers in the real world. Unreasonably high rates undermine the competitiveness of American manufacture. Thus, the results of this proceeding will help to determine the competitiveness of American manufacture on the world market.

A. The Movements at Issue

On June 15, 2007, a master agreement between DuPont and CSXT covering rail freight transportation expired. *See* Pileggi v S., ¶ 5. In its place, CSXT published common carrier tariff rates for a broad range of origin-destination pairs and commodities previously covered by the agreement. *Id.* One of the commodities now covered by these common carrier tariff rates is chlorine, STCC 2812815.

In this small rate case, DuPont challenges the reasonableness of CSXT's rates for the following three movements: (1) the movement of chlorine approximately 881 miles from Niagara

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Falls, NY to New Johnsonville, TN ("Niagara Falls Movement"), (ii) the movement of chlorine approximately 723 miles from Natrium, WV to New Johnsonville, TN ("Natrium Movement"), and (iii) the movement of chlorine approximately 588 miles from Niagara Falls, NY to Carneys Point, NJ ("Carneys Point Movement") All three of the issue movements involve single-line rail service in tank cars

Effective June 16, 2007, CSXT published the following common carrier rates for the movements that are the subject of this Complaint.

Movement	Rate	Source
Niagara Falls	\$8997.03 per car	CSXT 41248.1
Natrium	\$64 99 per net ton	CSXT 41248.1
Carneys Point	\$4779 00 per car	CSXT 41248.1

Beginning June 16, 2007, CSXT also assessed a fuel surcharge in addition to the rates listed above. As of the date of DuPont's complaint, the rates plus the applicable fuel surcharge for the movements are as follows:

Movement	Rate Including Fuel Surcharge
Niagara Falls	\$9173.17 per car
Natrium	\$5993.75 per car
Carneys Point	\$4896.66 per car

These rates (including the effect of the fuel surcharge) represented substantial increases of up to ■¹ percent, compared to the previous contract rates. Pileggi V.S , ¶ 5

¹ All shaded text is HIGHLY CONFIDENTIAL and CONFIDENTIAL information that has been redacted from the public version of this pleading.

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B. The Public Interest in the Safe Transportation of Chlorine

Although chlorine is a hazardous material that is considered toxic-by-inhalation ("TIH"), it is essential to the public welfare and the national economy. DuPont has attached as Exhibit D several documents that detail the pervasive role that chlorine plays in our everyday lives. Just a few examples are described below.

Chlorine is a disinfectant that is widely used in water purification. Today, 98 percent of all U.S. public water supplies that are disinfected are made clean and safe with chlorine or chlorine-based compounds. Chlorine's proven role in water disinfection is one of the most important public health advances of the 20th century. More than 93 percent of pharmaceuticals contain chlorine or are made using chlorine chemistry, including medicines that treat heart disease, cancer, AIDS, and malaria.

Chlorine is critical to the manufacture of antibiotics such as Cipro® that are recommended by the U.S. Centers for Disease Control and Prevention for the treatment of anthrax. Chlorine is used in the manufacture of titanium dioxide pigments, which are used in a broad range of coatings, plastics and personal care products that protect against the harmful effects of sunlight. Chlorine chemistry also is critical to modern agriculture. Chlorine is a key building block in the production of over 95% of crop protection chemicals and is one of the few chemical options available to combat post-harvest disease in crops.

Building and construction is dependant on chlorine enabling easy to maintain, long lasting, attractive and economical building materials. Nearly one-third of all chlorine is used to produce vinyl – for products such as wire and cable, pipe, floorings, siding, windows and doors. Over 25 percent of all medical plastics and over 70 percent of all disposable medical applications are made as the result of chlorine chemistry. This includes X-ray and mammography films as well as vinyl blood bags, tubing and valves, dialysis equipment, examination gloves, and

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inhalation masks to name just a few. In addition, chlorine is used in the manufacture of bullet-resistant vests, bullet-resistant glass, and fire-resistant clothing. Chlorine is so pervasive because it is the single material on which production of so many other chemicals depends.

The U S. Department of Transportation has adopted strict standards to ensure the safe transportation of chlorine. In addition, the chemical and rail industries have worked in concert to develop and implement numerous programs to promote the safe transportation of hazardous chemicals, including chlorine, by rail. The overall rail transportation safety record for all hazardous materials has been exemplary and rail is considered to be the safest and most efficient mode for transporting large volumes of chlorine over land. In its Answer to the First Amended Complaint, defendant CSXT admitted that "the rail transportation safety record for chlorine is good," and admits that "transportation by rail is a relatively safe mode of transporting chlorine over land." CSXT Answer to First Amended Complaint, ¶ 16.

Indeed, one reason why this proceeding is so important is precisely the need for safety in the transportation of chlorine. Although waterborne transportation is the safest mode, water transportation is not available in many locations. Transportation via motor carriage is substantially less safe than transportation by rail. Thus, artificial disincentives in the form of unreasonably high rail rates not only discourage American production and jobs, but also put the American public at greater risk. Thus, this Board's obligation to impose "reasonable" rates where rail carriers are market dominant also has, in the case of all hazardous commodities, but particularly commodities that are denominated toxic by inhalation, the additional salutary benefit of advancing public health and safety.

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C. Background to the Challenged Rates

For many years, the transportation of the commodities in the movements at issue in this proceeding, as well as all other DuPont products, was governed by successive Master Rail Transportation Agreements. Most recently, the relationship between CSXT and DuPont was governed by CSXT-1847 ("Master Contract"). *See*, Pileggi Verified Statement attached to Dupont September 24, 2007 Reply to CSXT Motion to Dismiss, p. 2) (hereafter, "9/24/07 Pileggi V.S.") That contract provided for the addition of new movements as the market changed, and the regular escalation of the agreed-to rates by means of an agreed-to escalation factor. *Id* The Master Contract was scheduled to expire on May 31, 2007. *Id*

Although DuPont requested new contract rates from CSXT covering the 21 separate DuPont sites served by CSXT over one year prior to the expiration of the contract, CSXT did not provide a written contract proposal until March 9, 2007, just 12 weeks prior to the expiration of the contract. *Id* at 3 The carrier's proposal failed to cover all traffic lanes, established a rate structure that the carrier knew was incompatible with DuPont's payment systems, and included substantial and unexplained rate increases *Id*

With only ten weeks remaining until the expiration of the contract, DuPont developed a counter-proposal and sent it to CSXT. *Id* DuPont also asked CSXT to meet with four of its business units most dependent upon CSXT to assist the carrier in understanding the impact of its proposed rate increases on the businesses Those meetings took place between May 7 and June 7, 2007. *Id*

Despite the Company's attempts to negotiate with the carrier and to educate CSXT, on May 23, 2007, in the midst of the scheduled meetings with the business units, the carrier informed DuPont that it intended to publish the rates in the previously rejected March 9 proposal,

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with an effective date of June 1, 2007. *Id* In view of the meetings already scheduled and the need for further discussions, DuPont asked CSXT to extend the existing contract for a two month period to allow the parties to try and reach a mutually acceptable agreement. *Id* DuPont believed that a two-month extension would be necessary, based on the scope and complexity of the traffic at issue, the delay in receiving the CSXT contract proposal, and because it still had not received complete rate information from CSXT for all traffic lanes to be included in the contract. *Id* at 3-4

However, on May 25, 2007, CSXT informed DuPont that it would agree to only a two week extension of the contract, until June 15, 2007 CSXT told DuPont that it would publish the rates proposed on March 9 in the tariffs challenged in this proceeding. *Id* On June 5, DuPont made one last request to CSXT to extend the current rates to June 30 to allow the contract negotiations to continue. *Id* On June 8, CSXT denied that request *Id* Because DuPont had no other option, it tendered traffic to CSXT pursuant to the tariffs and for the movements at issue in this proceeding *Id*

On August 21, 2007, DuPont filed the Complaint that initiated this proceeding.

II. CSXT IS MARKET DOMINANT OVER THE TRANSPORTATION TO WHICH THE CHALLENGED RATES APPLY

There can be no dispute that CSXT possesses market dominance over the transportation of chlorine between all three origin-destination pairs in the Complaint. In their initial disclosures in this case, both parties have calculated variable costs for all three movements that would result in an R/VC ratio that would exceed the 180% jurisdictional threshold. 49 U.S.C 10707(d)(1)(A) Furthermore, chlorine has no effective competitive alternatives to CSXT in all three lanes.

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A. There is No Dispute Over CSXT's Quantitative Market Dominance.

There does not appear to be any dispute between the parties that CSXT possesses quantitative market dominance over all three issue movements. Although CSXT's Answer to the First Amended Complaint denies the allegation that the R/VC ratio for each movement exceeds 180%, CSXT's initial disclosures accompanying its Answer produce R/VC ratios for each lane that are well in excess of 180%. Therefore, DuPont presumes that CSXT's denial applies only to the specific variable cost calculated by DuPont, and not to the fact that the R/VC ratios for each movement exceed 180%.

B. There is No Effective Intra- or Intermodal Competition.

CSXT's rates for the issue chlorine movements are not constrained by intra- or intermodal competition because no such competition exists, and even if such competition did exist, CSXT has priced chlorine movements to discourage such traffic, not to compete for it. Thus, anywhere that intra- or intermodal competition to CSXT exists for transporting chlorine, such competition cannot be deemed to be effective

CSXT, by its own admission, has no desire or intent to compete for chlorine movements. A multitude of CSXT documents, both public and private, state this fact in clear and unequivocal terms.

1. [REDACTED]
2. [REDACTED]

² All shaded text is HIGHLY CONFIDENTIAL and CONFIDENTIAL information that has been redacted from the public version of this pleading

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- 4 The internal statements identified above also have been repeated publicly by CSXT, albeit in softer but no less clear language. DuPont has attached as Exhibit C CSXT's comments to the Pipeline and Hazardous Materials Safety Administration, in which CSXT states that "Given a choice, CSXT would decline to transport these chemicals. It is a business that CSXT does not chose [sic] to be in."

In light of these statements, there is no possible way to conclude that any form of modal competition, to the extent it exists at all, could be an effective competitive constraint upon CSXT's rates for the issue traffic.

The fact, however, is that no form of modal competition exists at all for two of the three issue movements, and what does exist for the third is not truly competition.

There is no intra-modal competition for any of the three issue movements. The chlorine movement from Natrium, WV to New Johnsonville, TN is captive to CSXT for rail service at both the origin and destination; the chlorine movement from Niagara Falls, NY to New Johnsonville is captive to CSXT for rail service at both the origin and destination; and the chlorine movement from Niagara Falls to Carneys Point, NJ is captive to CSXT at the origin.

Pileggi V.S., ¶ 7. The Board has "generally found a lack of intramodal competition where.. a single railroad serves the sole origin ..because a railroad occupying a monopoly position in a routing would not necessarily be restrained from setting an unreasonably high rate for that portion and keeping the monopoly profits for itself, regardless of whether competition existed over other segments." *Amstar Corp v The Atchison, Topeka and Santa Fe Ry Co*, No. 37478, 1987 ICC LEXIS 47, *11 (Nov 23, 1987). See also, *Metropolitan Edison Co v Conrail*, 5 I.C.C. 2d 385, 413 (1989) ("When one carrier participates in all available routings, it will not

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necessarily have any incentive to moderate the revenue collected from this traffic."). Thus, there is no alternative rail transportation to CSXT available to DuPont for the issue movements.

Due to safety concerns, when rail is an option, DuPont does not transport chlorine by any other mode, except water. *Pileggi V S.*, ¶ 6. DuPont's long-standing policy on the transportation of chlorine is to use the lowest risk option available. Thus, DuPont's order of preference is water first, rail second, and truck last. *Id.* All of DuPont's U.S. facilities that use chlorine are designed to accept deliveries of chlorine only by rail, except for New Johnsonville, which also can receive chlorine by barge. *Id.* DuPont does not transport chlorine by truck anywhere in North America, and is not even aware of any trucking companies that handle chlorine shipments. *Id.* Indeed, as a result of its internal safety policy, Taiwan is the only place in the world where DuPont receives chlorine by bulk truck, and then only over short distances inland from the seaports, due to the absence of a rail or barge option. *Id.*

Of the three chlorine movements at issue in this Complaint, only the movement from Natrium to New Johnsonville has a barge option. Because DuPont considers barge to be a safer alternative than rail transportation, DuPont receives as much chlorine by barge over this lane as there is available barge capacity. *Id.* at ¶ 9. As a result, at New Johnsonville, DuPont receives more than ten times the volume of chlorine by barge than it receives by rail from Natrium. *Id.* CSXT receives only the volumes that cannot be transported by barge. *Id.* Thus, barges are not a competitive constraint upon CSXT's rates, since DuPont would never consider CSXT for any chlorine movement that could be handled by barge.

Unfortunately, as a practical matter, there is not sufficient barge capacity from Natrium to New Johnsonville to handle all of the chlorine that DuPont requires. The barges are provided by the chlorine manufacturer, PPG Industries. *Id.* at ¶ 10. DuPont is unaware of any commercial

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barge capacity for the transport of chlorine that could supplement PPG's private barge fleet. *Id* To DuPont's knowledge, the small number of chlorine barges in the United States are all privately owned. *Id* Furthermore, even when barges may be available, there are times throughout the year when the inland waterways are too high or too low, when locks are damaged or under repair, or other conditions restrict or completely preclude barge transportation. *Id* at ¶ 11. These are the only times that DuPont tenders chlorine to CSXT from Natrium to New Johnsonville. *Id* at ¶ 9.

Finally, CSXT's market dominance over the issue chlorine movements is manifest in the failed contract negotiations that took place prior to DuPont filing its Complaint. Specifically, CSXT provided DuPont with rates that CSXT declared to be "non-negotiable." *Id* at ¶ 12. Although as a common carrier, CSXT cannot refuse to haul chlorine, it can attempt to discourage movements by demanding unreasonably high rates. Clearly, CSXT's public and private statements indicate that is precisely CSXT's objective. CSXT would have absolutely no qualms if its [REDACTED] rate increases for the issue traffic caused DuPont to cease using CSXT at all. Such behavior constitutes the essence of market dominance.

III. THE DUPONT COMPARISON GROUP MEETS THE STANDARDS SET FORTH BY THE BOARD IN SIMPLIFIED STANDARDS, AND THE EVIDENCE SHOWS THAT THE RATES CHARGED BY CSXT ARE PRESUMPTIVELY UNREASONABLE AND UNLAWFUL

In *Simplified Standards*, the Board indicated that it would adopt a "final offer" procedure whereby the complainant and the defendant tender initial evidence regarding an appropriate comparison group. *Simplified Standard*, p. 18. The Board indicated that the movements to be included in the comparison group must be drawn from the unmasked confidential Waybill Sample provided to the parties by the Board at the outset of the case, which in this case is the Waybill Sample for the years 2002 through 2005. Under the procedures adopted in *Simplified*

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Standards, after the initial tenders are made in the opening evidence, each party is then to tender, in its reply evidence, its "final offer" group of movements that it believes should comprise the comparison group. The Board indicated that it will then select the comparison group that is "most similar in aggregate to the issue movements," by means of an "either-or," "final offer" selection. *Id.*

A. Factors To Be Consulted In Determining Comparability

In its *Rate Guidelines* and *Simplified Standards* decisions, the Board set out principles that would exclude certain movements from an appropriate comparison group, or exclude certain evidence that might be used to support inclusion of certain movements in a comparison group. In *Simplified Standards*, the Board also established a non-exclusive list of "comparability factors" that the agency would consult in determining which comparison group is "most similar in aggregate" to the issue movements

First, the Board noted that the comparison group must consist of "only captive traffic over which the carrier has market power." *Id.* at 17. However, the Board has made clear that it will conclusively presume that all traffic from the Waybill Sample with a revenue-to-cost ratio of 180 or more is "captive." *Rate Guidelines*, 1 S T B. at 1025-1026.³ The Board also indicated that traffic from non-defendant railroads would be excluded from any comparison group, because, among other things, the "R/VC ratios of one carrier cannot be fairly compared to the R/VC ratios charged by another railroad, since the amount of joint and common costs differ

³ In *Simplified Standards*, the Board also noted that the Waybill Sample does not identify the shipper of a movement, so that trying to identify the shipper involved for a particular movement in the Waybill Sample, to develop shipper-specific information from the files of the carrier, would be complicated and expensive. *Id.*, p. 84. Trying to determine whether a shipper in the Waybill Sample with a R/VC ratio of 180 percent or more was "captive" would lead to huge litigation costs.

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between carriers, thus creating differences in R/VC ratios between carriers." *Simplified Standards*, p. 82.

Continuing its focus on costs and R/VC ratios, in *Simplified Standards*, the Board also declared that, since the comparison is to be based on mark-ups over variable cost (rather than comparisons of absolute dollar levels), movements with different cost characteristics (such as multiple car or unit train movements in a case in which a complaint is brought against a single-car rate) can be included in an appropriate comparison group. *Id.*, see also, concurrence by Vice Chairman Buttrey, *id.* at 36. This is because there is no reason to assume, *a priori*, that the R/VC ratios of single car, multiple car, and unit train movements are or should be different.

The Board indicated that, because it is using the Uniform Rail Costing System (URCS) to develop the variable cost for the issue movement and comparison movements, the Board will favor a comparison group that "consists of like commodities" so that "the variable cost calculation of the issue movement and comparison group will be similar." *Id.* at 17. Accordingly, the Board noted that comparability would be determined by reviewing a variety of cost factors, such as "length of movement, commodity type, [and] traffic densities of the likely routes involved." *Id.*

The Board indicated that it would also review "demand elasticities," although the Board carefully noted that the comparison group "need not have movements with identical demand." *Id.*

The Board stated that it would *not* automatically exclude contract traffic from consideration in the comparison group, for two independent reasons. *Id.* at 82-83. First, the Board noted that one cannot assume that contract rates provide no useful information as to the maximum lawful rate of the challenged movement. Second, the Board was concerned that

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excluding contract movements from the comparison group may leave insufficient movements in the Waybill Sample to perform a statistically meaningful comparison analysis. However, the Board did indicate that, all other factors being equal, a comparison group that consists of just common carrier traffic will be preferred over a group that includes contract traffic. *Id.* at 83.

Finally, the Board placed strict limitations on the *type* of evidence that could be used to establish comparability. The Board declared that it would select the comparison group "based on information contained in the Waybill Sample . . . and other publicly available information," because to do otherwise would place the shipper on an uneven playing field with the carrier, or would lead to delayed proceedings and high litigation costs, which would be inconsistent with the Congressional policy." *Id.*

B. The DuPont Comparison Group Correctly Applies the Factors Enumerated By the Board, and Should Be Selected By the Board

The Verified Statement of witness Crowley sets forth the procedures used to select the DuPont initial comparison group. As explained in further detail in that Verified Statement, witness Crowley selected movements from the 2002-2005 unmasked confidential Waybill Sample having the following characteristics, which are consistent with the standards enumerated by the Board in its *Simplified Standards* decision as discussed above:

1. Movements with a Revenue to Variable Cost Ratio Greater than 180 Percent

In *Simplified Standards*, the Board noted that the purpose of the R/VCcomp benchmark is to use the R/VC ratios of "other potentially captive traffic" (i.e., traffic priced above the 180% R/VC level) as evidence of the reasonable R/VC levels for traffic of that sort." *Simplified*

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Standards, p. 17.⁴ The DuPont comparable group consists only of traffic with a revenue to variable cost ratio of greater than 180 percent

2. Movements in Single-Line CSXT Service

In *Simplified Standards*, the Board ruled that it would exclude non-defendant traffic from the comparison group. *Simplified Standards*, p. 82. The DuPont comparable group consists only of traffic moved by CSXT. Because each of the issue movements are transported in single-line CSXT service, the DuPont comparable group consists only of movements in the Waybill Sample that conform to subsection (1) above and that also originate and terminate solely on CSXT. Thus, the DuPont comparable group not only applies the exclusion required by the STB, but also incorporates only those movements that correspond to the single-line nature of the DuPont movements at issue in this complaint

3. Movements of Similar Distances

In *Simplified Standards*, the Board noted that one of the factors that it would review is the "length of movement" in order to determine comparability.⁵ Although the Board has not provided specific details on what constitutes a similar length of movement, DuPont has reasonably applied the Board's guidance. Specifically, DuPont has selected movements for the comparable group whose loaded miles are within a range of plus or minus 150 miles of the issue movement's loaded miles, rounded to the nearest 50 miles. *Crowley V.S.*, p. 9. As noted by witness Crowley, the loaded miles for the Niagara Falls movement equal 880.7 miles, which rounded to the nearest 50 miles is 900 miles. Therefore, the mileage range for selecting comparable movements to the Niagara Falls movement equals 750 to 1050 miles. *Id.*, note 3

⁴ See also, *Rate Guidelines*, 1 S.T.B. at 1035 ("to be similar traffic, the comparison traffic should involve a commodity moving at an r/vc level above 180")

⁵ See also, *Rate Guidelines*, 1 S.T.B. at 1035 ("to be similar traffic, the comparison traffic should involve a commodity moving similar distances")

PUBLIC VERSION

4. Movements in Similar Equipment

In neither *Simplified Standards* nor in *Rate Guidelines* did the Board identify car type or equipment as a factor in determining the comparable group. Nevertheless, DuPont believes that the Board's general focus on "similar traffic" would include traffic moving in similar equipment. Accordingly, for each movement encompassed in the Complaint, the DuPont comparable group consists of movements in the same car type as the issue movements (*i.e.*, tank cars). Crowley V S., p. 9. In addition, because the issue movements are in private cars, the DuPont comparable group also consists of movements in private cars *Id*

5. Movement Characteristics

As noted above, in *Simplified Standards*, the Board stated that movements with different cost characteristics (such as multiple car or unit train movements in a case in which a complaint is brought against a single-car rate) can be included in an appropriate comparison group *Simplified Standards*, p. 17; *see also*, concurrence by Vice Chairman Buttrey, *id.* at 36. Therefore, DuPont has included single car, multi-car and unit train movements in its comparable group

6. Movements of Like Commodities

In *Simplified Standards*, the Board noted that one of the factors that it would review is the "commodity type" in order to determine comparability.⁶ The Board has not provided any further guidance on what makes a commodity "similar." However, DuPont notes that the commodity at issue in this proceeding, chlorine, is a hazardous material, as that term is defined by the Department of Transportation. Furthermore, chlorine is a commodity that is "toxic by inhalation" ("TIH"). TIH materials are gases or liquids that are known or presumed on the basis

⁶ See also, *Rate Guidelines*, 1 S.T.B. at 1035 ("to be similar traffic, the comparison traffic should involve a similar commodity")

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of tests to be so toxic to humans as to pose a hazard to health in the event of a release during transportation. *See* 49 CFR 171.8, 173.115, and 173.132. Because TIH materials are deemed to pose a greater hazard than other types of hazardous commodities, the federal government imposes more stringent requirements upon their transportation.

DuPont recognizes that the movement of TIH commodities imposes certain operational requirements on carriers such as CSXT, and therefore, DuPont has limited its comparable group to only those commodities that are regulated in the same way, and that impose the same requirements on the carrier. Accordingly, the DuPont comparable group consists of all movements in the Waybill Sample that are classified as a hazardous commodity and as a TIH.

7. Movements with Similar Demand Elasticities

In *Simplified Standards*, the Board stated that one of the factors that it would review is the "demand elasticity" in order to determine comparability. *Simplified Standards*, p. 17 The Board noted, however, that "the comparison group need not have movements with identical demand " Moreover, in *Rate Guidelines*, the Board noted that "railroads do not directly measure demand elasticity in setting their rates. . . " *Rate Guidelines*, 1 S.T.B. at 1034

DuPont believes that the comparable group that it has chosen – consisting of only TIH commodities moving in similar equipment, at similar distances, in single-line CSXT service, at R/VC ratios exceeding 180 – also reflect similar demand elasticities This is because such commodities are "measur[ing] the markup taken on >180 traffic moving under similar transportation conditions " *Rate Guidelines*, 1 S.T.B. at 1034.

However, even beyond the similarity in DuPont's comparison group, which consists of all TIHs, it is clear that CSXT treats all TIHs as if they have similar demand elasticities – an elasticity of zero. As noted above, by its own public statements, CSXT has made clear that the transportation of TIHs "is a business that CSXT does not chose [sic] to be in." *See* p. 12, *infra*

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and Exhibits A-C. CSXT also has made it as difficult as possible to ship TIHs via the railroad. For example, although CSX I's website provides public rates for a wide range of commodities, it is not possible to obtain a public tariff rate for the transportation of chlorine or other TIHs. See, www.csxt.com. An examination of the "demand elasticity" factor, then, should lead the Board to conclude that, in the case of chlorine, a comparison group consisting of all TIHs has a similar demand elasticity

8. Contracts

In *Simplified Standards*, the Board noted that, if all other factors are equal, a comparison group that consists of only common carrier traffic will be selected over a group that includes contract traffic. Although this question cannot be decided until the parties submit their final comparable groups (since there is no way to determine, at present, whether all other factors are in fact equal), there are a number of considerations in this particular case and at this particular time that convincingly show why the Board should not credit any presumption in favor of comparable groups that contain only common carrier movements, regardless of the final comparison groups submitted by the parties in this case.

First, the rates that are the subject of this complaint were published in CSXT "Private Price Lists" ("PPLs"). In a Motion to Dismiss filed September 4, 2007, CSXT publicly chose to argue that such PPLs were "contracts." In a decision rendered in this case on December 20, 2007, the Board found that the PPLs were in fact tariffs, despite CSXT's characterization of them as contracts in its Motion, and despite the fact that CSXT labelled the PPLs as "confidential" ⁷

⁷ In a decision in this case served January 31, 2008, the Board confirmed that evidence with respect to comparability would be limited only to evidence in the Waybill Sample or other public information. CSXT's decision to file a Motion to Dismiss in this case renders the information in that motion public; the railroad cannot choose to both publicly argue a position and then claim that the matter is not publicly available. Moreover, in its decision, the Board noted that it was unclear "whether CSXT's unilateral attempt to designate the agreement 'confidential' is consistent with its obligations under section 11101." Decision served December 20, 2007, p. 6. The

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Although the Board, in making its decision, relied to some extent on the facts of the interactions between CSXT and DuPont, the Board found "most significant[]" the fact that the CSXT PPLs "unambiguously state[d]" that "*Rail Transportation Contracts take precedence over prices published herein for commodities over the same route* " Decision served December 20, 2007, p 5 [emphasis in original] The placement and phrasing of this text in the CSXT PPLs suggest that this language is not limited just to the DuPont PPLs, but is a boilerplate feature of CSXT PPLs in general. In that event, all CSXT PPLs would share similar infirmities as alleged "contracts," despite the fact that they all may have been coded as "contract" movements in the Waybill Sample. Indeed, given the public evidence in this case, it is impossible to tell whether CSXT has coded the Waybill Sample to correctly reflect the nature of its PPLs

Finally, in Ex Parte No. 669, *Interpretation of the Term "Contract" in 49 U.S.C. 10709*, the Board has proposed rules to more clearly distinguish contracts from tariff movements. The facts of this case reveal that the Board is on sound ground in attempting to clarify the situation, and until there are clearer standards for determining what is a contract and what is a tariff, the Board should not credit a carrier's designation in the Waybill Sample.⁸

wording of CSXT's PPLs, at least as they have been presented to DuPont, falls within the scope of publicly available information

⁸ Particularly in connection with this specific case, the Board should be aware that information provided by CSXT has revealed substantial inconsistencies in the way that CSXT codes in the Waybill Sample different movements allegedly governed by the same rate authority. This is a matter going to the integrity of this field in the Waybill Sample upon which the Board is relying in Three Benchmark cases. In response to DuPont's discovery, CSXT agreed to provide a list of requested PPLs and to match those PPLs to specific movements in the 2004 and 2005 Waybill Samples. In Exhibit E, DuPont has sorted and grouped the waybill data by PPL number (column 8). The Calculated Rate Flag (column 16) contains a "0" for tariff moves and a "1" for contract moves. These two columns reveal that CSXT frequently has flagged different movements governed by the same PPL as both contract and common carrier moves. But the same PPQ cannot be both a contract and a tariff. Clearly, CSXT has failed to properly code contract and tariff movements in the Waybill Sample. Given CSXT's inconsistencies in coding contract and tariff movements in the Waybill Sample, the Board in this case should drop its presumption in favor of the comparison group with the fewest contract movements. See, *Simplified Standards*, p. 83. The Board can solve this problem in the Ex Parte 669 proceeding, however, by ordering the carriers to cleanse the Waybill Sample of any contract designations that do not fall within the definition of a 10709 contract eventually adopted by the Board.

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IV. APPLICATION OF THE RATIO OF THE RSAM ÷ R/VC>180

In *Simplified Standards*, the Board indicated that, once it selects the appropriate comparison group using the final-tender process, it would then adjust each movement in the comparison group by the ratio of the RSAM ÷ R/VC>180 four-year average contained in the Board's December 20, 2007 decision in Ex Parte 347 (Sub-No 2), *Rate Guidelines – Non-Coal Proceedings*, served December 20, 2007. As set forth in his Verified Statement, Witness Crowley has applied that ratio to each movement in the comparable group chosen by DuPont. Crowley V.S., pp. 9-10. Then, as set forth in *Simplified Standards*, witness Crowley calculated the mean and standard deviation for the adjusted R/VC ratios for the comparable group. Next, using the mean and standard deviation, witness Crowley calculated the 90% confidence interval around the estimate of the mean to determine the upper boundary of the mean for the comparable group, which becomes the presumed maximum level. *Id.* As noted in that Verified Statement, the results are as follows for the three movements at issue in this complaint:

Presumed Maximum Rate for Issue Movements Using STB's December 20, 2007 RSAM and R/VC>180 Factor			
Item	Niagara Falls Movement	Natrium Movement	Carney's Point Movement
3Q07 Per Car Rate (including FSC)	\$9,173.17	\$5,993.75	\$4,896.66
3Q07 Variable Cost Per Car	\$1,993.25	\$1,712.52	\$1,472.65
R/VC Ratio	460%	350%	333%
Maximum R/VC Ratio	290%	332%	321%
Maximum Rate Per Car	\$5,780.43	\$5,685.57	4,727.21

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Witness Crowley made this calculation on the basis of the Board's December 20, 2007 calculation of the RSAM and R/VC>180. That calculation, in turn, was based on the cost of capital developed under a methodology that the Board has since discarded. Specifically, in a decision served January 17, 2008, the Board decided "that the time has come to replace the single-stage Discounted Cash Flow (DCF) model we have used since 1981 to estimate the cost of equity." *Methodology to be Employed in Determining the Railroad Industry's Cost of Capital*, decision served January 17, 2008 ("*Changed Cost of Capital Methodology*")

Congress has directed the Board to "ensure the availability of accurate cost information in regulatory proceedings." 49 U.S.C. 10101(14). Thus, as a matter of law, the Board must recalculate the RSAM and R/VC>180 figures developed in its December 20 decision in Ex Parte 347 (Sub-No. 2), by applying the "more current and precise techniques" adopted in *Changed Cost of Capital Methodology*, p. 1., to the cost of capital underlying the RSAM and R/VC>180 benchmarks, since those figures play a central role in calculating maximum reasonable rates under the Three-Benchmark procedure in *Simplified Standards*.

In *Changed Cost of Capital Methodology*, p. 5, the Board determined that the single stage DCF methodology underlying the cost-of-capital used in the December 20 decision "had fallen into disfavor in the finance and academic communities and that CAPM was a more current and widely used approach to estimating the cost of equity." Indeed, the Board noted that the railroads themselves "no longer seriously challenge the need to replace the 1981 DCF Model with more current approaches." *Id.* See also, *id.*, p. 7, note 12. Consequently, the Board held that "[g]iven the central role this calculation plays in our economic regulation of the rail industry, the time has come to modernize our approach to address concern over continued use of the 1981 DCF Model." *Id.*, p. 7. In light of the Board's own conclusions regarding the need to replace the

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1981 DCF Model with a more current and precise approach, now that the Board has adopted such an approach, it is legally obligated to apply that approach in this proceeding.

Given the Board's January 17 *Changed Cost of Capital* decision, the fact that all of the inputs to develop a cost of capital based on the new methodology are readily available and easy to apply; the centrality of the cost of capital to the calculation of the RSAM and R/VC>180; and, the fact that a decision in this case will not be due for five months and thus the Board has ample time to calculate a new expansion ratio, the Board must recalculate the RSAM and R/VC>180 to reflect its new cost of capital decision.

In his Verified Statement, Witness Crowley has applied the procedures adopted by the Board in its *Changed Cost of Capital Methodology* decision to the RSAM and R/VC>180 figures for the years 2002 – 2005. See, Crowley V.S , pp. 13-15. Application of the methodology adopted in *Changed Cost of Capital Methodology* would produce the following maximum R/VC ratios and the following maximum rates per car.

Presumed Maximum Rate for Issue Movements Using STB's RSAM and R/VC>180 Factors Developed By Using <i>Changed Cost of Capital Methodology</i>			
Item	Niagara Falls Movement	Natrium Movement	Carney's Point Movement
3Q07 Per Car Rate (including FSC)	\$9,173.17	\$5,993 75	\$4,896.66
3Q07 Variable Cost Per Car	\$1,993.25	\$1,712.52	\$1,472 65
R/VC Ratio	460%	350%	333%
Maximum R/VC Ratio	269%	309%	333%
Maximum Rate Per Car	\$3,811.33	\$702 06	\$493.44

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V. **OTHER RELEVANT FACTORS DEMONSTRATE THAT THE PRESUMED MAXIMUM LAWFUL RATE SHOULD BE ADJUSTED DOWNWARD**

A. **Even If the Board Does Not Apply the Procedures In Its *Changed Cost of Capital Methodology* Decision To Recalculate the RSAM and R/VC>180 Directly, It Should Adjust the Presumed Maximum Rate Downward on the Basis of That Decision As an "Other Relevant Factor"**

In Section IV above, DuPont has argued that, as a matter of law, the Board must recalculate the RSAM and R/VC>180 factors to apply the most current, and more importantly the most accurate, methodology for calculating the cost of capital in the critical "expansion ratio" that it will apply to the comparison movements

Even if the Board does not believe that it must apply the procedures in its *Changed Cost of Capital Methodology* decision to recalculate the RSAM and R/VC>180 factors as a matter of law, it should do so as part of its consideration of "other relevant factors." As presented by Mr. Crowley, the application of the *Changed Cost of Capital Methodology* procedures has a major effect on the expansion ratio, and cannot be ignored. The cost of capital is, in fact, a major element in the railroad's cost structure, and to utilize the Board's most current and most precise procedures is clearly relevant in the calculation of a maximum reasonable rate.

B. **The Board Should Adjust the Presumed Maximum Rate Downward To Account for Information Relevant to the Long-Cannon Factors**

Under 49 U.S.C. 10701(d)(2)(A)-(C), the Board is required to give consideration to the so-called "Long-Cannon" factors contained in that section, including (a) the amount of traffic which is transported at revenues which do not contribute to going concern value and the efforts made to minimize such traffic; and, (b) the amount of traffic which contributes only marginally to fixed costs and the extent to which rates on such traffic can be changed to maximize the revenues from such traffic; and (c) whether one commodity is assuming an unreasonable share of the cost burden of the carrier 49 U.S.C. 10701(d)(2)(A)-(C).

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In its *Rate Guidelines* decision, the Board calculated two versions of the RSAM, with and without an "efficiency adjustment." The RSAM with the "efficiency adjustment" reflected the fact that the carrier was transporting some traffic at rates that were less than its variable cost, and, in accordance with the first two Long-Cannon requirements, the "efficiency adjustment" eliminated that traffic from consideration in calculating the RSAM. *Rate Guidelines*, 1 S.T.B. at 1029-1030. In *Rate Guidelines*, the Board indicated that it would "look at both figures (the adjusted and unadjusted RSAM figures) and treat them as the relevant starting range for our consideration." *Id.*, p. 1030. However, in its *Simplified Standards* decision, the Board eliminated the efficiency adjustment, on the grounds that no party had requested the Board to retain it. *Simplified Standards*, p. 19.⁹

Whether or not the Board formally retains an "efficiency adjusted" RSAM, the Board is still required to consider the Long-Cannon factors in its determination of a maximum reasonable rate. The amount of traffic being carried at less than long-run variable cost must be considered as an "other relevant factor" in a Three-Benchmark case.

In its decision in Docket No. 42093, *BP Amoco Chemical Company v. Norfolk Southern Railway Company*, served June 6, 2005 ("*BP Amoco*"), the Board proposed to only use the unadjusted (i.e., without the efficiency adjustment) RSAM in that proceeding. The Board ruled in that decision that the "uncertainty" created by the range between the adjusted and the unadjusted RSAM "did not appear justified by the objectives of the managerial efficiency adjustment." *Id.*, p. 10. The Board noted that the amount of revenue shortfall attributed to traffic with an R/VC ratio below 100% cannot provide any reasonable approximation or useful

⁹ This issue is one of those subject to a Petition for Reconsideration in the *Simplified Standards* proceeding.

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surrogate for other inefficiencies in a carrier's system, and that the adjustment was outdated because "there is no longer significant excess capacity in the rail industry." *Id*

But if there is in fact "no longer significant excess capacity in the rail industry," then there is no reason for carriers to be transporting goods at less than long-run variable cost. Yet, as shown in the analysis by Mr. Crowley, *see Crowley V.S* , pp. 11-12, CSXT is in fact still carrying traffic at rates that are less than variable cost as calculated under URCS.

The Long-Cannon factors not only include a consideration of traffic that does not contribute to going concern value, but also require the Board to consider "the amount of traffic which contributes only marginally to fixed costs and the extent to which . . . rates on such traffic can be changed to maximize the revenues from such traffic . . ." 49 U.S.C. 10701(d)(2)(B). Even if traffic that is being transported at rates that produce a revenue to variable cost ratio below 100% still contributes (on a short-run basis) to the carrier's going concern value, such traffic is still contributing "only marginally" to the carrier's fixed costs, within the definition of the second Long-Cannon factor, since such traffic is being transported at rates that are less than long-run variable cost as calculated by URCS.

While the rates on such traffic might be justified if the carrier has excess capacity (since it would still be better for the carrier to transport that traffic even if such traffic contributes only marginally to fixed costs), there is no justification for captive shippers to subsidize such traffic when there is little or no excess capacity. Thus, the Board should credit, as an "other relevant factor," the adjustment shown in Mr. Crowley's Verified Statement calculating the RSAM value when such below-variable-cost traffic is eliminated. *See Crowley V.S.*, pp. 11-12.

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VI. BOTH THE PRESUMED MAXIMUM LAWFUL RATE AND THE RATE PRODUCED BY THE APPLICATION OF OTHER RELEVANT FACTORS MEET ALL OF THE REQUIREMENTS AND POLICIES OF THE STATUTE

Under 49 U.S.C. 10704(a)(2), the Board is to make an adequate and continuing effort to assist carriers in attaining adequate revenues, which are those sufficient, under honest, economical and efficient management, to cover operating expenses, support prudent capital outlays, repay a reasonable level of debt, raise needed equity capital, and otherwise retain capital in amounts adequate to provide a sound rail transportation system. 49 U.S.C. 10704(a)(2)

There is no doubt that the rate levels DuPont sets forth in this evidence meets those requirements. Without considering evidence on "other relevant factors," the presumed maximum reasonable rates DuPont sets forth in its evidence range from 290% to 332% of the carrier's long-run variable cost – i.e., approximately three times a cost level that includes a return on variable cost at the current cost of capital. These levels equal or exceed CSXT's 4-year average RSAM set forth in the Board's December 20, 2007 decision in Ex Parte 347 (Sub-No. 2), *Rate Guidelines – Non-Coal Proceedings*. They far exceed the 4-year average revenue to variable cost ratio of the average captive (i.e., over 180% R./VC ratio) shipment as determined by the CSXT's R/VC > 180, as set forth in the same decision. Even considering evidence of "other relevant factors," the rates DuPont seeks are far above the levels needed by the carrier for revenue adequacy, especially if the reductions in the cost of capital under the Board's new methodology are considered.

Revenues at this level meet all the requirements of the statute, and the Board should so find.

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VII. CONCLUSION

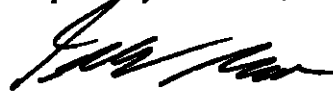
DuPont respectfully requests the Board to

(1) find that the CSXT's common carrier rates applicable to the transportation of the commodity between the origins and destinations named in the Complaint are unreasonable,

(2) prescribe just and reasonable rates for the future applicable to the rail transportation of DuPont's traffic, pursuant to 49 U.S.C. §§ 10704(a)(1) and 11701(a), and,

(3) award DuPont reparations, plus applicable interest, in accordance with 49 U.S.C. § 11704 for unlawful rates set by CSXT for the period beginning June 16, 2007 to the effective date of a decision by the Board prescribing just and reasonable rates.

Respectfully submitted,



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Attorneys for E I du Pont de Nemours and Company

February 4, 2008

PUBLIC VERSION

**BEFORE THE
SURFACE TRANSPORTATION BOARD**

		)	
E I DUPONT DE NEMOURS AND COMPANY		)	
		)	
Complainant,		)	
		)	
v		)	Docket No NOR 42100
		)	
CSX TRANSPORTATION, INC.,		)	
		)	
Defendant.		)	
		)	

PART II – VERIFIED STATEMENTS

- 1) Verified Statement of Mary Pileggi, North American Region Logistics Manager, DuPont Logistics, Global Sourcing and Logistics, Wilmington, Delaware
- 2) Verified Statement of Thomas D. Crowley, President, L.E. Peabody and Associates, Inc., Alexandria, Virginia

PUBLIC VERSION

**BEFORE THE
SURFACE TRANSPORTATION BOARD**

_____	)	
E.I. DUPONT DE NEMOURS AND COMPANY	)	
	)	
Complainant,	)	
	)	
v	)	Docket No 42100
	)	
CSX TRANSPORTATION, INC.	)	
	)	
Defendant.	)	
_____	)	

**VERIFIED STATEMENT OF MARY PILEGGI
E.I. DUPONT DE NEMOURS AND COMPANY**

1 My name is Mary Pileggi. I am the U.S./Canada Regional Logistics Manager for E.I. du Pont de Nemours and Company ("DuPont" or the "Company") in Wilmington, DE. I have been an employee of DuPont since December 1, 1999. Currently, I manage the transportation of products and raw materials manufactured or acquired by DuPont in the U.S. and Canada. My responsibilities include logistics, transportation equipment, safety, security, and supervision of the negotiation and administration of contracts between DuPont and its carriers. Prior to joining DuPont, I worked for Conrail. I am submitting this Verified Statement in support of the Company's claims that CSX Transportation, Inc. ("CSXT") possesses market dominance over the transportation of chlorine from Niagara Falls, NY to New Johnsonville, TN; from Niagara Falls to Carneys Point, NJ; and from Natrum, WV to New Johnsonville.

I.

**DUPONT RELIES UPON RAIL TRANSPORTATION SERVICES FOR THE SAFE AND
SECURE TRANSPORT OF HAZARDOUS MATERIALS**

2. DuPont is a global science company creating sustainable solutions essential to a better, safer, healthier life for people everywhere. Operating in more than 70 countries, DuPont offers a

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wide range of innovative products and services for markets including agriculture, nutrition, electronics, communications, safety and protection, home and construction, automotive and apparel. The science based solutions that DuPont delivers to the global marketplace require as raw materials or intermediates products that are both hazardous and non-hazardous in nature.

3. DuPont needs a strong, efficient, safe and competitive rail transportation network to remain viable in the markets it serves. DuPont ships or receives approximately 60,000 railcars annually. Of this total rail volume, 60% of the railcars contain hazardous materials, and 17% of the total contain materials classified as toxic inhalation hazards ("TIH"). The nature of the products and volumes that we ship or receive require movement by rail. DuPont has 39 active rail shipping locations in the US situated along the Gulf Coast and East of the Mississippi River. DuPont tenders traffic to 38 US railroads, including all seven Class I's and regional and shortline carriers. Eighty-eight percent of the rail transportation needs of DuPont are met by CSXT, UP, NS and KCS. Of the 39 active rail sites, DuPont is captive to one carrier at 32.

4. CSXT is the largest rail transportation carrier for DuPont. CSXT has access to 21 of the 39 DuPont rail sites and the Company is captive to CSXT at 16 locations. DuPont ships or receives a wide variety of commodities on CSXT, including plastics, ilmenite ore, titanium dioxide, sulfuric acid, chlorine, refrigerant gases and limestone. Eleven (11) percent of the DuPont shipments on CSXT are TIH materials, twenty-seven (27) percent are other hazardous material shipments, and the remaining sixty two (62) percent are non-hazardous shipments.

5. DuPont and CSXT have had a series of contractual relationships from 1988 until 2007. When the last of those contracts expired on June 15, 2007, CSXT sought to impose rate increases that averaged ■¹ percent across all pertinent traffic lanes. Due to the excessive rate

¹ All shaded text is HIGHLY CONFIDENTIAL and CONFIDENTIAL information that has been redacted from the public version of this pleading.

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increases, the parties failed to agree upon a new contract and CSXT published the rates for DuPont in four common carrier tariffs. The rates challenged by DuPont in this proceeding are published in CSXT 41248.1, which I have attached as Pileggi Ex. 1. Those rates are increases of up to ■% over the previous contract rates

6. *Safety is a core value of DuPont. When transporting TIH materials in bulk, such as chlorine, DuPont requires its businesses to use the lowest risk transportation option available* The order of priority is barge transportation first, rail second, and truck last. All DuPont facilities in the United States that consume chlorine are designed to accept deliveries by rail In addition, the Company's New Johnsonville, TN facility also can receive chlorine by barge. Because rail is an option for receiving chlorine at all of its domestic facilities, DuPont does not transport any chlorine by bulk truck in the U.S Moreover, DuPont is unaware of any commercial carriers that transport chlorine in bulk trucks in this country. DuPont does not receive chlorine by truck anywhere in the world, except Taiwan, and then only over short distances inland from the seaports, due to the absence of a rail or barge option.

II.

THERE IS NO INTRAMODAL COMPETITION

7 DuPont is captive to CSXT for rail service on each of the movements at issue. CSXT is the only rail carrier that serves the Niagara Falls and Natrium origins on all three of those movements, or the New Johnsonville destination on two of the issue movements. Thus, DuPont has no alternative to CSXT for rail transportation for any of the three movements at issue.

III.

THERE IS NO INTERMODAL COMPETITION

8. For the reasons stated above, bulk truck is not an option for transporting the issue chlorine movements

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9. Barge is an option for transporting chlorine only from Natrium to New Johnsonville. However, barge and rail do not compete for this traffic. Rather, DuPont receives as much chlorine by barge from Natrium as there is capacity to handle this traffic. CSXT transports only those volumes of chlorine that barge cannot transport. Consequently, New Johnsonville receives *ten times more chlorine from Natrium by barge than by rail.*

10. The barges used to transport chlorine from Natrium to New Johnsonville are provided by the chlorine producer, PPG Industries. To the Company's knowledge, there are only a small number of chlorine barges in this country and all of those are privately owned. Therefore, DuPont is unaware of any commercial barge capacity that could supplement PPG's private fleet to transport chlorine from Natrium to New Johnsonville.

11. Barge capacity also is dependent upon the capacity of the inland waterway system. If the water levels are too high or too low, barges cannot be used. It is not uncommon for locks to be damaged and/or under repair, which can restrict the flow of barge traffic or impede it altogether. Cold weather also is a factor, since barges cannot move when the locks and rivers are frozen.

12. Finally, CSXT informed DuPont, during our unsuccessful contract negotiations, that the rates for TIH movements were "non-negotiable." Although CSXT was willing to listen to "market-based" arguments that DuPont could present for lower rates on all other commodities, CSXT was absolutely clear that its TIH rates were a "take it, or leave it" proposition.

VERIFICATION

STATE OF DELAWARE)
)
CITY OF WILMINGTON)

I, Mary Pileggi, verify under penalty of perjury that I have read the foregoing Verified Statement of Mary Pileggi, that I know the contents thereof, and that the same are true and correct. Further, I certify that I am qualified and authorized to file this statement.



Mary Pileggi

Sworn to and subscribed
before me this day of February 1st 2008



Notary Public

**SANDRA L. CORROZI
NOTARY PUBLIC
STATE OF DELAWARE
My Commission Expires Jan 13, 2009**

Pileggi

Exhibit 1

All previous issues of CSXT 41248 1 are cancelled as
of the effective date shown below.

CSX

TRANSPORTATION

PRIVATE PRICE LIST CSXT 41248.1

**Containing
Confidential Information
for
DUPONT E I DENEMOURS**

CONTAINING PRICES ON

CHEMICALS

Prices are subject to increase, change or expiration. Any change to prices will be shown in supplements to or a reissue of this document, or through advanced notification. Except as otherwise noted, ancillary charges contained in CSXT Tariff 8100 (Merchandise)/8200 (Coal) Series, as of the date of shipment tender, shall apply.

EFFECTIVE: June 16, 2007
(except as otherwise noted)

EXPIRATION: December 31, 2007

CSX TRANSPORTATION
CHEMICALS
www.ShipCSX.com
Jacksonville, FL 32202

June 21, 2007

CSX
TRANSPORTATION
PRIVATE PRICE LIST CSXT 41248.1

**PARTICIPATING
CARRIERS**

ABBREVIATION

NAME OF CARRIER

CSXT
IAIS

CSX TRANSPORTATION, INC
IOWA INTERSTATE RAILROAD LTD

CSX
TRANSPORTATION
PRIVATE PRICE LIST CSXT 41248.1

**PUBLICATION
INFORMATION**

CANCELLATION NOTICE

All prior issues of this document are cancelled.

CONTACT PERSONNEL

Please refer to www.ShipCSX.com.

CURRENCY

Prices are stated and payable in U.S. funds unless shipment is wholly within Canada, then price is stated in Canadian funds.

ALTERNATION / NON-ALTERNATION OF PUBLICATION

Rail Transportation Contracts take precedence over prices published herein for the same commodities over the same routes

Prices published in this private Price List will alternate with prices, with similar price conditions, published in other private documents and take precedence over public price documents.

ALTERNATION OF PRICES

Prices in this publication will alternate with other prices, with similar price conditions, in this publication, unless otherwise specified in an alternation provision documented in the Private CSXT 41248.1 (0) workbook, sheet tab labeled CSXT Price List

CONFLICT OF RULES

The rules in this Price List will take precedence over rules contained in other separate publications when shipments move under the prices contained in Private CSXT 41248 1 (0) workbook

DESCRIPTION OF COMMODITIES AND INSPECTION

The description of commodity(s) on the Shipping Document will conform to the Standard Transportation Commodity Code (STCC) and show the STCC Number(s). When different prices are provided for the same commodity(s) according to the type of packing or package, the type of packing or package should be shown

The Carrier(s) reserve the right to inspect shipments to determine applicable prices. When the commodity(s) are found to be incorrectly described, freight charges will be collected *according to the proper description*

EMERGENCY ROUTING

When in the case of pronounced traffic congestion (not an embargo), washout, wreck or other similar emergency, or through Carriers' error, Carriers forward shipments via other junction points of the same Carriers or via the lines of other Carriers party to the Price List, the price to apply will be that specified in this Price List, but not higher than the price applicable via the route of movement

EQUIPMENT MILEAGE ALLOWANCE

For mileage allowance provisions on privately owned or lease equipment please see Private CSXT 41248 1 (0) workbook, sheet tab labeled CSXT Price List

FUEL RATE ADJUSTMENT

In the event that the monthly average price per gallon of highway diesel fuel (as determined below, the "HDF Average Price") equals or exceeds 200.0 cents, CSXT will apply a mileage-based fuel adjustment to the linehaul rates and charges provided for in this Contract or publication. The fuel adjustment will be applied to each shipment having a bill of lading or other shipping instruction dated on or after the first day of the second calendar month following the calendar month of a given HDF Average Price determination.

The "HDF Average Price" for a month will be the average price for that month of U.S. No. 2 Diesel Retail Sales by All Sellers, as determined and published by the U.S. Department of Energy, Energy Information Administration ("DOE-EIA"). That average price will, in calculating the HDF Average Price, be rounded to the nearest 1/10th of a cent applying conventional rounding principles. The fuel adjustment will be 1 cent per mile per railcar for every 4 cents per gallon, or portion thereof, by which the HDF Average Price for the calendar month two months prior to the calendar month of shipment exceeds 199.9 cents.

The DOE-EIA publication referenced above can currently be found at www.eia.doe.gov. On the home page select "Petroleum;" under "Prices" select "Weekly Retail Gasoline and Diesel Prices," for the "Area" select "U.S.," for the "Period" select "Monthly" then refer to the data on the line entitled "Diesel (On-Highway)." Monthly data is normally published Wednesday after the last Monday of a given month. If DOE-EIA ceases publication of the above information, CSXT will employ a suitable substitute source of price or measure.

The mileage to be applied in calculating the fuel adjustment will be based on rail miles between origin, interchange(s) and destination, and can be found at www.csx.com. On the home page select "Customers," select "Prices, Tariffs, Fuel Surcharge," select "Fuel Surcharge," then select "Mileage" and follow the instructions provided. Registration will be required to use the ShipCSX functions.

INTERNAL ROUTING

Prices or routes published herein, to, from or via stations on CSXT, while on the rails of CSXT, are applicable only over the shortest distance between the stations where transportation is performed by CSXT, except as otherwise specifically authorized by other agreement(s), or unless handled out of route for Carrier's convenience.

INCORPORATION OF DOCUMENTS

Prices subject to rules and conditions of Railway Equipment Register, STCC 6001, OP&S 6000, UFC 6000, Rules Circular CSXT 4048 Series (Waste Shipments) when applicable, and CSXT Tariff 8100 (Merchandise)/8200 (Coal) Series, unless otherwise noted.

LOADING AND UNLOADING

Consignors and Consignees will load and unload cars

Consignors must load all cars in accordance with the Association of American Railroads' Circular 42 Series and appropriate AAR commodity loading publications and revisions thereof, or as approved by Rail Carriers Involved. All unused securement devices must be returned to and stored in the same car from which removed, and devices must be secured. To inquire about loading and unloading requirements for a participating Carrier other than CSXT, contact that Carrier's sales office. For further information on CSXT loading and unloading requirements, contact

Director - Freight Damage Prevention
CSX Transportation, Inc - J815
P.O. Box 44085
Jacksonville, FL 32231-4085
800-327-9715 (Within U.S.)
904-279-6331 (Outside U.S.)

Temporary blocking, flooring or lining, corrugated fibreboard or plywood separators or dividers, standards, strips, stakes or similar bracing or supports (hereafter referred to as *dunnage*), bulkheads, partitions, temporary doors or door protection, not constituting a part of the car, when required to protect and make freight secure for shipment, will be furnished and installed by Consignor at his expense.

Transportation charges for dunnage, when made, shall be at the price applicable to the freight which it accompanies.

Consignee is responsible for unloading all material from the rail car. This includes lading, dunnage, loading or unloading enhancement materials, or any other miscellaneous debris. Failure to comply with these rules will result in Consignee being charged for all associated removal costs (minimum of \$150 to a maximum of \$500 per car).

When equipment is found to be misloaded or overloaded, the Consignor will be given the opportunity to correct the situation at the Consignor's expense. Consignor is responsible for all damage to freight, rail equipment, or both caused by misloading or overloading. For overloaded cars on CSXT, see CSXT Tariff 8100 Series.

Consignee is required to return and secure the same car, all railroad owned securement devices removed to complete unloading, securely lock all bulkhead doors, return wooden doors used in transportation of bulk commodities and close all exterior doors and hatches.

LOSS AND DAMAGE LIABILITY OF CARRIER

The Carrier shall be liable for claims only if Carrier negligence is shown by the claimant to be the proximate cause of the loss or damage

Carrier liability for shortage of goods shall be conditioned upon evidence of unauthorized entry into the rail car while the same is in the possession of the Carriers

Carrier shall not be liable for special or consequential damages, including market decline claims, products deterioration, or other such claims based on delay in transportation, nor shall Carrier be liable for punitive damages or attorney fees

Carrier liability for damages or shortages is contingent upon Carrier or its agent receiving immediate notification of all noted visible damages and/or shortages discovered during the unloading of a rail car. Damage or shortages discovered other than between 8.00 A.M. and 5.00 P.M., Monday through Friday, are subject to reporting no later than 24 hours following unloading from rail car, Saturdays, Sundays, and Holidays excluded. Concealed damage must be reported immediately upon discovery and made available for inspection at point of delivery. Damage may be reported to: Telephone 800-432-1032

Failure of the shipper to comply with packaging requirements of the Uniform Freight Classification and AAR loading provisions shall be a defense to any claim for damage

Any claim for loss or damage shall be filed within nine (9) months of the date the shipment was delivered, or in the case of failure to make delivery, then within nine (9) months after a reasonable time for delivery. Any lawsuit or other action for the enforcement or liability for loss of damage shall be instituted within one year after the railroad first declines the claim. Loss and Damage Claims should be filed with

Director - Freight Claims Services
CSX Transportation, Inc. - J815
P.O. Box 44085
Jacksonville, FL 32231-4085
800-327-9715 (Within U.S.)
904-279-6331 (Outside U.S.)

ONE CONSIGNOR, CONSIGNEE, AND DESTINATION

The name of only one Consignor, one origin, one Consignee and one destination shall appear on a Shipping Document. The Shipping Document may also specify the name of a third party that will be billed for the freight charges or a party at the same destination to be notified of the arrival of the shipment. See provisions in the Private CSXT 41248.1 (0) workbook, sheet tab labeled CSXT Column Definitions.

OVERCHARGE CLAIMS

Claims for overpayment of charges must be in writing and received by Carriers no later than three years after delivery or tender of delivery of shipment. Any lawsuit for overpayment of charges must be filed within

- A. three years after delivery or tender of delivery of shipment or
- B. six months from the date of Carriers' disallowance of the last timely filed claim, whichever occurs later.

For Overcharge Claim Information pertaining to a participating Carrier other than CSXT contact that Carrier's sales office.

To inquire on CSXT overcharge claims contact
Patron Overcharge Claims
CSX Transportation, Inc - J605
6737 Southpoint Drive South, 2nd Floor
Jacksonville, FL 32216-6177
904-279-4764

PACKAGING (applicable on regulated commodities)

Shipper must package all shipments governed by this Price List in accordance with Rules 5, 40, 41 and 51 of the Uniform Freight Classification, UFC 6000 Series, and exceptions thereto as published in 2000 Series Tariffs

CSX
TRANSPORTATION
PRIVATE PRICE LIST CSXT 41248.1

GENERAL RULES

PAYMENT OF CHARGES - EXTENSION OF CREDIT

Customers not on credit must pay freight and other accrued transportation charges prior to transportation of a shipment if it is tendered "prepaid" and prior to placement of a shipment if it is tendered "collect". In order to establish credit with CSX Transportation, Inc., contact:

CSX Transportation, Inc.
Credit Administration - J220
500 Water Street
Jacksonville, FL 32202
Telephone. 904-366-3807
Fax 904-366-4406

On-line at www.csx.com

a) Click on "Customers" (on menu bar)

b) Click on "Credit Application" under "Become a Customer"

If credit has been established with CSX Transportation, Inc., freight and other accrued transportation charges shall be paid fifteen (15) calendar days or less from the billing date.

Freight and other accrued transportation charges may not be offset by overcharge, freight damage or other claims.

CSX Transportation, Inc. reserves the right to cancel the credit of any party and place the responsible party (Consignee, Consignor, or other billed party) on a cash basis. If the party responsible for freight charges has not established credit with CSXT, or has their credit cancelled by CSX Transportation, Inc., pursuant to 49 CFR, Section 1320.2, they will be subject to Liquidated damages interest, in addition to the Liquidated damages interest shall not apply in instance of clear clerical error on the part of CSX Transportation, Inc. "Liquidated damages interest" means 20% of the charges due.

PRICE APPLICATION

Actual City locations applying from or to stations within the switching district will be designated as "SD" (Switch District) in the Private CSXT 41248.1 (0) workbook with sheet tab labeled CSXT Price List.

Prices will NOT apply to/from stations within the switching district of a zip code, state, FSAC (Freight Station Accounting Code), or NRB (National Rate Basis).

Prices in this Price List and other Price Lists may not be used to make a combination of prices that defeat the through prices documented in this CSXT Price Authority.

PRICE TERMS AND CONDITIONS (additional):

Carrier agrees to provide rail transportation service at the rates and subject to the additional terms and conditions set forth in Private CSXT 41248.1 (0) workbook with sheet tabs labeled CSXT Price List, CSXT Commodity Definitions, CSXT Column Definitions, CSXT Location Groups, and CSXT Price List Terms. The workbook is a part of this Price List and may be supplemented from time to time.

PROPORTIONAL APPLICATION OF PRICES (applicable only to Rule 11 rates)

When Price List proportional prices are used to construct through charges beyond the geographic scope of this publication on a through Shipping Document, the Price List charges will be assessed and billed separately by CSXT or other participating Carriers, as appropriate. Shipping Documents on such rebilled shipments must indicate that the shipment is made under Railway Accounting Rule 11. Industry agrees to specify on each Bill of Lading and requests origin Carrier to place the following statement on the waybill:

"Charges to Carriers which are party to this Price List are separately collected pursuant to Railway Accounting Rule 11."

REJECTED, REFUSED, RETURNED SHIPMENTS

Unless restricted, shipments reaching destination but unloaded (for reasons other than the Carriers' errors), may be returned to the original shipping point via the reverse route at the same price and conditions, unless a lower price exists for such return shipments.

SHIPPING DOCUMENT

Prior to tender of freight, Consignor shall execute a Shipping Document similar in content to the Uniform Bill of Lading. However this Price List shall override any inconsistent terms in the Shipping Document.

**BEFORE THE
SURFACE TRANSPORTATION BOARD**

E. I. duPont de Nemours and Company	)	
	)	
Complainant	)	
	)	
	)	
v.	)	Docket No. NOR 42100
	)	
	)	
CSX Transportation, Inc.	)	
	)	
Defendant	)	

Verified Statement
of
Thomas D. Crowley
President
L E Peabody & Associates, Inc.

Due Date: February 4, 2008

PUBLIC VERSION

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LIST OF EXHIBITS

<u>EXHIBIT NO.</u>	<u>DESCRIPTION</u>
TDC-1	Statement of Qualifications
TDC-2	3Q07 Variable Costs for DuPont's TIH Movements on CSXT
TDC-3	Comparable Group and Maximum R/VC Ratio for the Niagara Falls Movement
TDC-4	Comparable Group and Maximum R/VC Ratio for the Natrium Movement
TDC-5	Comparable Group and Maximum R/VC Ratio for the Carneys Point Movement
TDC-6	RSAM to $R/VC_{>180}$ Ratio Adjusted for Efficiency
TDC-7	Comparison of Railroad Industry Cost of Capital Based on the STB's Single Stage Discounted Cash Flow Model ("DCF") to the STB's Capital Asset Pricing Model ("CAPM") - - 2002 through 2005
TDC-8	RSAM to $R/VC_{>180}$ Ratio Adjusted for CAPM Cost of Capital

I. INTRODUCTION

My name is Thomas D Crowley. I am an economist and President of the economic consulting firm of L. E. Peabody & Associates, Inc. The Firm's offices are located at 1501 Duke Street, Suite 200, Alexandria, Virginia 22314, 5901 N Cicero Avenue, Suite 504, Chicago, Illinois 60646 and 10445 N Oracle Road, Suite 151, Tucson, Arizona 85737. My qualifications and experience are attached to this verified statement as Exhibit (TDC-1).

E. I. duPont de Nemours and Company ("DuPont") is requesting that the Surface Transportation Board ("STB") prescribe reasonable rates, service terms and reparations associated with the transportation of chlorine via CSX Transportation, Inc. ("CSXT") for the following three (3) movements

- 1 Niagara Falls, NY to New Johnsonville, TN ("Niagara Falls Movement");
- 2 Natrium, WV to New Johnsonville, TN ("Natrium Movement"); and
- 3 Niagara Falls, NY to Carneys Point, NJ ("Carneys Point Movement").

I have been requested to apply the STB's procedures for the Three-Benchmark Methodology specified in the STB's September 5, 2007 decision in Ex Parte No. 646 (Sub-No 1) Simplified Standards for Rail Rate Cases ("Simplified Standards") and provide the following information to support DuPont's request.

- 1 The revenue / variable cost ("R/VC") ratio for each of the issue movements;
2. The selection of comparable CSXT movements from the STB's Unmasked Confidential Waybill Sample ("Waybill Sample") for CSXT for each year 2002 through 2005,

- 3 The upper boundary of the R/VC ratio for the comparable group (referred to as the "Maximum R/VC Ratio") for each of the issue movements following the STB's procedures specified in Simplified Standards;
- 4 The identification and quantification of other relevant factors, and
- 5 The relief to which DuPont is entitled for each issue movement.

My verified statement describes how I developed the above information and the results of my analyses. The remainder of my verified statement summarizes the analyses I have performed and the results are summarized under the following headings and in the accompanying Exhibits:

- II. Revenue/Variable Cost Ratios for the Issue Movements
- III. Maximum Revenue/Variable Cost Ratios for the Issue Movements
- IV. Other Relevant Factors
- V. Relief for DuPont

II. REVENUE / VARIABLE COST RATIOS FOR THE ISSUE MOVEMENTS

The first step in the STB's Three-Benchmark analysis is to calculate the R/VC ratio for the issue movements. To develop an R/VC ratio, the rates and variable costs for each movement need to be developed. These three components are discussed below under the following topics:

- A Rates for the Issue Movements
- B Variable Costs for the Issue Movements
- C R/VC Ratios for the Issue Movements

A. RATES FOR THE ISSUE MOVEMENTS

Dupont's 3Q07 rates (including the July 2007 fuel surcharge) for the issue movements are shown in Table 1 below:

Table 1 3Q07 Rates Per Car (Including Fuel Surcharge) for Issue Movements			
Item	Niagra Falls - New Johnsonville	Natium - New Johnsonville	Niagra Falls - Carneys Point
(1)	(2)	(3)	(4)
1 3Q07 Rate Cost Per Car	\$8,997.03	\$5,849.19	\$4,779.00
2 July 2007 Fuel Surcharge Per Car ^{1/}	<u>\$176.14</u>	<u>\$144.56</u>	<u>\$117.66</u>
3 Total Rate Per Car - 3Q07 ^{2/}	\$9,173.17	\$5,993.75	\$4,896.66
^{1/} CSXT July 2007 surcharge of \$0.20 per loaded mile from CSXT Fuel Surcharge Publication 8661-A			
^{2/} Line 1 + Line 2			

As shown in Table 1 above, the 3Q07 rates for the issue movements range from \$4,896.66 per car to \$9,173.17 per car.

**B. VARIABLE COSTS FOR
THE ISSUE MOVEMENTS**

In the STB's October 30, 2006 decision in Ex Parte No. 657 (Sub-No. 1) Major Issues in Rail Rate Cases ("Major Issues"), the STB revised the variable cost procedures for rate complaints. The STB decided that variable costs would be calculated using the STB's Uniform Railroad Costing System ("URCS") Phase III cost program without adjustments. The STB also identified the following nine inputs to calculate unadjusted variable costs for an issue movement:

1. Railroad,
2. Loaded miles (including loop track miles);
3. Shipment type (local, originated delivered, bridge or received terminated),
4. Number of freight cars per shipment;
5. Tons per car;
6. Commodity (for loss and damage only);
7. Type of movement (single car, multiple cars or unit train),
8. Car ownership (railroad or private), and
9. Type of car.

Table 2 below shows the nine inputs that I incorporated into CSX's URCS Phase III cost program for each issue movement.

Table 2 <u>CSXT's URCS Phase III Cost Program Inputs for the Issue Movements</u>			
<u>Item</u>	<u>Niagra Falls - New Johnsonville</u>	<u>Natrum - New Johnsonville</u>	<u>Niagra Falls - Carney Point</u>
(1)	(2)	(3)	(4)
1 Railroad	CSXT	CSXT	CSXT
2 Loaded Miles	880.7	722.8	588.3
3 Shipment Type	Originated & Terminated	Originated & Terminated	Originated & Terminated
4 Number of Freight Cars Per Shipment	1	1	1
5 Tons Per Car	90	90	90
6 Commodity (3-digit STCC)	281	281	281
7 Type of Movement	Single Car	Single Car	Single Car
8 Car Ownership	Private	Private	Private
9 Type of Car	Tank < 22,000 gallons	Tank < 22,000 gallons	Tank < 22,000 gallons

The nine items summarized in Table 2 were input into the Phase III cost program for each movement and applied to the CSXT 2005 URCS unit costs. The base year 2005 costs for each issue movement were then indexed to 3Q07 levels.

Table 3 below shows the base year 2005 variable costs and the 3Q07 indexed variable costs for each of the three issue movements.

Table 3 <u>STB's URCS Phase III Cost Program Variable Costs Per Car</u>			
<u>Item</u> (1)	Niagra Falls - <u>New Johnsonville</u> (2)	Natium - <u>New Johnsonville</u> (3)	Niagra Falls - <u>Carneys Point</u> (4)
1 2005 Variable Cost Per Car ^{1/}	\$1,863.01	\$1,600.62	\$1,376.42
2 3Q07 Variable Cost Per Car ^{1/}	\$1,993.25	\$1,712.52	\$1,472.65
^{1/} Exhibit_(TDC-2)			

As shown in Table 3 above, the 3Q07 variable costs for the issue movements range from \$1,472.65 per car to \$1,993.25 per car

C. R/V C RATIOS FOR THE ISSUE MOVEMENTS

Table 4 below shows the base year 2005 variable costs, the 3Q07 indexed variable costs, the 3Q07 rates (including fuel surcharge) and the R/V C ratios for each issue movement.

Table 4 STB's URCS Phase III Cost Program Variable Costs Per Car and R/VC Ratio				
	<u>Item</u> (1)	<u>Niagra Falls - New Johnsonville</u> (2)	<u>Natium - New Johnsonville</u> (3)	<u>Niagra Falls - Carneys Point</u> (4)
1	2005 Variable Cost Per Car ^{1/}	\$1,863 01	\$1,600 62	\$1,376 42
2	3Q07 Variable Cost Per Car ^{1/}	\$1,993 25	\$1,712 52	\$1,472 65
3	3Q07 Rate per Car (Including Fuel Surcharge) ^{2/}	\$9,173 17	\$5,993 75	\$4,896 66
4	R/VC Ratio ^{3/}	460%	350%	333%
^{1/} Exhibit_(TDC-2)				
^{2/} Table 1 above				
^{3/} Line 3 - Line 2 x 100				

As shown in Table 4 above, the R/VC ratios for the issue movements range from 333% to 460%.

III. MAXIMUM REVENUE / VARIABLE COST RATIOS FOR THE ISSUE MOVEMENTS

The STB's decision in Simplified Standards specified the procedures to develop the Maximum R/VC Ratio for the issue movements using the Three Benchmark Methodology. The results of my analyses following the STB procedures are summarized below under the following topics.

- A. Selection of Comparable Movements
- B. Maximum R/VC Ratios for the Issue Movements

A. SELECTION OF COMPARABLE MOVEMENTS

The STB provided DuPont with Waybill Samples for 2002 through 2005 containing all waybill records in which CSXT was a participating railroad. Movements with characteristics similar to each issue movement were selected to form the "comparable group" for each issue movement. The movements in the comparable group for each issue movement were selected based on the following criteria:

1. The commodity (STCC) is classified as TIH,^{1/}
2. The movement is classified as a hazardous commodity in the Waybill Sample,
3. CSXT originates and terminates the movement;
4. The rebill code is zero,^{2/}

^{1/} A complete listing of the TIH STCC's used for the comparable movements is included in my electronic workpapers in file "Exhibit_3_TIH Comparables Lane 1.xlsx," Tab "Select TIH STCC"

^{2/} The "Rebill Code" field in the Waybill Sample identifies those records that are local movements with a code of "0" and those records that reflect only a portion of the movement with codes of "1", "2" or "3"

- 5 The R/VC ratio is greater than 180%;
6. The car type is the same as the issue movement (i.e., tank car),
7. The car ownership is private; and
- 8 The loaded miles are within a range of plus or minus 150 miles of the issue movement loaded miles rounded to the nearest 50 miles ^{3/}

Exhibit_(TDC-3) through Exhibit_(TDC-5) contain a listing of the comparable group for each issue movement ^{4/}

B. MAXIMUM R/VC RATIOS FOR THE ISSUE MOVEMENTS

To develop the Maximum R/VC Ratio for each issue movement, I followed the procedures set forth in Simplified Standards. First, I selected the comparable group for each issue movement. Next, I multiplied the R/VC for each comparable movement by the ratio of the CSX I¹ RSAM and $R/VC_{>180}$ four-year average contained in the STB's December 20, 2007 decision in Ex Parte No. 347 (Sub-No. 2) Rate Guidelines - Non-Coal Proceedings ("Non-Coal Guidelines"). I then calculated the mean and standard deviation for the adjusted R/VC ratios for the comparable group. Next, using the mean and standard deviation, I calculated the 90% confidence interval around the estimate of the mean to determine the upper boundary of the mean for the comparable group which becomes the threshold for determining if a rate is unreasonable ^{5/}

^{3/} For example, the loaded miles for the Niagara Falls Movement equal 880.7. 880.7 miles rounded to the nearest 50 miles is 900 miles; therefore, the mileage range for comparable movements equals 750 to 1,050 miles.

^{4/} The selection process used to identify the comparable movements for each issue movement is included in the electronic workpapers supporting my verified statement.

^{5/} The calculation of the Maximum R/VC Ratio for each issue movement is shown in Exhibit_(TDC-3) through Exhibit_(TDC-5).

Table 5 below compares the issue movement R/VC ratio to the Maximum R/VC Ratio calculated following the STB's procedures

Table 5 Maximum Rate for Issue Movements Using STB's RSA M and R/VC>180				
	Item (1)	Niagra Falls - New Johnsonville (2)	Natium - New Johnsonville (3)	Niagra Falls - Carneys Point (4)
1	3Q07 Rate per Car (Including Fuel Surcharge) ^{1/}	\$9,173 17	\$5,993 75	\$4,896 66
2	3Q07 Variable Cost per Car ^{2/}	\$1,993 25	\$1,712 52	\$1,472 65
3	R/VC Ratio ^{3/}	460%	350%	333%
4	Maximum R/VC Ratio ^{4/}	290%	332%	321%
5	Maximum Rate per Car ^{5/}	\$5,780 43	\$5,685 57	\$4,727 21
6	Amount CSX1 Rate per Car Exceeds Maximum Rate per Car ^{6/}	\$3,392 75	\$308 18	\$169 45
^{1/} Table 1 above ^{2/} Table 3 above ^{3/} Line 1 - Line 2 x 100 ^{4/} Exhibit (TDC-3), Exhibit (TDC-4) and Exhibit (TDC-5) ^{5/} Line 2 x Line 4 ^{6/} Line 1 - Line 5				

As shown in Table 5 above, CSXT's rate for each of the issue movements (Line 1) exceeds the rate based on the Maximum R/VC Ratio (Line 5) for the comparable group by an amount ranging from \$169.45 per car to \$3,392.72 per car.

IV. OTHER RELEVANT FACTORS

In this section of my verified statement, I quantify and apply other relevant factors to the issue movements. The results of my other relevant factor analyses are summarized below under the following headings

A. STB's RSAM Ratio Adjusted for Efficiency

B. STB's RSAM and $R/VC_{>1.0}$ Ratios Adjusted for the STB's New Cost of Capital Methodology

A. STB'S RSAM RATIO ADJUSTED FOR EFFICIENCY

The STB's CSXT RSAM calculation is based on all movements involving CSXT including those movements that have an R/VC ratio of less than 1.0. I have recalculated CSXT's 2002-2005 and 4-year average RSAM ratio after elimination of movements that have an R/VC ratio less than 1.0. As shown in Exhibit_(TDC-6), this calculation results in a 4-year average CSXT RSAM ratio of 273% which is less than the STB's 4-year average CSXT RSAM of 292%. Exhibit_(TDC-6) also compares the RSAM to $R/VC_{>1.0}$ ratio used to adjust the R/VC ratios of the comparable movements prior to eliminating non-compensatory traffic and after that traffic is eliminated, i.e., a change from 1.24 to 1.16

To quantify the impact of this modification, I substituted the 1.16 ratio of the RSAM (excluding movements with an R/VC of less than 1.0) to $R/VC_{>1.0}$ into the calculation of the Maximum R/VC Ratio for each issue movement. Specifically, I adjusted the R/VC ratios of the comparable group

by 1.16 instead of 1.24 and recalculated the Maximum R/VC Ratio for each issue movement.^{1/} The results of this substitution are summarized in Table 6 below

Table 6 Maximum Rate for Issue Movements Using Efficiency RSAM and R/VC>180				
Item (1)	Niagra Falls - New Johnsonville (2)	Natium - New Johnsonville (3)	Niagra Falls - Cameys Point (4)	
1 3Q07 Rate per Car (Including Fuel Surcharge) ^{1/}	\$9,173 17	\$5,993 75	\$4,896 66	
2 3Q07 Variable Cost per Car ^{2/}	\$1,993 25	\$1,712 52	\$1,472 65	
3 R/VC Ratio ^{3/}	460%	350%	333%	
4 Maximum R/VC Ratio with RSAM Adjusted for Efficiency ^{4/}	272%	312%	301%	
5 Maximum Rate per Car ^{5/}	\$5,421 64	\$5,343 06	\$4,432 68	
6 Amount CSXI Rate per Car Exceeds Maximum Rate per Car ^{6/}	\$3,751 53	\$650 69	\$463 98	
^{1/} Table 1 above ^{2/} Table 3 above ^{3/} Line 1 - Line 2 x 100 ^{4/} Electronic workpapers ^{5/} Line 2 x Line 4 ^{6/} Line 1 - Line 5				

As shown in Table 6 above, CSXT's rate for each of the issue movements (Line 1) exceeds the rate based on the Maximum R/VC Ratio using the RSAM adjusted for efficiency (Line 5) for the comparable group by an amount ranging from \$463.98 per car to \$3,751.53 per car

^{6/} See electronic workpapers, files "Efficient_TIIH Comparables Lane 1.xlsx", "Efficient_TIIH Comparables Lane 2.xlsx" and "Efficient_TIIH Comparables Lane 3.xlsx"

**B. STB'S RSAM AND R/VC_{>180} RATIOS
ADJUSTED FOR THE STB'S NEW
COST OF CAPITAL METHODOLOGY**

In its January 17, 2008 decision in Ex Parte No. 664 Methodology to be Employed in Determining the Railroad Industry's Cost of Capital ("Cost of Capital"), the STB changed the methodology used to calculate the railroad industry's annual cost of capital. Specifically, the STB replaced its single-stage Discounted Cash Flow ("DCF") model with a Capital Asset Pricing Model ("CAPM") to determine the cost of equity component in the cost of capital calculation. The cost of capital is used in the STB's URCS formula and impacts the unit costs for the return components used by the URCS Phase III cost program.

I incorporated the CAPM cost of capital into the calculation of the maximum rates for the issue movements. Analytically, I performed the following steps:

1. I developed the cost of capital for each year 2002-2005 using the CAPM methodology contained in Cost of Capital. The results are shown in Exhibit (TDC-7),
2. I modified all return on investment unit costs in the STB's URCS Phase III unit cost files for each year 2002-2005 by the ratio of the CAPM cost of capital to the single stage DCF cost of capital for each year;
3. I recalculated the variable costs using the URCS Phase III cost program for all movements involving CSX¹ in the 2002-2005 Waybill Samples with an R/VC ratio greater than 165;^{2/}

^{2/} As the RSAM and R/VC ratios are based only on movements with an R/VC ratio greater than 180, I only re-costed those movements in the Waybill Sample that could potentially have an R/VC ratio of that level. To account for the lower variable costs resulting from the revised return unit costs and the reality that current R/VC ratios of less than 180 for some movements would be changed to an R/VC ratio greater than 180, I selected all movements with a current R/VC ratio greater than 165.

4. I recalculated the RSAM and R/VC ratios based on the movements in the Waybill Samples that exceeded an R/VC ratio of 180 using the revised costs; and
5. I performed the same calculations described above to determine the Maximum R/VC Ratio for each issue movement

Exhibit_(TDC-8) shows the RSAM and $R/VC_{>180}$ ratios and the adjustment ratio for the comparable group R/VC ratios that result from using the CAPM cost of capital ^{8/} Exhibit_(TDC-8) also compares the RSAM to $R/VC_{>180}$ ratios used to adjust the R/VC ratios of the comparable movements prior to using the CAPM cost of capital and after using the CAPM cost of capital, i.e., a change from 1.24 to 1.15. The calculations of the Maximum R/VC Ratios for the three issue movements, using the RSAM to $R/VC_{>180}$ ratio based on the CAPM methodology, are contained in my workpapers ^{9/} The results of this analysis are summarized in Table 7 below.

^{8/} These ratios do not reflect the efficiency adjustment described previously

^{9/} See electronic workpapers, files "CAPM_TIH Comparables Lane 1.xlsx", "CAPM_TIH Comparables Lane 2.xlsx" and "CAPM_TIH Comparables Lane 3.xlsx."

Table 7			
<u>Maximum Rate for Issue Movements Using CAPM RSAM and R/VC>180</u>			
<u>Item</u>	<u>Niagra Falls - New Johnsonville</u>	<u>Natrum - New Johnsonville</u>	<u>Niagra Falls - Carneys Point</u>
(1)	(2)	(3)	(4)
1 3Q07 Rate per Car (Including Fuel Surcharge) ^{1/}	\$9,173 17	\$5,993 75	\$4,896 66
2 3Q07 Variable Cost per Car ^{2/}	\$1,993 25	\$1,712 52	\$1,472 65
3 R/VC Ratio ^{3/}	460%	350%	333%
4 Maximum R/VC Ratio with RSAM Adjusted for CAPM ^{4/}	269%	309%	299%
5 Maximum Rate per Car ^{5/}	\$5,361 84	\$5,291 69	\$4,430 22
6 Amount CSXT Rate per Car Exceeds Maximum Rate per Car ^{6/}	\$3,811 33	\$702 06	\$493 44
^{1/} Table 1 above ^{2/} Table 3 above ^{3/} Line 1 - Line 2 x 100 ^{4/} Electronic workpapers ^{5/} Line 2 x Line 4 ^{6/} Line 1 - Line 5			

As shown in Table 7 above, CSXT's rate for each of the issue movements (Line 1) exceeds the rate based on the Maximum R/VC Ratio using the RSAM and R/VC_{>180} ratios adjusted for the CAPM cost of capital (Line 5) for the comparable group by an amount ranging from \$493 44 per car to \$3,811 33 per car

V. RELIEF FOR DUPONT

In this section of my verified statement, I present the relief that DuPont is entitled to for the issue movements based on the methodologies described above. The results of my analyses are shown in Table 8 below.

Table 8 <u>Estimated Relief to DuPont For Movements At Issue</u> (In thousands)			
<u>Movement</u> (1)	Based on		
	STB's RSAM and $R/VC_{>180}$ (2)	Efficient RSAM and $R/VC_{>180}$ (3)	CAPM RSAM and $R/VC_{>180}$ (4)
1 Niagara Falls, NY - New Johnsonville, TN	\$712	\$788	\$801
2 Natrium, WV - New Johnsonville, TN	\$128	\$270	\$291
3 Niagara Falls, NY - Carneys Point, NJ	<u>\$278</u>	<u>\$761</u>	<u>\$809</u>
4 Total	\$1,118	\$1,819	\$1,901

As shown in Table 8 above, DuPont is entitled to relief totaling \$1.12 million using the STB's RSAM and $R/VC_{>180}$ ratios subject to the appropriate cap in Three-Benchmark cases. The relief increases to \$1.82 million using the RSAM and $R/VC_{>180}$ ratios adjusted for efficiency and to \$1.90 million using the RSAM and $R/VC_{>180}$ ratios adjusted only for the CAPM cost of capital (i.e., unadjusted for efficiency) ^{10/}, again subject to the appropriate cap.

^{10/} See electronic workpapers, file "TIH Relief Summary.xls" for the detailed calculations.

VERIFICATION

COMMONWEALTH OF VIRGINIA)
)
CITY OF ALEXANDRIA)

I, THOMAS D. CROWLEY, verify under penalty of perjury that I have read the foregoing Verified Statement of Thomas D. Crowley, that I know the contents thereof, and that the same are true and correct. Further, I certify that I am qualified and authorized to file this statement.


Thomas D. Crowley

**Sworn to and subscribed
before me this day of February 4, 2008**

Diane R. Kavounis
Diane R. Kavounis
Notary Public for the State of Virginia

My Commission expires: November 30, 2012

STATEMENT OF QUALIFICATIONS

My name is Thomas D. Crowley. I am an economist and President of the economic consulting firm of L. E. Peabody & Associates, Inc. The firm's offices are located at 1501 Duke Street, Suite 200, Alexandria, Virginia 22314, 5901 N. Cicero Avenue, Suite 504, Chicago, Illinois 60646 and 10445 N. Oracle Road, Suite 151, Tucson, Arizona 85737.

I am a graduate of the University of Maine from which I obtained a Bachelor of Science degree in Economics. I have also taken graduate courses in transportation at George Washington University in Washington, D.C. I spent three years in the United States Army and since February 1971 have been employed by L. E. Peabody & Associates, Inc.

I am a member of the American Economic Association, the Transportation Research Forum, and the American Railway Engineering and Maintenance-of-Way Association.

The firm of L. E. Peabody & Associates, Inc. specializes in solving economic, marketing and transportation problems. As an economic consultant, I have organized and directed economic studies and prepared reports for railroads, freight forwarders and other carriers, for shippers, for associations and for state governments and other public bodies dealing with transportation and related economic problems. Examples of studies I have participated in include organizing and directing traffic, operational and cost analyses in connection with multiple car movements, unit train operations for coal and other commodities, freight forwarder facilities, TOFC/COFC rail facilities, divisions of through rail rates, operating commuter passenger service, and other studies dealing with markets and the transportation by different modes of various commodities from both eastern and western origins to various destinations in the United States. The nature of these

STATEMENT OF QUALIFICATIONS

studies enabled me to become familiar with the operating practices and accounting procedures utilized by railroads in the normal course of business.

Additionally, I have inspected and studied both railroad terminal and line-haul facilities used in handling various commodities, and in particular unit train coal movements from the Powder River Basin to various utility destinations in the midwestern and western portions of the United States and from the Eastern Coal Fields to various destinations in the Mid-Atlantic, northeastern and southeastern portions of the United States. These operational reviews and studies were used as a basis for the determination of the traffic and operating characteristics for specific movements of coal and numerous other commodities handled by rail.

I have frequently been called upon to develop and coordinate economic and operational studies relative to the acquisition of coal and the rail transportation of coal on behalf of electric utility companies. My responsibilities in these undertakings included the analyses of rail routes, rail operations and an assessment of the relative efficiency and costs of railroad operations over those routes. I have also analyzed and made recommendations regarding the acquisition of railcars according to the specific needs of various coal shippers. The results of these analyses have been employed in order to assist shippers in the development and negotiation of rail transportation contracts which optimize operational efficiency and cost effectiveness.

Moreover, I have developed numerous variable cost calculations utilizing the various formulas employed by the Interstate Commerce Commission ("ICC") and the Surface Transportation Board ("STB") for the development of variable costs for common carriers, with particular emphasis on

STATEMENT OF QUALIFICATIONS

the basis and use of Rail Form A and its replacement costing formula the Uniform Railroad Costing System ("URCS"). I have utilized Rail Form A/URCS costing principles since the beginning of my career with L. E. Peabody & Associates Inc. in 1971.

I have frequently presented both oral and written testimony before the ICC, STB, Federal Energy Regulatory Commission, Railroad Accounting Principles Board, Postal Rate Commission and numerous state regulatory commissions, federal courts and state courts. This testimony was generally related to the development of variable cost of service calculations, rail traffic and operating patterns, fuel supply economics, contract interpretations, economic principles concerning the maximum level of rates, implementation of maximum rate principles, and calculation of reparations or damages, including interest. I presented testimony before the Congress of the United States, Committee on Transportation and Infrastructure on the status of rail competition in the western United States. I have also presented testimony in a number of court and arbitration proceedings concerning the level of rates, rate adjustment procedures, rail operating procedures and other economic components of specific contracts.

Since the implementation of the Staggers Rail Act of 1980, which clarified that rail carriers could enter into transportation contracts with shippers, I have been actively involved in negotiating transportation contracts on behalf of coal shippers. Specifically, I have advised utilities concerning coal transportation rates based on market conditions and carrier competition, movement specific service commitments, specific cost-based rate adjustment provisions, contract reopeners that recognize changes in productivity and cost-based ancillary charges.

STATEMENT OF QUALIFICATIONS

I have been actively engaged in negotiating coal supply contracts for various users throughout the United States. In addition, I have analyzed the economic impact of buying out, brokering, and modifying existing coal supply agreements. My coal supply assignments have encompassed analyzing alternative coals to determine the impact on the delivered price of operating and maintenance costs, unloading costs, shrinkage factor and by-product savings.

I have developed different economic analyses for over sixty (60) electric utility companies located in all parts of the United States, and for major associations, including American Paper Institute, American Petroleum Institute, Chemical Manufacturers Association, Coal Exporters Association, Edison Electric Institute, Mail Order Association of America, National Coal Association, National Industrial Transportation League, North America Freight Car Association, the Fertilizer Institute and Western Coal Traffic League. In addition, I have assisted numerous government agencies, major industries and major railroad companies in solving various economic problems.

In the two Western rail mergers that resulted in the creation of BNSF Railway Company and Union Pacific Railroad Company and in the acquisition of Conrail by Norfolk Southern Railroad Company and CSXT, I reviewed the railroads' applications including their supporting traffic, cost and operating data and provided detailed evidence supporting requests for conditions designed to maintain the competitive rail environment that existed before the proposed mergers and acquisition. In these proceedings, I represented shipper interests, including plastic, chemical, coal, paper and steel shippers.

STATEMENT OF QUALIFICATIONS

I have participated in various proceedings involved with the division of through rail rates. For example, I participated in ICC Docket No. 35585, Akron, Canton & Youngstown Railroad Company, et al. v. Aberdeen and Rockfish Railroad Company, et al. which was a complaint filed by the northern and midwestern rail lines to change the primary north-south divisions. I was personally involved in all traffic, operating and cost aspects of this proceeding on behalf of the northern and midwestern rail lines. I was the lead witness on behalf of the Long Island Rail Road in ICC Docket No. 36874, Notice of Intent to File Division Complaint by the Long Island Rail Road Company.

As a result of my extensive economic consulting practice since 1971 and my participating in maximum-rate, rail merger, and rule-making proceedings before various government and private governing bodies, I have become thoroughly familiar with the operations, practices and costs of the rail carriers that move coal over the major coal routes in the United States.

3Q07 Variable Costs for DuPont's TIH Movements on CSXT

Origin Niagara Falls, NY
 Destination New Johnsonville, TN

<u>URCS PHASE III INPUT ITEM</u>	<u>INPUT</u>	<u>SOURCE</u>
1 Railroad	CSXT	DuPont
2 Type of Shipment	OT (Originate & Terminate - Local)	DuPont
3 One-Way Distance (Loaded Miles)	880.7	PCRail, Version 10 (Practical, Familized)
4 Type of Car (URCS Code)	Tank < 22,000 gallons (URCS Code 15)	DuPont
5 Number of cars	1	DuPont
6 Car Ownership	Private	DuPont
7 Commodity Type (STCC)	281 - Industrial Chemicals	DuPont
8 Weight (tons per car)	90	DuPont
9 Type of Movement	Single Car	DuPont

<u>Cost Item</u> (1)	<u>2005 Phase III</u>				<u>Make-Whole</u> (6)	<u>Total incl make-whole</u> (7)	<u>Indexed to 3Q07.1/ (8)</u>
	<u>OPR</u> (2)	<u>DRL</u> (3)	<u>ROI</u> (4)	<u>Total</u> (5)			
Gross Ton-mile	\$313.14	\$84.71	\$256.87	\$654.72		\$654.72	\$700.49
Locomotive unit-mile	\$272.22	\$33.14	\$49.76	\$355.12		\$355.12	\$379.95
Carload Clerical	\$25.56			\$25.56	\$9.25	\$34.81	\$37.24
Crew Wage	\$234.61			\$234.61		\$234.61	\$251.01
Train-mile other	\$22.07	\$0.24	\$0.39	\$22.70		\$22.70	\$24.29
SEM - O&T, Interchange, I&I	\$172.84	\$14.25	\$53.54	\$240.63	\$231.21	\$471.84	\$504.83
Private Car Rental	\$88.25			\$88.25		\$88.25	\$94.42
Loss & Damage	\$0.96			\$0.96		\$0.96	\$1.02
Total				\$1,622.54	\$240.46	\$1,863.01	\$1,993.25

1/ CSX I index from annual 2005 to 3Q07 - 1.06991

3Q07 Variable Costs for DuPont's LH Movements on CSXT

Origin	Natium, WV
Destination	New Johnsonville, TN

<u>URCS PHASE III INPUT ITEM</u>	<u>INPUT</u>	<u>SOURCE</u>
1 Railroad	CSXT	DuPont
2 Type of Shipment	OT (Originate & Terminate - Local)	DuPont
3 One-Way Distance (Loaded Miles)	722 8	PCRail, Version 10 (Practical, Familized)
4 Type of Car (URCS Code)	Tank < 22,000 gallons (URCS Code 15)	DuPont
5 Number of cars	1	DuPont
6 Car Ownership	Private	DuPont
7 Commodity Type (STCC)	281 - Industrial Chemicals	DuPont
8 Weight (tons per car)	90	DuPont
9 Type of Movement	Single Car	DuPont

Cost Item (1)	2005 Phase III				Make-Whole (6)	Total incl make-whole (7)	Indexed to 2007 1/ (8)
	OPR (2)	DRI (3)	ROI (4)	Total (5)			
Gross Ton-mile	\$256.98	\$69.52	\$210.80	\$537.30		\$537.30	\$574.86
Locomotive unit-mile	\$224.36	\$27.31	\$41.01	\$292.68		\$292.68	\$313.15
Carload Clerical	\$25.56			\$25.56	\$9.25	\$34.81	\$37.24
Crew Wage	\$195.02			\$195.02		\$195.02	\$208.65
Tram-mile other	\$18.35	\$0.20	\$0.32	\$18.87		\$18.87	\$20.19
SFM - O&T, interchange, I&I	\$161.92	\$13.35	\$50.16	\$225.43	\$223.13	\$448.56	\$479.92
Private Car Rental	\$72.42			\$72.42		\$72.42	\$77.49
Loss & Damage	\$0.96			\$0.96		\$0.96	\$1.02
Total				\$1,368.24	\$232.38	\$1,600.62	\$1,712.52

1/ CSXT index from annual 2005 to 3Q07 - 1 06991

3Q07 Variable Costs for DuPont's TTH Movements on CSXT

Origin Niagara Falls, NY
Destination Carneys Point, NJ

<u>URCS PHASE III INPUT ITEM</u>	<u>INPUT</u>	<u>SOURCE</u>
1 Railroad	CSXT	DuPont
2 Type of Shipment	OT (Originate & Terminate - Local)	DuPont
3 One-Way Distance (Loaded Miles)	588.3	PCRail, Version 10 (Practical, Familized)
4 Type of Car (URCS Code)	Tank < 22,000 gallons (URCS Code 15)	DuPont
5 Number of cars	1	DuPont
6 Car Ownership	Private	DuPont
7 Commodity Type (STCC)	281 - Industrial Chemicals	DuPont
8 Weight (tons per car)	90	DuPont
9 Type of Movement	Single Car	DuPont

<u>Cost Item</u> (1)	<u>2005 Phase III</u>				<u>Make-Whole</u> (6)	<u>Total incl make-whole</u> (7)	<u>Indexed to 3Q07 1/</u> (8)
	<u>OPR</u> (2)	<u>DRL</u> (3)	<u>ROI</u> (4)	<u>Total</u> (5)			
Gross Ton-mile	\$209.00	\$56.54	\$171.44	\$436.97		\$436.97	\$467.52
Locomotive unit-mile	\$183.47	\$22.33	\$33.54	\$239.34		\$239.34	\$256.07
Carload Clerical	\$25.56			\$25.56	\$9.25	\$34.81	\$37.24
Crew Wage	\$161.19			\$161.19		\$161.19	\$172.46
Train-mile other	\$15.16	\$0.17	\$0.27	\$15.60		\$15.60	\$16.69
SFM - O&T, Interchange, I&I	\$152.59	\$12.58	\$47.27	\$212.43	\$216.22	\$428.66	\$458.63
Private Car Rental	\$58.90			\$58.90		\$58.90	\$63.02
Loss & Damage	\$0.96			\$0.96		\$0.96	\$1.02
Total				\$1,150.95	\$225.47	\$1,376.42	\$1,472.65

1/ CSXT index from annual 2005 to 3Q07 - 1.06991

REDACTED

REDACTED

REDACTED

**Summary of CSXT Ratios of RSAM to
R/VC $>_{180}$ (Excluding R/VC $<_{100}$ Shortfall) - 2002 to 2005**

	<u>4-Year Average</u> (1)	<u>2005</u> (2)	<u>2004</u> (3)	<u>2003</u> (4)	<u>2002</u> (5)
<u>RSAM</u>					
1. STB Decision <u>1/</u>	292	300	292	292	286
2. CSXT Waybill Data Based on R/VC $>_{180}$ <u>2/</u>	273	283	272	273	262
<u>R/VC $>_{180}$ <u>3/</u></u>					
3 STB Decision <u>1/</u>	236	236	231	239	238
4 CSXT Waybill Data Based on R/VC $>_{180}$ <u>2/</u>	236	236	231	239	238
<u>RSAM to R/VC Ratio <u>4/</u></u>					
5. STB Decision	1.24	1.27	1.26	1.22	1.20
6. CSXT Waybill Data Based on R/VC $>_{180}$ <u>2/</u>	1.16	1.20	1.18	1.14	1.10

1/ STB Ex Parte No. 347 (Sub-No. 2) decided December 20, 2007. The actual calculated 4 year average for RSAM is 292.5 or 293.

2/ STB Ex Parte No. 646 (Sub-No. 1) decided September 4, 2007, p. 10, "Potentially captive traffic is defined as all traffic priced above the 180% R/VC level..."

3/ All R/VC $>_{180}$ ratios calculated without rounding.

R/VC ratios are calculated by taking the total move revenue divided by the total move variable cost
Expanded miscellaneous charges have been included in the revenue.

4/ RSAM - R/VC $>_{180}$

REDACTED

**Comparison of Railroad Industry Cost of Capital
Based on the STB's Single Stage Discounted Cash
Flow Model ("DCF") to the STB's Capital Asset
Pricing Model ("CAPM") – 2002 through 2005**

		STB Cost of Capital			
		DCF Model		CAPM	
Year		After Tax 1/	Pre-Tax 2/	After Tax 3/	Pre-Tax 3/
(1)		(2)	(3)	(4)	(5)
1	2002	9.8%	13.7%	8.1%	11.1%
2	2003	9.4%	13.3%	7.9%	11.0%
3	2004	10.1%	14.5%	8.4%	11.8%
4	2005	12.2%	17.9%	9.2%	13.2%

1/ STB Decisions in Ex Parte No. 558

2/ With equity adjusted to pre-tax levels, used in the STB's URCS formula

3/ Based on the methodology from the STB's January 17, 2008
decision in Ex Parte No. 664

**Summary of CSXT Ratios of RSAM to
R/VC _{>180} (Using CAPM Methodology) - 2002 to 2005**

	<u>4-Year Average</u>	<u>2005</u>	<u>2004</u>	<u>2003</u>	<u>2002</u>
	(1)	(2)	(3)	(4)	(5)
<u>RSAM</u>					
1. STB Decision <u>1/</u>	292	300	292	292	286
2. CSXT Waybill Data Based on R/VC _{>180} <u>2/</u>	281	279	285	283	275
<u>R/VC _{>180} <u>3/</u></u>					
3. STB Decision <u>1/</u>	236	236	231	239	238
4. CSXT Waybill Data Based on R/VC _{>180} <u>2/</u>	245	247	242	245	245
<u>RSAM to R/VC Ratio <u>4/</u></u>					
5. STB Decision	1.24	1.27	1.26	1.22	1.20
6. CSXT Waybill Data Based on R/VC _{>180} <u>2/</u>	1.15	1.13	1.18	1.16	1.12

1/ STB Ex Parte No. 347 (Sub-No. 2) decided December 20, 2007. The actual calculated 4 year average for RSAM is 292.5 or 293.

2/ STB Ex Parte No. 646 (Sub-No. 1) decided September 4, 2007, p. 10, "Potentially captive traffic is defined as all traffic priced above the 180% R/VC level.. "

3/ All R/VC _{>180} ratios calculated without rounding.

R/VC ratios are calculated by taking the total move revenue divided by the total move variable cost. Expanded miscellaneous charges have been included in the revenue.

4/ RSAM - R/VC _{>180}

REDACTED

PUBLIC VERSION

**BEFORE THE
SURFACE TRANSPORTATION BOARD**

_____	)	
E I DUPONT DE NEMOURS AND COMPANY	)	
	)	
Complainant,	)	
	)	
v	)	Docket No NOR 42100
	)	
CSX TRANSPORTATION, INC.,	)	
	)	
Defendant.	)	
_____	)	

PART III – EXHIBITS

- | | |
|-----------|---|
| Exhibit A | CSXT's Handling of TIH Shipments (9/24/07) |
| Exhibit B | Untitled and undated CSXT presentation on TIH shipments |
| Exhibit C | Comments of CSXT in Docket No. TSA-2006-26514· Rail Transportation Security |
| Exhibit D | Collection of documents on the critical role of chlorine in our everyday lives. |
| Exhibit E | List of 2004 and 2005 Waybill Movements with R/VC Ratios > 1.8 Moving Under CSXT PPQs |

Exhibit A

Redacted

Exhibit B

Redacted

Exhibit C

**BEFORE THE PIPELINE AND HAZARDOUS MATERIALS
SAFETY ADMINISTRATION AND
TRANSPORTATION SECURITY ADMINISTRATION**

**DOCKET NO. RSPA-04-18730:
HAZARDOUS MATERIALS: ENHANCING RAIL TRANSPORTATION
SAFETY AND SECURITY FOR HAZARDOUS MATERIALS SHIPMENTS
AND
DOCKET NO. TSA-2006-26514:
RAIL TRANSPORTATION SECURITY**

COMMENTS OF CSX TRANSPORTATION, INC.

CSX Transportation, Inc. appreciates the opportunity to offer these individual comments on the notices of proposed rulemakings published by PHMSA and TSA on December 21, 2006.

CSXT joins in and fully supports the more extensive industry comments submitted by the Association of American Railroads. The challenges of safely and securely transporting toxic inhalation hazard (TIH) commodities are not unique to CSXT. However, CSXT is one of the largest rail transporters of chemical products in America, and hopes that these separate comments will aid DHS and DOT in understanding the impacts of the proposed rules, the enforcement of those proposed rules, and other agency activities from the perspective of a carrier that is required to move these highly hazardous commodities

OVERARCHING POLICY CONSIDERATIONS

While these two rulemakings are limited to the proposals of the two agencies, each acting within its respective statutory authority, CSX feels it is crucial that the policy decisions in these rulemakings be understood for their role and place in overall federal policy for TIH issues. Regulations should not – and CSXT is confident that they will not – be adopted without a proper consideration of their role in overall TIH policy.

For well over half a century, railroads have actively helped American Industry solve the supply chain challenges that had to be overcome to move large quantities of these chemicals from production site to consumption site. Railroads have long been seen by the public and by government officials as the preferred way of transporting these commodities. The rail mode, with its lower cost and superior safety record was widely accepted as the distribution channel

of choice. With the railroad network available to distribute TIH products, the economic efficiencies of high-volume production facilities could be achieved. When lower production costs make overseas sourcing cheaper, users of TIH are able to import large quantities through ports in major cities, storing the TIH in large tanks and using the railroad to distribute the product safely and efficiently. Manufacturers, industrial consumers, and the public benefited from, and broadly supported, rail's role as the solution to their logistical challenges.

The support of the public, and of many policy makers, has greatly eroded since September 11, 2001. Now, railroads, including CSXT, are harshly criticized for transporting these commodities. Sometimes, the criticism is directed toward how the railroad transports these commodities – most often at the open nature of the rail network. For CSXT, that is a network of over 20,000 miles. Other times, the criticism is directed at the fact that the railroad transports these commodities through a particular community. Without necessarily agreeing with the critics, CSXT can appreciate the concerns and views of those constituencies.

The fact is this. Under the current state of the law, CSXT is required to transport these commodities "on reasonable request" when tendered to it in conformity with DOT regulations. See, 49 USC Sec. 11101(a) and *Classification Ratings on Chemicals, Conrail*, 3 ICC 2d 331 (1986).

Given a choice, CSXT would decline to transport these chemicals. It is a business that CSXT does not choose to be in. The financial risk should an incident occur – whether or not CSXT were at fault – is tremendous. The new regulatory burdens that are being imposed, with consequent operational impacts that will have to be addressed, are substantial. Our company's reputation has been, and will continue to be, assailed. CSXT has expressed this to our customers. We have expressed it to state, local, and federal officials. We understand that many industrial customers rely today on CSX to solve their transportation and distribution needs. We understand that the nation's manufacturing infrastructure has been designed assuming the availability of rail transportation, and that the availability of rail enables our customers to achieve substantial economic savings. We also know that some municipal water treatment centers still rely on TIH chemicals.

But this reliance can change with conversion of processes, on-site production, and use of alternative products. Sodium hypochlorite (a bleach) can be used to purify water. Much anhydrous ammonia already moves by stationary pipeline and in smaller, truckload quantities. Alternative nitrogen products such as urea ammonium nitrate (UAN) and urea are available and in use today. Federal policy must support and encourage change, leaving railroads like CSXT free to exit a business that carries more burden than is reasonable to impose. It certainly should discourage further development of industrial capacity and new distribution needs that would rely on rail transportation of TIH in the future.

CSXT understands that DOT and DHS have their individual regulatory authorities and policies. We do not expect the agencies to make all the changes that need to be made in national TIH policy, for they cannot. But, CSXT does ask the agencies to act in ways that are consistent with such a policy.

In that regard, CSXT submits that the right way to address the new paradigm is not through efforts to make railroads into something they are not

The railroad carload transportation system is not "trucks on rails," and any misunderstanding that it is will inevitably lead to unsound policy decisions. Consider a simplified description of the process: A railroad's local train leaves the serving yard with cars for delivery, reaches a chemical plant, and leaves cars (loads and empties). At the same time, it picks up one or more cars (loads and empties) at that chemical plant. Often, each car has a different destination. That same train picks up and delivers cars at other industries on its assigned run. At the end of the crew's run, the cars that are ultimately picked up by the "local" typically are brought back to the serving freight yard. There, the crew sets them off on a track. Depending on that yard's work plan, that crew or another will next handle those cars. Sometimes the cars will be switched onto classification tracks for inclusion in certain trains. In other facilities, there will be no classification, and the cars will all go into the same outbound train to move to a yard where they can be classified. Cars will move from terminal to terminal in road trains. They will be reclassified for connecting trains along the way. Each time a car must be reclassified, it must await the next outbound train to continue its movement. Typically, that means about a day spent in that yard. Once a car arrives at the destination terminal, the local delivery will reverse the pick-up process.

The actual process varies considerably. Available infrastructure will drive many operating decisions. If there are not enough yard tracks to accommodate classification, the amount of switching within the yard will be limited. Actual volumes of traffic will affect the number and timing of trains.

Our point in describing this process, even in this abbreviated and simplified way, is twofold. First, as noted, policy makers cannot think of railroad operations as trucks on rails. Rail works on a very different construct. Trucks dedicate a single power unit to a single load. Often, a single driver is dedicated to the movement. Alternatively, two drivers are dedicated to the single movement, and they take turns driving to minimize stops on long hauls. Rail carload traffic, on the other hand, is a batch processing business, with cars assembled for movements along segments of the total route. In useful and constructive discussions with TSA, FRA, PHMSA, and others, it has been made clear that there are many within government who would like the railroads to provide truck-like service for TIH shipments. It cannot be done.

Even dedicated trains are not a practical alternative for TIH shipments. The number of carloads and the huge diversity of origin-destination pairs make it

wholly impractical. CSXT is aware of only one movement on its lines where a sufficient volume, in sufficient frequency, with available line capacity justifies a dedicated train movement for TIH. Due to the very limited number of movements, special train service (dedicated trains) has proven workable for spent nuclear fuel shipments, which the government continues to demand the railroads transport.¹ The number of movements of TIH that occur in the course of a year over CSXT could not be practicably handled in special trains, even if customers were willing to pay for the costs of that service.

Our second reason for offering the simplified description of operations above is to underscore the fact that cars will, of necessity, be held in yards. The fact that cars arrive in yards and stay in yards until the appropriate train departs is an unavoidable part of the rail mode.

These disadvantages of the rail mode have long been understood. But, the combination of rail's lower cost structure compared to motor carrier, and rail's safety record led to widespread consensus – and even public support – for rail transportation.

Today, many major policy figures and interest groups will not accept the movement of TIH through cities under any set of conditions. Those that do accept it are questioning whether rail is still an acceptable mode for moving TIH, with its inherent stops in transit to make connecting trains, interchange between carriers at locations that are not guarded, and the need to conduct generally open operations. Railroad companies have been vilified in the media and accused of putting balance sheets before public responsibility, for simply complying with their legally-imposed duties.

CSXT has changed its own views as a consequence of the additional risks, the reputational damage, and new requirements that government now seeks to impose upon the handling of TIH. If given a choice, the company would decline to participate in the business under any circumstances not essential to the public health of the communities we serve. Federal policy needs to recognize the changed paradigm. TIH simply cannot continue to move by railroad indefinitely. Federal policy should create tax incentives, and, if necessary, phased-in mandates to convert industrial processes that use these chemicals to eliminate the need to move them long distances. Until that is achieved, interim policies must be adopted to reduce the number and distance of TIH shipments by rail. More robust tank car designs for TIH shipments must be implemented as quickly as practicable. Liability and risk sharing legislation must be passed to relieve the railroads of risk, while those who have long called on the railroads to transport TIH have a fair opportunity to adjust to new modes of distribution and production.

¹ The government has yet to issue an unqualified endorsement of special trains for spent nuclear fuel transportation by rail.

Ultimately, the steps required by the NPRM should be understood to be only a temporary, stop-gap measure while federal policy is properly re-aligned to move toward a world where these products no longer must move by railroad.

This is not exclusively a matter of liability. It is important to remember, that even if the potential for ruinous liability were somehow erased, the widespread social disapproval of TIH transport by rail would remain.

What cannot succeed is an attempt to force the railroad industry to reinvent its operations wholesale, in a misguided attempt to force it to accommodate a small fraction of its traffic. A common carriage business model is designed to permit any shipper anywhere to ship to any other shipper anywhere. Federal policy cannot impose special handling requirements and simultaneously preserve a common carrier obligation with near-universal service.

"CHAIN OF CUSTODY"

Again, CSXT joins the AAR Comments and does not oppose the proposed regulation. CSXT is prepared to accept and abide by the proposed interchange restrictions. In doing so, TSA must recognize that compliance will require changes in operations – and in some cases changes in the service that can be provided. AAR describes suggested changes in the definition of "attended." Without that change, substantial and immediate disruption of supply chains will be inevitable. With AAR's proposed change, alterations in service and in service patterns will be needed, but they will be less severe than the current definition in the NPRM would mandate.

CSXT urges both TSA and PHMSA to carefully consider the extensive rail customer comments that it anticipates will be filed addressing the effects of these rules on their business.

TSA's requirement for attended interchange is one example of a special handling requirement that cannot be universally accommodated in a common carriage network. While couched in terms of a requirement that applies only to shipments that "may" pass through a HTUA, TSA must understand that, in operational reality, routing complexities and the structure of the rail network linking cities would make the requirement one of nearly universal application. In practical effect, the proposed chain of custody regulation, as it affects inter-carrier interchange of freight cars would prohibit use of any interchange that is unattended, as ultimately defined by TSA.

The common carrier obligation is not absolute. A carrier is required only to provide service on "reasonable request." While it is impossible to determine just how limited or expansive the changes in operations will be, clearly some currently provided services will no longer be "reasonable" in light of the new

regulations. Further, the concept of open routing from any origin to any destination cannot survive these restrictions

At the core of the concept of a common carrier rail network is the notion that almost every customer connecting to the national rail network should be able to ship to almost every other shipper connecting to the network. This is constrained only by the ICCTA's reasonableness standards.

CSXT has 1,190 operating interchanges with other railroads (as opposed to "commercial interchanges" not at issue here). While TSA looked at interchanges actually used for TIH handlings over a time period (and the data used by TSA may not have identified switch movements), it did not consider that the majority of interchanges were not used for TIH handling during that time period. CSXT believes that a majority of these interchanges would be "unattended" even under the AAR's proposed wording. The notion that every one of the 1,190 CSXT interchanges should stand ready and able to handle a TIH shipment, should a car be consigned over a route requiring that interchange's use, is clearly voided by the new regulations. By making most interchanges non-compliant, one can no longer speak in terms of a "common carrier network" for TIH, even if the obligation to provide service on reasonable request were to continue for certain origin-destination pairs

CSXT will not establish operating plans for TIH movements that it does not in good faith believe can be sustained with one-hundred percent compliance. Accordingly, it will evaluate current interchanges where TIH is handled and determine which do not meet the requirements of the new regulations. These interchanges will not be used so long as they are not in compliance. Where practical alternative interchanges are identified that do comply, operating plans will be changed to use them. In many cases, CSXT anticipates that this will mean use of larger yards for interchange, since of course it is the larger facilities that maintain a 24x7 operation. While AAR appropriately cannot generalize and can only state that the chain of custody requirement might well increase traffic through larger cities, on CSXT this will, in fact, be the case. Large yards that are accessible by other railroads tend to be in larger industrial areas where competing railroads built their lines, and where rail service and a large labor force led industries to build and expand. And, it is to these facilities that other railroads operate trains. It must be remembered that cars can only go where trains go; the presence of a physical connection does not always mean that CSXT or the other railroad operate trains to that location. Inevitably, some of the yards that will comply with the proposed rules will, unsurprisingly, fall into zones designated by the government as HTUA's.

In some situations, there may be no practical interchange alternative. It may be that these situations will be limited to short haul movements and the relatively rare TIH movement that originates on short lines. It is likely, though, that some short movements in the form of switching in terminals may have to be

replaced by joint line movements. Given the complexity of the network and the number of different origin-destination pairs, it is difficult to offer more than a good faith projection that there will be some effects on the ability to provide service.

SPECIFIC COMMENTS ON ELEMENTS OF THE NPRM's

A core principle of rulemaking is that rules must be written in language sufficiently precise to describe what is required. Voluntary guidelines and non-rule "best practices" can adopt wording that indicates general expectations, directs the use of judgment, and does not describe with precision exactly what is required in every conceivable situation. Guidelines are inherently flexible. Rulemaking must proceed according to an entirely different standard of precision. In several places, the wording of the proposed rules set out in the NPRM fails to meet the required standard of precision. AAR addresses the use of the ambiguous term "positive control" and suggests an alternative formulation. CSXT will address several other similar issues in wording of the proposed regulations.

REPORTING SECURITY CONCERNS

While CSXT agrees that the objectives of the proposed reporting rule are commendable and is fully supportive of the concept, we respectfully submit that it is a good idea that will make a bad law. The rule offers no criteria whatsoever as to what a reportable "concern" is. Is a generalized concern about passenger and commuter operations a "concern" that must be reported, or risk citation by an inspector? At what point does a trespasser become a "significant security concern"? Is a rail fan taking photographs of a spent nuclear fuel train a "significant security concern"? In all fairness, the intent of the proposed rules is that the railroad use judgment to decide if an event or situation calls for reporting to TSA. But subjective judgment is a poor, even legally unenforceable, standard for a federal regulation. CSXT believes that, unlike safety standards, security standards should rely heavily on cooperation, consultation, and mutual judgment between government and industry. Requirements to report security concerns such as this would have been better when voluntary guidelines were the favored approach. With the policy shift to regulation, CSXT urges that, instead of a vague characterization of what is required, TSA instead adopt a requirement that certain specific crimes be reported. Otherwise, there will be an inevitable tension -- and enforcement disagreements -- as individual field federal inspectors assert their individual judgment and disagree with railroad management's judgment as to what should have been reported as a "significant security concern."

NOTIFICATION OF "SIGNIFICANT" DELAYS

The same vagueness defect appears in the proposal to require notice of "significant" delays to customers. Rail freight transportation, even though trains are scheduled, is seldom conducted pursuant to a "schedule" in the sense that airlines or passenger trains are "scheduled." It is thus not entirely clear what a "delay" is, but certainly there is no basis on which a TSA inspector could determine whether a delay, however defined, is "significant."

Under the proposal, notice "should" be made by a method acceptable to both railroad and receiver. Again, the choice of wording is more appropriate for a voluntary guideline or best practice than a regulation. "Should" is highly appropriate in the former context, but fraught with controversy in the latter. To a field inspector enforcing a regulation, "should" will almost inevitably be interpreted as "shall." Yet, that is not the legal import of the word. AAR suggests that giving consignees veto power over the means of communication makes no sense. On the other hand, making available a mechanism to permit customers to electronically monitor their shipments is both practical and can be accomplished.

And, if a railroad and a consignee cannot agree on the method of notification, what course is the railroad to take? Presumably, it cannot proceed to transport a commodity under circumstances where it has no agreement with the consignee. To do so would put it in jeopardy of being cited for violation of federal law, clearly an unreasonable requirement. (See above.) Note, too, that the proposed rule assumes some sort of interaction and an ongoing relationship between the railroad and a consignee. That cannot be assumed in a common carrier network where a consignor might choose on any given day to ship to a new receiver, with which the railroad has not had prior (or recent) contact. Some changes in practices will be required to ensure compliance with this regulation.

INTERPLAY BETWEEN PROPOSED RULES AND EXISTING REGULATIONS

TWIC and Railroad ID Cards:

Existing security action item SA 17 calls for railroads to "Establish employee identification measures for all employees. Conduct spot checks of identification as threat conditions warrant." CSXT is actively participating in the National Maritime Security Advisory Committee TWIC Working Group, an industry task force to adopt Transportation Worker Identification Credentials technical requirements.² As we have participated in that process, it has become

² CSXT would like to take this opportunity to commend the several federal agencies that took the lead in creating this group, giving the affected private sector an opportunity to participate in the process of implementing the TWIC regulations. CSXT believes that this cooperative effort

evident that the ultra-high-technology credential now under consideration for port access may not be necessary for all ports or for all transportation entities. In the case of rail, access to ports is limited to the rail line entering the facility. The locomotive and cars can only follow the path of the tracks. With rail employees reporting for duty at serving yards or other rail-controlled locations, CSXT suggests that, in lieu of the TWIC card, railroads should have the option of complying with credentialing requirements with the identification measures called for by SA 17 and any subsequent replacement regulation. No additional security benefits will be gained from a high-technology card reader at trackside on the perimeter of the port property. This is particularly important for railroads, as crew members for a particular train to or from a port are chosen based on union contract procedures, and their availability. To have the flexibility to serve ports when and as needed, CSXT will need to secure credentials for far more employees than the number of train movements might suggest. Under these circumstances, permitting railroads like CSXT to credential their employees with existing photographic IDs would make good sense, would continue fluid rail service to ports, and would fully meet any actual need for identification of rail workers.³ If a comprehensive substitution of railroad photo IDs is unacceptable to DHS, CSXT suggests, as an alternative, that railroads be permitted to seek port-specific partial waivers through a joint FRA- TSA- Coast Guard review that would evaluate the specific railroad's photo ID, voluntary background check process, and other relevant criteria.

The "48-hour Rule":

Under existing DOT regulations, a railroad must require the shipper to accept delivery within 48 hours of notice of arrival at destination yards. See, 49 CFR Sec. 74.16(b). With the proposed regulation requiring that the receiver have someone present at time of delivery, there may be some times when a car is undeliverable under the new regulation and must be returned to the serving yard. This may result in more cars reaching the 48-hour limitation. (CSXT does not offer scheduled delivery times or storage services for TIH.) CSXT is evaluating how to put into place provisions for return or other disposition of cars that have been on hand for more than 48 hours since notice of delivery.

It would be helpful if TSA and/or DOT would develop their own communications program with receivers of TIH to emphasize for them the importance of having an individual on-location ready to accept delivery of TIH.

between government and the private sector will improve implementation, enhance security, and further the smooth and efficient flow of commerce.

³ CSXT serves a number of port facilities that do not handle cargo containers. For example, CSXT's Baltimore coal terminal is a bulk commodity facility. The security concerns associated with manne terminals that handle inbound cargo containers are very different than those associated with bulk materials handling facilities. This underscores the appropriateness of recognizing railroad-issued photo IDs, or permitting a waiver process.

shipments. This kind of public outreach would be most helpful in promoting compliance with the new rules and in reducing dwell of TIH cars in HTUA's.

CONCLUSION

CSXT understands that, under the current state of the law, it has a legal obligation to accept and transport these commodities on reasonable request. But beyond that obligation, CSXT also recognizes that it has a social responsibility to transport these products safely. We take that responsibility very seriously. Regardless of action that may or may not be taken by federal policy makers in these areas, CSXT will continue its efforts to transport TIH and other highly hazardous materials as safely and securely as possible.

Exhibit D

Some people think we'd all be better off without chemicals like chlorine. But chlorine is used in many products we use daily, including water purification systems. Most drinking water systems in the U.S. and Canada use chlorine-based disinfectants to kill viruses and bacteria in water that can make us sick.



Besides clean water, chlorine is used in many other things that we use everyday.

But if you really think you're ready to give up some of those things, here's what you'll need to live without:

Medicine - More than 93 percent of pharmaceuticals contain chlorine or are made with chlorine chemistry, from over-the-counter products that treat minor aches and pains to prescriptions that treat heart disease, cancer, AIDS and malaria.



Affordable housing - Chlorine technology is used to make polyvinyl chloride and vinyl for affordable and energy-efficient building materials, siding, windows, flooring, decking, piping and more. Vinyl is used in so many products, it ranks second among all of the most widely used plastics in the world.

Fresh produce - Chlorine chemistry is used in 90 percent of crop protection chemicals, including those that combat post-harvest disease. That allows farmers to raise, harvest and sell more fresh produce to consumers year-round.



TV - Whether you have an older television set or one of the latest plasma screens, all TVs have parts that are made using chlorine technology.

Paper - Most kinds of paper, including paper, paper, paper, coffee filters and many others, are processed with chlorine products.

Sports - Chlorine is needed to make all kinds of sports equipment like balls, rackets, jump balls, helmets and basketball shoes, just to name a few.



Computers - From memory chips to microprocessors, computers rely on chlorine technology.

CDs and DVDs - Whether it's video games, music, data or movies, discs are made with polycarbonate, which is manufactured with chlorine.

Cars, trains, boats and airplanes - All of these inventions have parts that are manufactured using chlorine, from airbags and safety belts to instrument panels and armrests.

Public Safety - Chlorine is used in the production of bulletproof vests, face shields, helmets and fire-resistant clothing.

And that's just the beginning.

Chlorine is directly used in 40 percent of U.S. industries, and indirectly used in virtually all industries. That means nearly all manufactured products are somehow related to chlorine. Chlorine is one of the most abundant naturally occurring building blocks. Chlorine is essential to life.



* The filtration of drinking water plus the use of chlorine is probably the most significant public health advance of the millennium. *"Life Magazine" (1997)*

Chlorine was discovered in 1774 by Swedish chemist Carl Wilhelm Scheele, who mistakenly thought it contained oxygen. In 1810, chlorine was given its current name and correctly identified as an element by Sir Humphry Davy.

Chlorine's powerful disinfectant qualities come from its ability to bond with and destroy the outer surfaces of bacteria and viruses.

The use of chlorine in water supplies has played a key role in increasing life expectancy in America by more than 50 percent – from about 45 years in 1900 to 78 years today – by eliminating most waterborne diseases that once killed tens of thousands.

The most common method of making chlorine is by passing an electric current through a saltwater solution. The solution separates into chlorine and two other useful products: sodium hydroxide (also known as caustic soda or lye), and hydrogen.



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Chlorine and Drinking Water: Here's to Your Health

When unprecedented floods ravaged the Midwest in 1993, chlorine emerged as one of the heroes of the relief effort, bringing safe water back to hundreds of thousands of residents along the Mississippi River.

Whether coming to the rescue of natural disaster victims or providing clean and safe water for everyday use, chlorine's water disinfection capabilities are unmatched. In fact, were it not for chlorine, "water, water everywhere and not a drop to drink" would be more than an old saying; it would be a fact of life – and death – for people throughout the world.

Although three-quarters of the Earth's surface is water, only one percent is available for human consumption . . . and that one percent often contains hundreds of microorganisms that may cause life-threatening waterborne diseases such as cholera, typhoid and dysentery. Fortunately, since 1908, when chlorine was first used on a large scale in the U.S. to purify drinking water, these epidemic diseases have been virtually wiped out in our country.

Today, 98 percent of U.S. public water supplies that are disinfected are made clean and safe with chlorine or chlorine-based compounds. More than 200 million Americans rely on chlorine every day to give them safe water for everything from brushing their teeth and making their morning orange juice and coffee to cooking, washing, cleaning, swimming and, of course, drinking.

Chlorine: The Essential Element

Just as water is essential to life, chlorine is essential to safe water. Public health officials overwhelmingly agree:

- In a 1992 survey of public health officials, 92 percent agreed that chlorine is crucial to eliminating waterborne diseases, and 87 percent said they view chlorine as the safest way to assure quality drinking water.

Experts also agree that chlorine's introduction early this century into the U.S. drinking water supply is one of history's great public health advances. Safe, chlorinated water has played a key role in:

- a 50 percent-plus increase in life expectancy, from about 45 years in the early 1900s to about 76 years at present,
- a dramatic decline in infant mortality rates; and
- the virtual elimination of cholera, typhoid fever, dysentery and gastroenteritis, as well as many other waterborne diseases which once killed tens of thousands of Americans.

Many Uses, Many Benefits

Chlorination is the only water disinfection method that protects all the way to the tap, for just pennies a day. But chlorine does much more than kill deadly germs and microorganisms in the nation's water supply. Chlorine also:

- removes unpleasant tastes and odors that come from algae and decaying natural vegetation in water distribution systems
- effectively controls microorganisms such as slime bacteria, molds, algae, and fungi that tend to grow on the walls in transmission mains and treatment basins.

- keeps water pipes and filters free from dirt
- eliminates or reduces organic coloration
- destroys hydrogen sulfide and removes ammonia and other compounds that have unpleasant tastes and impede disinfection

Our water supply benefits from chlorine in another way. Corrosion-resistant polyvinyl chloride (PVC) pipe, which is made from chlorine, protects our water supply by significantly decreasing leaks in public drinking water systems.

Coming to the Rescue in Natural Disasters

Chlorine's potent germ-killing qualities are used extensively throughout the world to provide safe drinking water to areas suffering from floods and hurricanes, which wash high levels of microorganisms into existing water sources.

Chlorine brought safe drinking water back to victims of the Midwest floods in 1993.

In 1991, local drinking water supplies in New Bedford, Massachusetts were contaminated by high levels of bacteria as a result of Hurricane Bob. Increased levels of chlorine corrected the tainted water.

When tropical storm Thelma devastated the Philippines and contaminated its water supply in 1991, large shipments of chlorine were among the first relief supplies to reach that country.

Relief During Natural Disasters

Chlorine plays a vital role in providing relief during natural disasters. Airlifts of chlorinated water purification chemicals, for example, were distributed to hospitals, clinics and refugee centers in the civil war-torn Russian republic of Chechnya. Without such aid, Chechnyans could have faced a fate similar to the thousands of Rwandan refugees who died during a cholera epidemic in that country.

Safe Drinking Water: A Benefit Not to Be Taken for Granted

Without chlorine, nine out of 10 public health officials agree, the risk of waterborne disease outbreaks in the US would increase significantly. Although most Americans never think about getting sick or dying from drinking water, it is still a sad fact of life in many developing countries.

More than 1.5 billion people around the globe do not have access to safe drinking water, and diseases associated with dirty water kill more than 25,000 people per day – more than 9 million each year – around the world, according to the World Health Organization. Chlorinated water supplies could have helped save thousands of lives that were lost during recent typhoid and cholera outbreaks in Latin America and Africa.

Thanks to chlorine, these deadly diseases are just a memory in this country. Americans are very fortunate to have had the benefits of a water supply made clean and safe with chlorine for more than 80 years. The next time you turn on the tap, rest easy, chlorine is there protecting your health.

*Chlorine Chemistry Council® Brochure
November 1995*

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Chlorine is one of the most abundant naturally occurring chemical elements. It is one of the most important and significant role in the manufacture of thousands of products we depend on every day.





Chlorine and Food Safety White Paper

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Preface

"...Illness due to contaminated food is perhaps the most widespread health problem in the contemporary world and an important cause of reduced economic productivity."

—Expert Committee on Food Safety convened by the World Health Organization and the Food and Agriculture Organization of the United Nations, 1983



This paper explores the role chlorine plays in the efforts of industry, public health officials and consumers to maintain the safety of the global food supply. Chlorine and chlorine-containing compounds are critical factors in food safety all along the path leading from the farm to the consumer's plate.



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Executive Summary

Chlorine plays a vital role in the safe production, processing, transport and preparation of foods of all varieties. "To date, no other sanitizing agent has appeared which competes with chlorine in all the areas needed for safe food production" (McLaren, 2000). On the farm, chlorinated water is used for irrigation and livestock watering to lower the risk of contamination of crops and livestock. Chlorine solutions are used industrially to wash and sort fruits and vegetables. The dairy, poultry, egg and meat industries use the chemical in numerous ways to prevent contamination that could lead to foodborne illness. Chlorine is used extensively in food processing and transport to disinfect surfaces of all types (e.g., work surfaces, instruments, machinery, containers) that contact edible products. In the effort to increase food safety, researchers continue to find innovative uses for chlorine as food travels from "the farm to the fork."

The challenges of safe food production and delivery in the 21st century are unique in human history. Opportunities for food contamination are many. Some of these opportunities arise from human negligence or ignorance of hygiene. In other cases they are a consequence of modern agricultural practices, food handling techniques, changing patterns of food distribution or changing consumer preferences and demographics.

In this era of global trade, paths from the farm to the fork have lengthened. Modern consumers demand year-round fresh fruits and vegetables of a wide variety, with fewer preservatives (Zink, 1997). This demand fuels the importation of produce from countries with variable food safety standards. It is true that, "in a globalized world, we all swim in a single microbial sea" (Brundtland, 2001).



As a result of changing demographics (e.g., the aging "Baby Boomers") and better health care, the elderly population is growing. Advances in medicine are also prolonging the lives of the immunocompromised. These populations are statistically more vulnerable to foodborne illness.

In addition, increasing numbers of US residents eat restaurant-prepared foods, rendering themselves dependent on the food handling and preparation procedures followed by these establishments.



The US Food and Drug Administration recently announced a program designed to establish a national baseline on the occurrence of foodborne disease risk factors within the retail segment of the food industry. Risk factors outlined are food from unsafe sources, inadequate cooking, improper holding temperature, contaminated equipment and poor personal hygiene (US FDA, 2000). Combating foodborne diseases requires the constant vigilance of many segments of society and their awareness of the changing nature of the challenge. In response to recent concerns about potential terrorist threats, US officials are calling for a stronger public health infrastructure to respond effectively to public health emergencies of all types, including those related to contamination of the food supply. This effort may provide better links among local, state, regional

and national public health offices, and improve notification and response regarding foodborne disease outbreaks.

Although the US food supply is among the safest in the world, foodborne illnesses affect millions in the United States annually, causing thousands to die. Accompanying the many conveniences of modern life is an unfortunate sense of complacency about food safety on the part of many consumers. Opportunities for food contamination and cross-contamination abound in home kitchens when consumers fail to practice safe food preparation and handling.



In the developing world, foodborne disease is a major cause of infant and childhood mortality. According to the World Health Organization, children under the age of five suffer approximately 1.5 billion cases of diarrhea annually, resulting in over 3 million deaths (WHO, 1997). A significant proportion of diarrheal diseases are of foodborne origin. (Untreated or inadequately disinfected drinking water also accounts for a large proportion of diarrheal diseases.) Two to three percent of non-fatal foodborne diseases in developing countries result in long-term health consequences. The economic costs of foodborne diseases are huge and include treatment and case investigation costs, work absence and lost human potential. Chlorine is a highly effective yet inexpensive weapon available to control foodborne disease all over the world.

There are common foodborne pathogens, but the foodborne "enemy" is not static. Microorganisms harbored in foods evolve and new ones emerge. These may spread rapidly over great distances by food transportation mechanisms. Surveillance of foodborne pathogens by government and public health monitoring of outbreaks, once a relatively simple task, is now highly complex as people travel widely and food is shipped globally. Nevertheless, new technologies afford sensitive tracking.

techniques and rapid global electronic reporting

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Introduction

Impacts of Foodborne Disease

The US food supply is among the safest in the world. The overall high quality of life enjoyed by Americans can be attributed, in part, to an abundant, nutritious and relatively risk-free food supply. Nevertheless, every year an estimated 76 million people in the United States become sick, 300,000 are hospitalized and approximately 5,000 die as a result of the basic human activity of eating (US Centers for Disease Control, 2001a). The annual economic cost of foodborne diseases to the US economy is estimated to be several billion dollars (Satcher, 1998).

Ingestion of foods contaminated with bacteria, viruses and parasites is a major world public health issue, especially in developing countries. Particularly susceptible are infants, young children, the elderly, pregnant women and immunocompromised individuals. According to the World Health Organization (WHO), foodborne diarrhea is one of the most common illnesses of children and one of the major causes of infant and childhood mortality in developing countries. The WHO estimates that children age five and younger suffer 1.5 billion episodes of diarrhea annually from consumption of both unsanitary drinking water and tainted foods, resulting in over 3 million premature deaths. Repeated childhood bouts of diarrhea have dire long-term consequences including malnutrition, increased vulnerability to many diseases and stunted physical and mental development. The WHO estimates that approximately 2–3% of cases of foodborne disease outbreak lead to long-term ill health (WHO, 1999).

Economically, foodborne diseases exact a huge price in treatment, case investigation, work absence and lost human potential due to long-term damaging effects (WHO, 1999). Further, developing nations, which experience the highest rates of foodborne disease, can least afford to address the problem effectively. Although the safety of the US food supply is generally not a subject of concern, complacency is a dangerous attitude. Combating foodborne diseases requires the constant vigilance of many segments of society and their awareness of the changing nature of the challenge.

Safe practices are critical at every stage of food production and handling, all along the path leading to, and including, the consumer's kitchen. Opportunities for food contamination and cross-contamination abound in home kitchens. Consumer awareness of safe food preparation and storage practices helps guard against foodborne illness originating in the home.

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Trends in Foodborne Disease Outbreak

The majority of foodborne illness cases arise from the consumption of foods of animal origin. Foods traditionally implicated in outbreaks include undercooked meat and poultry, seafood and unpasteurized milk. More recently, scientists have discovered pathogens in foods once believed incapable of supporting their growth. Such foods include eggs, juices, tomatoes, apple cider and lettuce (Prier and Solnick, 2000). While scientists and health experts work to understand, prevent and combat food contamination, their efforts have not kept pace with certain modern developments that exacerbate the health problem. Foodborne illness originating from eating contaminated fruits and vegetables, already prevalent in developing countries, is becoming increasingly common in developed countries (WHO, 1998). There are several possible reasons for this. The increasing globalization of food trade means that contaminated fruits and vegetables may be widely distributed. The susceptibility of foods to infection increases with lengthening transit times.

Further, as the elderly population increases, the average resistance to foodborne disease decreases, resulting in a greater portion of the population succumbing to illness from tainted foods. Not only is the elderly population increasing, but also, by virtue of rapidly paced medical advances, many more immunocompromised individuals are surviving. These include people with chronic rheumatological disease, cancer, solid-organ transplantation and AIDS (WHO, 1998). Such individuals' compromised immune systems make them more vulnerable to foodborne illness.

Changes in eating habits also may contribute to increasing numbers of cases of foodborne illness stemming from contaminated produce. Many are heeding the advice of health experts to increase their consumption of fresh fruits and vegetables. The modern consumer demands a wide variety of these products year-round, and with fewer preservatives (Zink, 1997). This demand fuels the importation of produce from countries with variable food safety standards. It is believed that the number of foreign food items sold in the US increased by 50%, from 2.7 million items in 1997 to 4.1 million in 2000 (Winter, 2001). Finally, according to Collins (1997), the typical American over the age of eight is eating four restaurant meals every week. Increased consumption of restaurant-prepared meals increases the potential for sickness resulting from improper food handling in restaurant kitchens.

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Chlorination Protects Public Health

Historically, chlorine is one of mankind's most trusted weapons in the war against infectious waterborne diseases. Drinking water chlorination, first introduced in Great Britain in the early 1900's and shortly afterwards in the US, immediately improved the quality of life wherever it was employed. Chlorination and filtration of raw water are responsible for the virtual elimination of serious waterborne diseases such as cholera, typhoid, dysentery and hepatitis A (White, 1986). LIFE magazine, in rating the 100 most important historical events of the past millennium, called drinking water chlorination and filtration "probably the most significant public health advance of the millennium" (Anonymous, 1997).

While chlorine's role in protecting against waterborne disease is widely recognized, chlorine also plays a vital role in the safe production of a wide variety of foods.

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The Micro-Culprits of Foodborne Illness

Bacteria and viruses are the most common causes of foodborne illness, protozoa may also cause sickness. Among bacteria, *Campylobacter*, *Salmonella*, *E. coli* O157 H7 and *Vibrio* cause the majority of foodborne sickness cases. The Norwalk viruses (also known as caliciviruses), are common culprits in foodborne illness, but are rarely diagnosed due to the unavailability of the diagnostic laboratory test.

Hepatitis A is a virus that infects the liver and causes the disease hepatitis A. *Toxoplasma gondii* and *Cryptosporidium parvum* are common parasitic protozoa that cause foodborne illness. Table 1 lists pertinent information on each of these common microorganisms.

Table 1: Common Foodborne Pathogens ¹

Pathogen	Infection Symptoms in Humans	Pathogen Reservoir	Cause of Infection
Bacteria			
<i>Campylobacter</i>	Fever, diarrhea, abdominal cramps, nausea, vomiting. Most commonly identified cause of diarrheal illness in the world. May cause Guillain-Barre syndrome.	Intestines of healthy birds, Raw poultry meat, cattle and sometimes swine.	Eating undercooked chicken or foods contaminated with juices from undercooked chicken. In developing countries, unchlorinated drinking water supplies, e.g., wells, contaminated with poultry feces.
<i>Salmonella</i>	Fever, diarrhea, abdominal cramps, headache.	Intestines of birds, reptiles and mammals.	Spread to humans by a variety of foods of animal origin, e.g., undercooked poultry, contaminated eggs (eaten raw) and raw milk. May invade the bloodstream in persons of poor health or weakened immune systems, causing life-threatening infections.
<i>E. coli</i> O157 H7	Severe, bloody diarrhea, painful abdominal cramps, not much fever. May cause acute kidney failure, hemolytic uremic syndrome, in children.	Cattle and similar animals, also resides in humans.	Consuming food or water that has been contaminated with microscopic amounts of cow feces, Contaminated raw milk.
<i>Vibrio parahaemolyticus</i>	Watery diarrhea, abdominal pain.	Estuarine and marine environment and fish and seafood from those environments.	Consuming raw, improperly cooked, or cooked, recontaminated fish and shellfish.
Viruses			
<i>Norwalk-like virus</i>	Acute gastrointestinal illness, usually with more vomiting than diarrhea, Headache, myalgia and low-grade fever.	Infected persons for up to 2 days after diarrhea stops.	Contact with infected persons/food handlers.
<i>Hepatitis A</i>	Infects the liver and causes hepatitis A virus fever, malaise, nausea, abdominal discomfort, dark urine and jaundice.	Feces of infected people, Poor sanitation and crowding facilitate.	Person-to-person fecal-oral route by infected food handlers.

		transmission	
Protozoa			
<i>Toxoplasma gondii</i>	No symptoms but possible diarrhea; Infected pregnant women may pass the disease to their fetuses, resulting in death of the fetus or severe health effects, such as mental retardation.	Found in virtually all animal foods	Consuming raw or undercooked meat or contact with cats that shed cysts in their feces during acute infection.
<i>Cryptosporidium parvum</i>	Profuse watery diarrhea, Life-threatening among the immunocompromised.	Waterborne or found in animal manures	

¹ Adapted from US CDC (2001b), US FDA on-line "Bad Bug Book" (as viewed 8-16-01), and personal communication with Dr. Fred Raiff (10-4-01)

Studies Indicate Contaminated Foods May Cause More Than Gastrointestinal Illness

Besides the expected gastrointestinal upset, other chronic diseases may result from foodborne infections. The US Centers for Disease Control and Prevention (CDC) (2001a) reports that in the past fifteen years, several important diseases of previously unknown cause have been determined to be complications of foodborne infections. Examples are Guillain-Barre syndrome, which can be caused by *Campylobacter* infection, and hemolytic uremic syndrome (acute kidney failure in children), caused by *E. coli* O157 H7. In addition, *Salmonella* infection may produce reactive arthritis and serious infections, while *Listeria* can cause meningitis and stillbirths. In the future, further associations between diseases and food contamination may be uncovered.

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Human Infection with Foodborne Pathogens

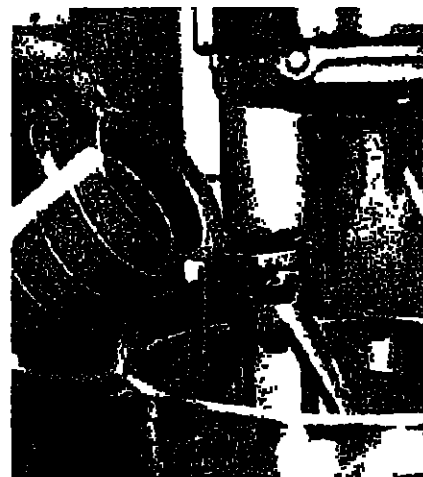
How are harmful microorganisms transmitted to people? Healthy animals raised for food host a variety of microbes, especially in their intestines. These microbes can transfer to meat and poultry during animal slaughter. Fruits and vegetables may be contaminated if they are irrigated or washed with waters contaminated with animal manure or human sewage. Filter feeding shellfish concentrate bacteria, such as *Vibrio*, that are naturally present in sea water, or other microbes originating in human sewage disposed of in marine waters. During food processing, infected human food handlers may contaminate foods by introducing microbes by hand contact. Alternatively, food may be contaminated by contact with contaminated surfaces, including work surfaces and utensils. Fabrics and sponges used to wipe surfaces also may transfer pathogens. Cross-contamination is the "transfer of harmful substances or disease-causing microorganisms to food by hands, food-contact surfaces, sponges, cloth towels and utensils that touch raw food, are not cleaned, and then touch ready-to-eat foods." Cross-contamination can also occur when raw food touches or drips onto cooked or ready-to-eat foods" (Partnership for Food Safety Education On-Line Glossary)

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Combating Foodborne Disease with Chlorine

Chlorine is a highly effective yet inexpensive weapon used in the battle to control foodborne disease. Chlorine generally is applied to contaminated surfaces in the form of elemental chlorine (chlorine gas) or a bleach solution made from either liquid sodium hypochlorite or granular calcium hypochlorite. These three forms of chlorine have been approved for use by the US Environmental Protection Agency and by individual states. General statements about chlorine in this document refer to these three commonly used chemical forms. The inhibitory or lethal activity depends on the amount of free available chlorine in the solution (in the form of hypochlorous acid, HOCl, present in bleach and chlorine solutions) that comes in contact with microbial cells. Free chlorine disinfects by chemically disrupting bacterial cell walls and membranes through oxidation of a chemical group known as the thiol group (WHO, 1998). Many viruses and protozoa are also inactivated by chlorine. Thus, chlorine is a powerful weapon used to inactivate harmful microorganisms and help prevent the spread of disease.

To minimize chlorine waste and optimize its efficient use, chlorine concentrations in sanitizing solutions should be monitored. The concentration of the fast-acting, antimicrobial hypochlorous acid, the chemical species providing free available chlorine to disinfectant solutions, is a function of pH. Between pH 6.5 and 7.0, HOCl exists as 95- 80% of the free chlorine concentration. At pH greater than 8, the free chlorine concentration is less than 20%. To complicate matters, the paper test strips and colorimetric kits used to monitor chlorine do not distinguish between the presence of HOCl and a far less active chemical



species, hypochlorite (OCl-) Therefore, to maintain a given free chlorine concentration, it is necessary to monitor and adjust the pH of disinfectant solutions (Suslow, 2000) Efficient use of chlorine for various food industry disinfection purposes can reduce costs (especially by minimizing machinery and equipment corrosion) and the negative environmental impact of wasting chlorine (Denny, 2000)

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Chlorine in Food Production

On the Farm

In the production of safe, nutritious foods, chlorine's first role is on the farm Chlorinated water, used for irrigation and livestock watering, lowers the risk of waterborne contamination to crops and farm animals. Chlorine also prevents the formation of bacterial slime and biofilms on irrigation equipment used to deliver water to crops (Suslow, 2000)

Recently, scientists at the Agricultural Research Service in College Station, Texas, reported that the chlorine-containing compound sodium chlorate, fed in low doses to cows and pigs prior to slaughter, selectively kills *Salmonella typhimurium* and *Escherichia coli* 0157:H7 The CDC estimates about 1.4 million cases of salmonellosis and 73,000 cases of diarrheal illness are caused by these two pathogens annually (USDA, 2001)

Routine seed disinfection is achieved by soaking seeds in chlorinated water, often with heating, to reduce the potential for viral, bacterial and fungal disease epidemics (Suslow, 2000). Recent outbreaks of *E. coli* and *Salmonella* in raw alfalfa and clover sprouts in the US and Japan prompted a review of industry practices by the US Food and Drug Administration and the California Department of Health Services A series of safety measures were introduced in the US in 1999, including treating sprout seeds with chlorine dilutions and regular testing of irrigation water Sprouts, considered ready-to-eat foods, are finished in warm, wet, dark conditions that are ideal for microbial growth (Green, 2001) Researchers have found that presoaking contaminated sprout seeds in a 20,000 mg/liter calcium hypochlorite solution reduces the risk of infection (Brooks et al., 2001)

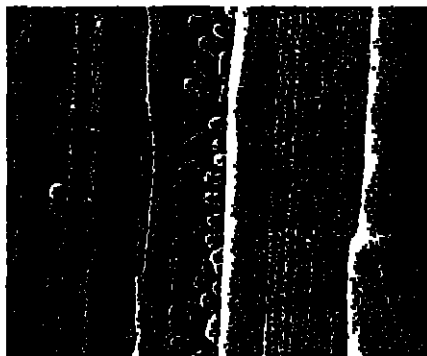
Chlorine is an effective, inexpensive agent used to help manage post-harvest diseases affecting fruit and vegetable crops Many fruits and vegetables are treated in flumes, water dump tanks, spray washers or hydrocoolers to which chlorine is added (Suslow, 2000) Up to 30% of harvested crops, especially highly perishable items such as tomatoes, squash and peaches, may be lost to post-harvest disease, according to the North Carolina Cooperative Extension Service Investments made to save harvested crops are usually less costly and less environmentally damaging than efforts to increase production Currently, chlorination is one of the few chemical options available to combat post-harvest disease Various fungicides and bactericides that had been used alone or in combination with chlorine in the past have been removed from the market due to economic, environmental or health concerns

Effective chlorination of harvested crops depends upon frequent monitoring of the chlorine solution and an understanding of the various factors involved According to the North Carolina Extension Service, these factors include the pH of the solution, chlorine concentration, water temperature, amount of organic matter present, exposure time and the growth stage of the pathogens present

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In Food Processing Facilities

The usefulness of chlorine is abundantly evident in food processing facilities where it is used extensively to prevent food contamination Food processing facilities rely heavily on chlorine to disinfect various food and food-contact surfaces Chlorine also is used frequently as a whitening agent to remove stains on equipment and walkways



Chlorine quickly kills microorganisms on food surfaces, producing a lethal effect in the first few seconds of treatment Unlike the chlorination of a liquid medium, such as raw water in which chlorine is effectively and uniformly dispersed, chlorine disinfection of solid surfaces generally presents a more difficult challenge Physical and chemical characteristics of surfaces involved in food production vary greatly Food surfaces themselves vary in geometric area, texture, pH and temperature These surface properties influence the efficiency of chlorine disinfection For example, the convoluted surface of a cantaloupe harbors microorganisms more efficiently than the smooth surface of a watermelon. (In June, 2001, in fact, there were two deaths and many cases of food poisoning across 14 US states attributed to *Salmonella*-infected cantaloupes grown in Mexico. *Salmonella* are believed to be transferred from the infected cantaloupes and to the interior fruit via cutting knives.) Similarly, food-processing machinery with

numerous interconnecting parts of various shapes, sizes and materials can be extremely difficult to decontaminate. Even a stainless steel table surface may present a disinfection challenge, given the ability of bacteria to colonize microscopic crevices (see photomicrograph below)

The relative temperatures of food tissue and disinfectant help determine the effectiveness of disinfection. The temperature of wash water should be at least 10°C higher than that of the fruits or vegetables to achieve a positive temperature differential, and to minimize the uptake of wash water through stem tissues or open areas in skin or leaves (Bartz and Showalter, 1981, Zhuang et al., 1995)

In addition to the consideration of surface properties and temperature, the particular varieties of microorganism(s) infecting the host surface help determine the effectiveness of disinfection. It is known, for example, that among bacteria, *Salmonella*, *Escherichia coli* and *Shigella* are less resistant than *Listeria monocytogenes*.

Researchers have developed a method to allow residual chlorine to remain in water after it is used to wash foods. The residual chlorine is an added measure of disinfection protection. The method has become known as "in-plant chlorination" (Griffin, 1946). Fruits, vegetables, poultry products, eggs, fish, frog legs and nut meats are washed with chlorinated water prior to being sold to the public or undergoing additional processing. In addition, flours are bleached with chlorine. The advantages of in-plant chlorination include odor and slime reduction, reduced clean-up time, lower bacterial counts on finished products and no apparent corrosion of metal equipment with continuous contact (Ritchell, 1947)

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Meat and Poultry Industries



Chlorine solutions are used in many facets of meat and poultry processing, including worker hand, foot, shoe and boot sanitizing, equipment cleaning, sanitizing and whitening, and meat and poultry disinfection. Birds in poultry slaughtering facilities are cooled in chillers to which a chemical disinfectant, usually chlorine, is added. Chlorine in the chiller water reduces microbial content of the poultry and prevents cross-contamination. Beef carcasses, on the other hand, are washed with plain tap water as the organic material associated with beef quickly deactivates chlorine (Brashears, 2000)

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Dairy Industry



The dairy industry was the first of the food industries to exploit the germicidal and deodorant properties of chlorine. Cheese plants are the largest users of chlorine in the dairy industry (Vavak, 2000). The Grade "A" Pasteurized Milk Ordinance (US FDA, 1995), issued by the US Department of Health and Human Services, specifies the officially approved methods of sanitation for dairy plants. Chlorine compounds used for dairy sanitation include calcium and sodium hypochlorite and certain organic chlorine compounds.

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Egg Industry



Chlorine, combined with anionic detergents, effectively removes protein residues, and to a lesser extent, carbohydrate residues from egg shell surfaces. The chemical also reduces bacteria levels on egg shells. Due to the high pH and organic load of egg wash water, chlorine serves more as a cleaning compound than a sanitizer in these solutions (McKee, 2000).

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Fish and Seafood Industry



Chlorine, in the form of sodium and calcium hypochlorite, is used in seafood processing sanitation applications. Scientists have found that the human pathogen *Aeromonas hydrophila*, commonly isolated from seafoods, forms biofilms on stainless steel within a three-minute contact time (Bal'a et al., 1999). Furthermore, they found the complexity of biofilms to increase with time at room temperature. Chlorine applied to infected stainless steel inactivates the biofilms. The effectiveness of chlorine on such biofilms is greatest when it is applied soon after infection.

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Fresh Produce Industry



Chlorine is used extensively as a disinfectant in wash, spray and flume waters in the raw fruit and vegetable

industry (WHO, 1998) The three forms of agricultural chlorine commonly used for fresh fruits and vegetables are chlorine gas, calcium hypochlorite and sodium hypochlorite

Chlorine gas is generally restricted to use in very large operations and requires automated controlled injections systems with in-line pH monitoring It is highly effective in situations in which soil, plant debris and decaying fruit or vegetables may enter early stages of washing and grading Calcium hypochlorite, available as a granulated powder or compressed tablet, is the most common source of chlorine used for disinfection of produce and produce process water Sodium hypochlorite, a water-based formulation, is the chlorine source frequently used in small-scale operations (Suslow, 2000)

An increasingly popular broad-spectrum antimicrobial agent used on foods, especially fresh produce, is chlorine dioxide Chlorine dioxide is efficacious against bacteria on a variety of vegetables and fruits including carrots, mushrooms, asparagus, tomatoes, lettuce, cabbage, cherries, strawberries and apples Reducing bacterial concentrations on produce increases the shelf lives of these foods Chlorine dioxide also controls the fungal disease known as late blight and other secondary infections such as soft rot on stored potatoes (Khanna, 2002)

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Chlorine in Food Transportation

As foods are transported ever greater distances for processing and distribution, the potential for food contamination rises Chlorine is used to lower the risk of food contamination during transport

Chlorine sanitization of storage containers prevents food contamination during transport To optimize chlorine use efficiency, field bins, food totes, cartons and pallets should be sanitized after pre-washing to remove soils and organic debris as these materials quickly deplete free available chlorine (Suslow, 2000) Beyond its disinfection benefits, calcium hypochlorite is reported to improve the shelf life and disease resistance of produce by adding calcium to the cell walls of fruits and vegetables (Suslow, 2000)



Unsanitary ice used to chill produce during transportation can transmit diseases to produce that may cause decay of the produce or illness to the consumer Ice made from potable, chlorinated water is an effective safeguard against external contamination during transport (Suslow, 2000)

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Chlorine in Food Preparation

Chlorine plays an essential role in the final destination of many fresh foods: restaurant and consumer kitchens Infectious germs can spread quickly when food is not prepared and stored safely, causing foodborne illness As consumers carry out the final stages of food preparation, dilute solutions of chlorine bleach (1-3 tablespoons household chlorine bleach in one gallon of water) are recommended for use in sanitizing cutting boards, countertops and cooking surfaces (Separate cutting boards are recommended for meat and produce) Cloths and sponges, which contact raw foods, should be soaked frequently in a stronger disinfecting solution of 3/4 cup bleach in one gallon of water Washing raw foods with chlorine solutions is not generally advised 2



In a comparison study of commercial and homemade disinfectants, scientists found that commercial products, such as chlorine-based household sanitizers, kill more than 99.9% of bacteria, including E. coli and Salmonella, while natural products such as vinegar and baking soda were not nearly as effective (Rutala et al., 2000). In addition, as opposed to antibacterial sanitizing products that attack only bacteria, chlorine products kill both bacteria and viruses, both of which can sicken people

Experts estimate that washing hands often and thoroughly could eliminate nearly half the cases of foodborne illness Furthermore, hot foods should be kept hot (at temperatures greater than 140°F) and cold foods cold (at temperatures less than 40°F) Microorganisms thrive in the range 40- 140°F, and toxins produced in that range may not be destroyed by reheating foods. Foods should be thawed in the refrigerator or microwave oven, or in a sealed package in cold water that is changed every

half hour. Only pasteurized eggs should be used in recipes requiring uncooked eggs (Brody, 2001). Food should be stored in clean, covered containers. Consumers who heed food safety advice significantly increase their defenses against foodborne diseases.

Restaurant kitchens typically use sodium hypochlorite solutions to disinfect kitchen work surfaces and equipment. The Chlorine Chemistry Division of the American Chemistry Council, in concert with the Water Quality and Health Council and the National Restaurant Association, distributes food safety posters listing detailed directions for sanitizing porous and nonporous food contact surfaces. The posters are available in English, Spanish, Cantonese and Mandarin (see below).

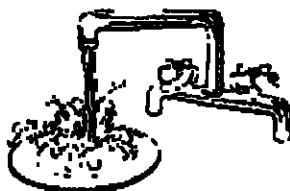
1. WASH

WASH dishes, utensils, cookware, cutting boards, appliances and cooking surfaces with HOT, SOAPY WATER to remove visible soil.



2. RINSE

Thoroughly RINSE OFF soap and film.



3. SANITIZE

REGULAR CHLORINE BLEACH* diluted in water is an easy-to-use germ killer. Here are two effective bleach and water cleaning solutions:

1 Tablespoon

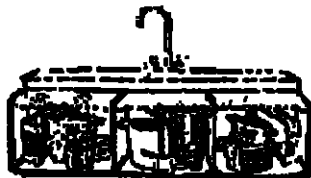


FOR SURFACES THAT COME IN CONTACT WITH FOOD

- **Nonporous Surfaces** — Tile, Metal and Hard Plastics
Use 1 tablespoon liquid bleach per gallon of water (200 ppm[†]). Leave wet for 2 minutes. Air dry.
- **Porous Surfaces** — Wood, Rubber or Soft Plastics
Use 3 tablespoons liquid bleach per gallon of water (600 ppm[†]). Leave wet for 2 minutes. Rinse and air dry.

3 Tablespoons





WASH, RINSE and SANITIZE pots, pans, glasses, dishes and utensils



WASH, RINSE and SANITIZE other food contact surfaces

Recommendations are for regular chlorine bleach (5.25% sodium hypochlorite), do not use scented or color safe bleaches
*parts per million

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Foodborne Disease Surveillance

Globalization of the food supply and changing life styles have complicated greatly the work of government public health officials in tracking the sources of foodborne disease outbreaks. In the past when food distribution networks were small and easily mapped, outbreaks could be relatively easily traced. Food distribution in the US today is much more complex. The classic case of a congregation's food poisoning from undercooked meat at a church supper would entail considerably less investigation than would infections of numerous widely dispersed individuals who may have consumed the same source of tainted food over a variable period of time. For example, a tainted airline meal could be served to some of the passengers on each of several different flights over a period of 24 hours. The consumers of the tainted meal become widely dispersed due to the fact the meal was served on several flights. Because of meal selection, not all those who ate in-flight meals become sick.



According to the CDC (2001a), since many sick people do not seek medical attention, and since many who do are not tested, numerous cases of foodborne illness go undiagnosed. The CDC estimates that 38 cases of salmonellosis occur for every case that is diagnosed and reported to public health authorities. The CDC uses a DNA "fingerprinting" technology to more easily detect foodborne disease outbreaks across the United States. Using the new molecular subtyping network, PulseNet (<http://www.cdc.gov/ncidod/dbmd/pulsenet/pulsenet.htm>), state laboratories and the CDC can compare strains of E. coli O157 H7 and an increasing number of other pathogens to detect widespread outbreaks.



The changing face of the enemy complicates the battle against foodborne illness. New foodborne pathogens will continue to be identified and rare but known pathogens may reemerge as public health threats. Improved surveillance allows a better understanding of the impact of these infections and how to prevent them. The CDC has enhanced foodborne disease outbreak investigation by applying sophisticated epidemiologic and microbiologic techniques to field investigations. Collaborative active surveillance systems include the CDC's electronic transmission system, the Public Health Laboratory Information System in state health departments and automated reporting and outbreak detection analysis (Satcher, 1996). Nevertheless, public health officials should continue to improve food safety

surveillance and coordination among various levels of government. In response to recent concerns about potential terrorist threats, US officials are calling for a stronger public health infrastructure to respond effectively to public health emergencies of all types, including those related to contamination of the food supply. This effort may provide better links among local, state, regional and national public health offices, and improve notification and response regarding foodborne disease outbreaks. The United Nations Food and Agriculture Organization of the WHO recently called upon countries to upgrade their domestic food safety systems. The organization noted that developing countries, with no food safety systems in place, have an opportunity to "leap-forward," and capitalize on the experiences of industrialized countries, adopting modern food safety systems that work well (United Nations Food and Agriculture Organization, 2001).

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Conclusions

Chlorine is a highly effective, inexpensive chemical disinfectant that is used to help maintain the safety of the nation's food supply. Chlorine has extensive critical uses all along the path from the farm to the fork. Tried and trusted methods of chlorine disinfection are well documented in numerous aspects of the food production industry. Untold



numbers of cases of foodborne disease are prevented by chlorine disinfection of foods and food-contact surfaces. From the farm, to food handling, processing and transportation facilities, to restaurant and consumer kitchens, chlorine successfully inactivates a wide variety of disease-causing microorganisms associated with foods.



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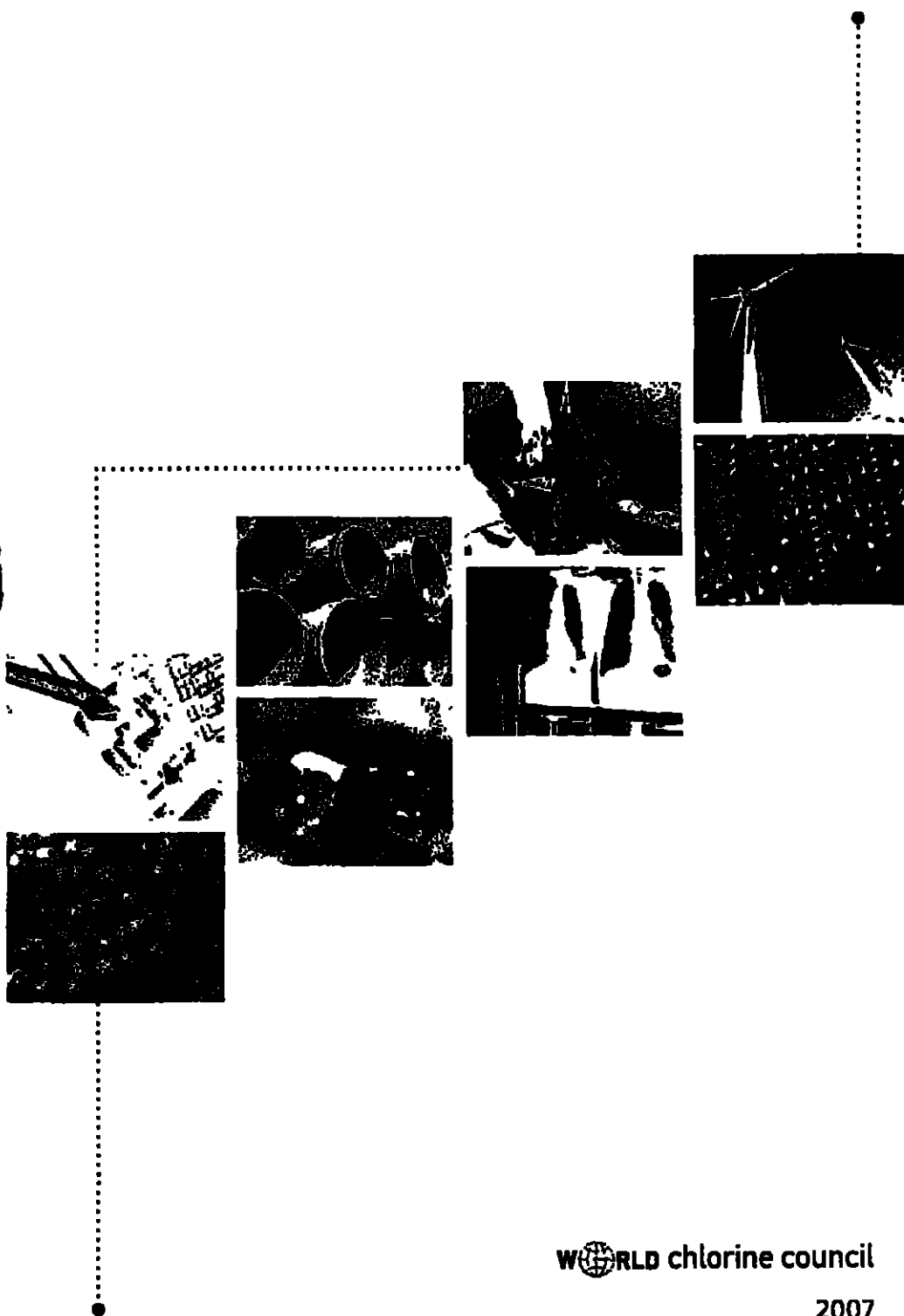
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Introduction to the World Chlorine Council

The World Chlorine Council (WCC)—created in 1993—is a global network of national and regional chlorine-related trade associations and their member companies. WCC has participation from chlor-alkali producers in 27 countries and is striving to include all producers worldwide. WCC primarily aims to improve the performance and sustainability of the industry by promoting responsible stewardship practices and addressing safety, health, environmental and public policy issues. It is accredited as a non-governmental organization by the United Nations General Assembly, and recognized as a major stakeholder that can provide input into the U.N. system on priority international issues.

WCC perspective on sustainability

Chlorine chemistry is essential to solving many of society's greatest challenges—such as the need for *clean water, affordable and durable housing, plentiful food and effective medicines*—and is a central force in economies around the world. In addition to making useful products, the chlor-alkali industry is dedicated to continuous social, economic and environmental improvement, also known as the "triple bottom line" of sustainability.

To be sustainable, the chlorine industry must act from local, regional and global perspectives. We must maintain open and timely dialogue with regulators, elected officials, scientists, the media, investors, employees and other stakeholders. And we must share best practices for optimizing safety and minimizing emissions no matter where we are located. Our long-term vision is to achieve zero accidental releases, transportation and customer safety incidents. In the shorter term, we will strive to make significant improvements in these indicators, using new process and engineering solutions as they are developed.

WCC views sustainability as a journey, underway but not complete. Challenges remain, particularly in further reducing environmental emissions, increasing energy efficiency, improving safety, and implementing best practices globally. Addressing these challenges is not just driven by moral considerations. It also makes good business sense. The ability to fully integrate the principles of Sustainable Development might very well become a determining factor in the long-term survival of companies.

Mario Cifento
Chairman
WCC Governing Council
Executive Vice-President, Carbocloro

Michael R. Gambrell
Immediate Past Chairman
WCC Governing Council
Executive Vice President, Dow Chemical

Executive Summary

In the journey toward sustainability—and in support of the U.N. Millennium Development Goals—WCC and its members focus their energies on a range of activities. This report examines progress since publication of our first sustainability report and commitments for action in 2002.

Providing essential products (Chapter 1) Some 500 companies at 650 sites around the world have the capacity to produce over 58 million metric tonnes of chlorine and 62 million metric tonnes of its co-product, caustic soda (sodium hydroxide) per year. These are used in more than half of all commercial chemistry applications to develop plastics, pharmaceuticals and vast numbers of other products. Key end uses with potential to help achieve the Millennium Development Goals include products for safe drinking water, healthcare, nutrition, public safety, improved quality of life and environmental protection.

Developing scientific understanding (Chapter 2) WCC works to improve scientific knowledge and address public health and environmental challenges. One major effort is the International Council of Chemical Associations' (ICCA) High Production Volume initiative to learn more about products used in large quantities. National and regional initiatives are also underway.

Promoting sound management of chemicals (Chapter 3) WCC strongly supports the objectives for chemical management articulated at the 2002 World Summit on Sustainable Development, including the use of "transparent, science-based risk assessment procedures and science-based risk management procedures to achieve minimization of significant adverse effects on health and the environment by 2020." WCC and ICCA contributed to the development of the Strategic Approach to International Chemicals Management (SAICM), an international policy framework, and have launched voluntary initiatives to support its implementation.

Promoting resource conservation (Chapter 4) Resource conservation is an important—and challenging—element of sustainability for industry. WCC's commitment to sustainable development includes the goals of energy and water conservation, these are being addressed both by individual companies and through regional and national programs.

Improving chlorine safety performance (Chapter 5) While chlorine-based products provide great benefit to society, the industry acknowledges the safety hazards of some aspects of its chemistry. Through the WCC safety program, the industry works to achieve continuous improvements in global safety performance at facilities and during transportation and use. WCC identifies new technologies and successful safety programs and broadly shares this information with facilities around the world.

Implementing *Responsible Care*® (Chapter 6) Commitment to and faithful implementation of *Responsible Care*—a global industry performance initiative to help safeguard employees, the environment and neighboring communities—is a condition of WCC membership. *Responsible Care* has been adopted in countries representing 76% of chlorine production, efforts continue to extend it to all producers, which is a challenge for the future. WCC views *Responsible Care* as the foundation on which all of its sustainability efforts are built.



1. A vital industry providing essential products

Chlorine may be best known for its use as a drinking water disinfectant. Less well known is chlorine chemistry's role in producing thousands of other beneficial products. As a vital component of materials used in automobiles, construction, crop protection, electronics, aerospace, pharmaceuticals and manufacturing, chlorine chemistry helps to improve health and safety, and enhance quality of life.

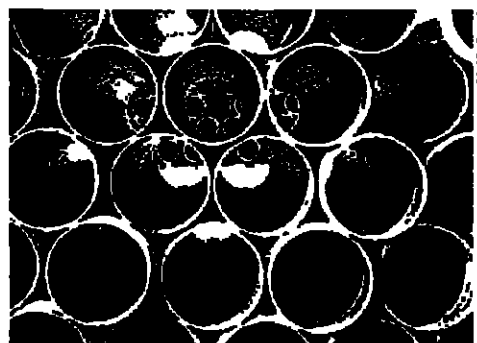
This section provides an introduction to the chlor-alkali industry, and examines chlorine chemistry's contributions to the three pillars of sustainability—society, economy and the environment.

Underpinning global economies

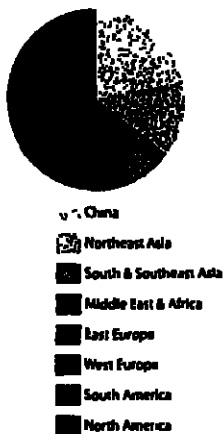
There are more than 500 chlor-alkali producers and over 650 sites around the world, with a total production capacity of 58 million metric tonnes of chlorine and 62 million metric tonnes of its co-product, caustic soda (sodium hydroxide) per year. The industry directly employs an estimated 136,000 people worldwide and creates many more jobs in downstream and closely related industries. In the U.S. alone, the total economic contribution of the industry is estimated to be over \$2 billion.

Chlorine and sodium hydroxide are used in more than half of all commercial chemistry applications to create hundreds of secondary compounds that in turn contribute to plastics, pharmaceuticals and thousands of other products. The largest use of chlorine is in the production of polyvinyl chloride (PVC or vinyl), a versatile plastic used in construction materials, automobile components, medical devices and many other applications. Other chlorine derivatives include isocyanates and oxygenates (used for upholstery and insulation), chloromethanes (silicon rubber), epichlorohydrin (printed circuits), solvents (adhesives), and other organics (detergents).

Chlor-alkali consumption is expected to grow at an annual rate of 3.4% through 2010, with much of this growth concentrated in China, India and other developing economies.

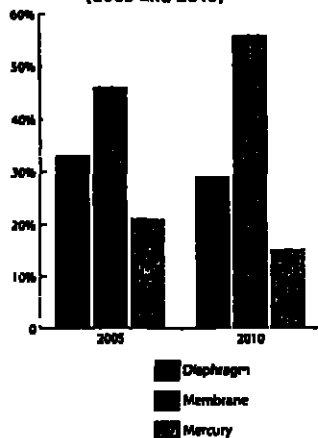


Chlorine Production Capacity by Region (2007)



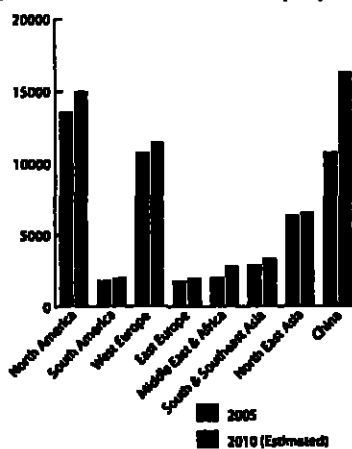
Source: Tecnon Orbichem (2006)

Chlorine Production by Process Type (2005 and 2010)



Source: Tecnon Orbichem (2006)

Chlorine Consumption by Region (1000s metric tonnes of chlorine per year)



Source: Tecnon Orbichem (2006)

Production technologies

The basic raw materials for chlorine chemistry are salt (sodium chloride), water and energy. Nearly all chlorine and sodium hydroxide production is based on the chlor-alkali process, which involves applying a direct electric current to a brine (water and sodium chloride) solution to produce chlorine, sodium hydroxide and hydrogen. The first commercial production of chlorine using electrolysis was in 1888. There are three main electrolytic production technologies used in the chlor-alkali industry – the diaphragm, mercury and membrane cell processes. Each technology uses a different method of keeping the chlorine separated from the hydrogen and sodium hydroxide. Adoption of these production processes varies significantly from region to region.

Essential products

The industry makes a significant social contribution—and offers products and technology to improve lives and help to achieve the Millennium Development Goals.

Healthcare Chlorine-based products play a key role in medical devices and pharmaceuticals. More than 90% of pharmaceuticals contain or are manufactured using chlorine, including products to treat HIV/AIDS, allergies, arthritis, cancer, depression, diabetes, heart disease, hypertension, infections, pneumonia and ulcers.

Through its use in PVC, chlorine also contributes to safety in tamper-resistant pharmaceutical packaging and in “blister” packs, which help extend shelf-life and make it easier for patients to take the correct dose. One-quarter of medical devices contain chlorine. Chlorine-based plastics are used to make intravenous drips and blood bags, sterile tubing and packaging, prosthetics and heart catheters. Chlorine is also used to make semiconductors for diagnostic instruments.

In hospitals, chlorine compounds help protect patients from infections through their use in cleaning and disinfection, and as antiseptics.

Nutrition: Chlorine is used in the manufacture of 86% of crop protection chemicals, which help to boost crop yields and quality. In commercial food preparation, chlorine-based products are used for:

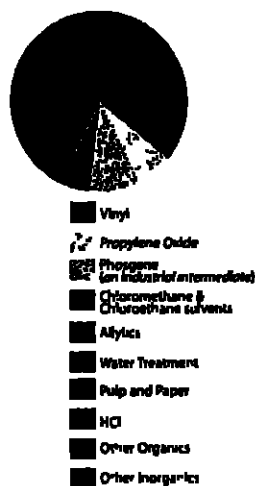
- Disinfection of equipment and food contact surfaces (killing food-borne bacteria such as *Salmonella*, *Escherichia coli* and *Campylobacter*)

- Making packaging to keep food fresh and prevent contamination

Public safety Chlorine's role in public safety includes the following:

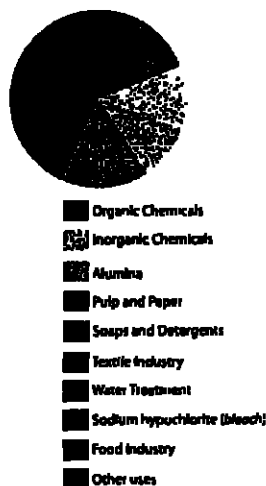
- Decontaminating public water supplies damaged by natural disasters, such as hurricanes, floods, tornadoes and earthquakes, and preventing mold growth, particularly as flood waters recede
- Materials used in protective equipment for police, fire and ambulance services, such as bullet-resistant vests, face shields and helmets, and fire-resistant clothing
- Communications equipment and components for emergency services, such as radios, mobile telephones and microprocessors

World Chlorine Consumption by End Use (2005)



Source: Techno OrbChem (2006)

World Sodium Hydroxide Consumption by Sector (2005)



Source: Techno OrbChem (2006)

Quality of life Chlorine chemistry's role in improving quality of life includes

- ▶ Providing long-lasting, energy-efficient materials for home construction, such as PVC window frames, siding and pipes, insulation, adhesives, paints and carpets
- ▶ Use in toiletries and cosmetics, contact lenses, computers, televisions and compact discs
- ▶ Use in equipment for many leisure activities, such as soccer balls, tents, waterproof clothing, skateboards, tennis rackets and skis
- ▶ Providing durable materials for automotive components such as upholstery, bumpers and mats, dashboards, fan and alternator belts, hoses, gaskets and seals

Environmental protection Chlorine, sodium hydroxide and downstream products provide a range of environmental benefits, including

- ▶ PVC is one of the most resource efficient materials for many applications. Many PVC products have a long life, ensuring maximum use is made of natural resources used in their manufacture. In over 50% of PVC applications, the products last over 35 years.
- ▶ PVC requires less oil for production and emits about 50% less carbon dioxide than some other polymers if incinerated at the end of its useful life. It can be recycled on an industrial scale for most applications.
- ▶ Clean solar energy reduces society's dependence on fossil fuels. It is harnessed by solar panels constructed of thousands of wafers of silicon, purified using chlorine chemistry.
- ▶ Sodium hydroxide neutralizes acidic environmental pollution. It is used to control and remediate acid mine drainage, pollution that can severely degrade the habitat and water quality of receiving streams.
- ▶ Used aluminum beverage cans and packaging containers represent a large source of aluminum in the municipal solid waste stream. Chlorine gas is bubbled through molten aluminum scrap during the recycling process to reduce magnesium and other impurities in the aluminum melt.
- ▶ Hydrochloric acid is used to remediate soils polluted by mining and metallurgical activities.
- ▶ PVC pipes are strong, durable and immune to corrosion, helping to minimize water loss in municipal water systems.
- ▶ Many energy efficient building products, such as foam insulation and PVC windows, are based on chlorine chemistry.



"The filtration of drinking water plus the use of chlorine is probably the most significant public health advance of the millennium "
LIFE Magazine (1997)

Safe drinking water: Today, 11 billion people do not have access to safe water sources, and 17 million deaths per year are caused by diarrheal diseases—the vast majority among children under five—according to the World Health Organization (WHO). Some 94% of the burden of diarrheal disease is attributable to environmental and associated risk factors such as unsafe drinking water and poor sanitation and hygiene. At the 2002 World Summit on Sustainable Development, the global community committed to halve by 2015 the proportion of people without access to safe drinking water and basic sanitation.

The World Health Organization notes that "reducing the disease burden of environmental risk factors will contribute significantly to the Millennium Development Goals (MDGs)." Improving global access to safe water and sanitation plays a key role in many MDG targets, including eradicating extreme poverty and hunger (by helping avoid water-related illness and lost earnings), achieving universal primary education (safe water and good latrines encourage school attendance), promoting gender equality and empowering women (by saving the time needed to collect water and care for sick children), reducing child mortality (by reducing water-borne illness), improving maternal health (by reducing contamination in the home and helping reduce infection risks around childbirth), and ensuring environmental sustainability (by reducing pressures on ecosystems from water- and air-borne contamination).

Chlorine-based products, such as disinfectants and PVC pipes, are essential to help meet this global challenge. For more than 100 years, chlorine has been added to drinking water to kill microorganisms and prevent diseases such as cholera and typhoid fever. Chlorine has the major advantage of providing a "residual" level of disinfectant that remains to help protect treated water all the way to the tap. In addition to purifying water, chlorine helps remove tastes and odors, controls the growth of slime and algae in pipes and storage tanks, and helps to remove unwanted nitrogen compounds from water.



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"Where Engineers Without Borders does water management projects, PVC is the obvious choice. Products and materials for these projects should be low tech but still meet the needs of the community and be sustained by the local people. Also, PVC operates for a long time."

Mel Torre
American Society of Mechanical Engineers



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"Household approaches, including treatment with chlorine-based disinfectants, have been shown to be extremely cost effective, rapidly deployable, and can lead to significant health gains. We encourage the World Chlorine Council to remain active and contributing to this important area."

– World Health Organization

"The World Chlorine Council's generous contribution to World Vision has made it possible for 200 WAWI wells in Mali to be equipped with high-grade PVC piping to provide clean water for 60,000 people in 150 Malian villages over the next 20 years."

– Richard Stearns, President World Vision

"Safe Water Delivered Safely"

Under the banner of "Safe water delivered safely," WCC supports a range of humanitarian partnerships and international relief efforts to improve access to safe drinking water, a key building block of sustainable development

- **Household water treatment:** WCC is a partner of the World Health Organization's Household Water Treatment Network. Through this network, WCC supports the widespread adoption of simple, low-cost technologies to disinfect and safely store water for household use. In communities where safe water supplies are not available, use of specially packaged chlorine disinfectants in individual households has been shown to reduce the incidence of diarrhea by 25-50%.
- **West Africa Water Initiative:** WCC actively supports the West Africa Water Initiative (WAWI), a multi-partner alliance working in some of the most arid regions of western Africa. WAWI projects are focused on providing sustainable water supplies, reducing disease and improving water management in Ghana, Mali and Niger. Unveiled at the 2002 World Summit on Sustainable Development, WAWI is a leading example of the "partnership" model for achieving the United Nations' Millennium Development Goals. WCC is providing PVC pipe and other materials for use by World Vision, UNICEF and other WAWI partners to construct bore wells and sanitary latrines. WAWI projects are expected to improve the lives of more than 500,000 people by 2010.
- **Disaster relief:** WCC and its members have a long-standing commitment to supporting water and sanitation efforts in international disaster relief efforts. In the wake of the tsunami that hit South Asia in December 2004, WHO advised that ensuring access to safe water was critical to preventing outbreaks of waterborne diseases such as cholera and typhoid. Within days, WCC member associations in the U.S. and Europe coordinated an industry response, raising over \$150,000 to aid Red Cross water and sanitation efforts. This is in addition to substantial efforts by individual member companies.

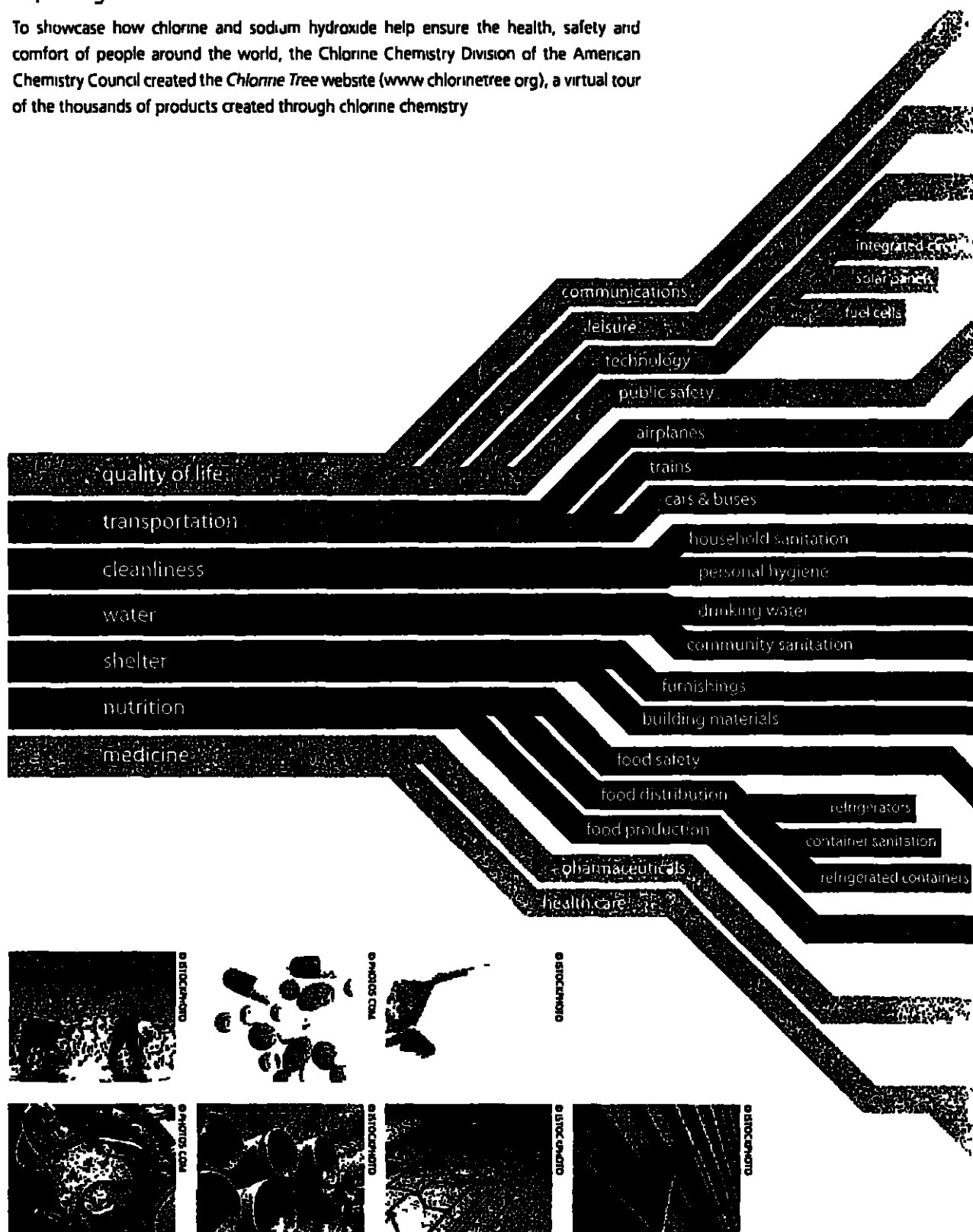


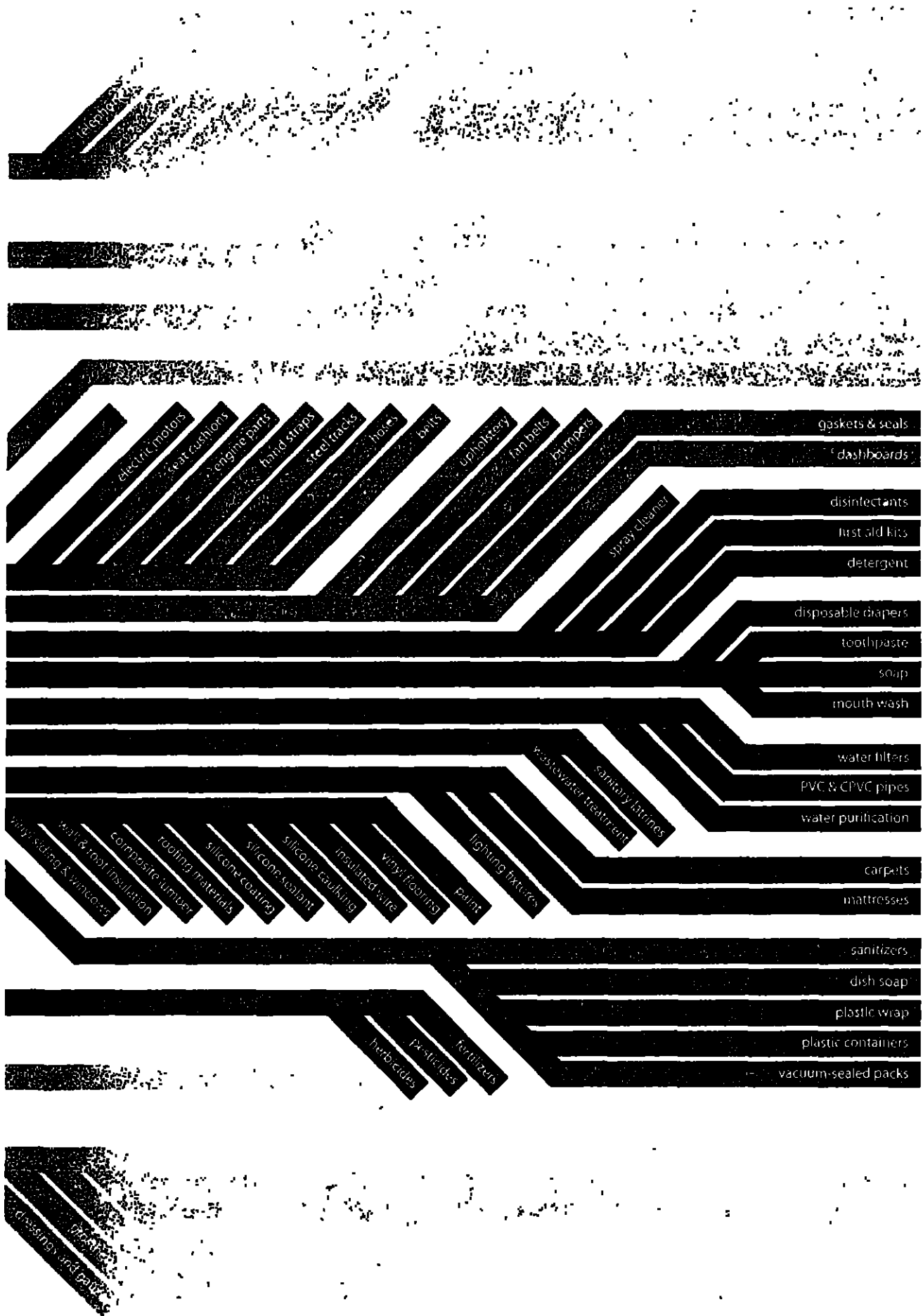
© AMERICAN CHLORINE COUNCIL



Exploring the branches of the Chlorine Tree

To showcase how chlorine and sodium hydroxide help ensure the health, safety and comfort of people around the world, the Chlorine Chemistry Division of the American Chemistry Council created the *Chlorine Tree* website (www.chlorinetree.org), a virtual tour of the thousands of products created through chlorine chemistry





2. Science: the key to sound public policy decision-making

WCC is strongly committed to addressing public health and environmental challenges related to chlorine-containing compounds. Science plays an important role in the industry's efforts to respond to society's and regulators' concerns.

The main goal of WCC's science program is to promote science-based decision-making. WCC collaborates closely with both industry experts and independent researchers to provide scientific information on chlorine-related health and environmental issues. WCC regional organizations also sponsor a wide range of scientific studies to inform decision makers about the properties of key chlorinated compounds.

Information for policy makers and the scientific community

High Production Volume (HPV) chemicals

The global chemical industry made public commitments to voluntarily compile and report basic screening information for high production volume (HPV) chemicals. As part of this commitment, WCC agreed to coordinate efforts to address 46 chlorinated chemicals, and identified company and/or consortia sponsors to conduct the screening tests. WCC has completed work on 87% of these chemicals. For the remaining chemicals, sponsors continue to work with lead countries to develop the required data packages and make this information publicly available. WCC will continue to coordinate closely with ICCA on any follow-up HPV activities.

A database on the WCC web site tracks the status of all 126 chemicals and provides links to the data packages generated under the HPV initiative. www.worldchlorine.org/wcchpv/cms/display_table.php3



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The HPV Initiative

- ▶ Provides globally harmonized, internationally-agreed data sets and initial hazard assessments under the refocused HPV Chemicals Programme of the Organisation for Economic Co-operation and Development (OECD)
- ▶ Eliminates duplication of efforts
- ▶ Offers a sound scientific basis for any global, regional and/or national risk assessment, subsequent voluntary industry action or regulation
- ▶ Reduces the number of animals used for testing

Providing data to support chemical management programs

WCC continues to actively provide input to support implementation of international chemical management programs. For example, WCC participates in assessing of whether certain chlorinated compounds are likely to travel long distances in the environment and cause adverse effects. This information provides the scientific basis for regulatory authorities to determine if these substances should be banned or restricted under the United Nations Economic Commission for Europe (UNECE) Persistent Organic Pollutants (POPs) protocol and the Stockholm POPs Convention.

Assessing impacts of drinking water chlorination

Broadly acknowledged as one of the great public health advances in history, drinking water chlorination nonetheless raises some concerns related to disinfection by-products (DBPs), chemical compounds formed unintentionally when chlorine and other disinfectants react with natural organic matter in water. The chlorine industry has contributed to the wealth of scientific knowledge about chlorinated DBPs. For example, the Chlorine Chemistry Division of the American Chemistry Council sponsored a series of reproductive and developmental toxicology studies that were used by the U.S. Environmental Protection Agency to help set health protective standards for DBP levels in drinking water. Euro Chlor also performed an extensive environmental risk assessment on DBPs, which concluded that DBPs arising from use of active chlorine for microbial control and cleaning are not likely to produce adverse environmental effects.

The industry's work provides further support for the WHO conclusion that, *"the health risks from these byproducts at the levels at which they occur in drinking water are extremely small in comparison with the risks associated with inadequate disinfection. Thus, it is important that disinfection not be compromised in attempting to control such byproducts"* [WHO 2000, *Environmental Health Criteria 216, Disinfectants and Disinfection Byproducts*].

Understanding natural organochlorines

More than 2,400 organochlorines are produced by living organisms (for example, termites may account for 15% of global chloroform emissions) or made during natural processes such as volcanoes, forest fires, and geothermal processes (volcanoes emit three million metric tonnes of hydrogen chloride per year). The industry has sponsored significant research on the challenges of risk assessments for man-made and naturally occurring organic substances—particularly where these occur side-by-side in the environment.



Science Ambassadors

WCC's Science Ambassador Program promotes science-based assessment of human health and environmental risks in regions outside the E U , U S and Japan. WCC has held two Congresses on Science, in Sao Paulo, Brazil (2003) and Buenos Aires, Argentina (2004)

National and regional initiatives

Chemical Reviews

The Canadian Chlorine Chemistry Council (C4) has been actively engaged in Canada's Existing Substances Review process, a pioneering national initiative to improve knowledge about chemicals, including chlorinated products. Mandated by the Canadian Environmental Protection Act, this involves categorization and screening of some 23,000 chemical compounds on the national inventory or Domestic Substances List. Dialogue between industry and government departments has been strong and constructive, with C4 providing valued input to Environment Canada. All chlorinated substances of interest to C4's members that have been identified for further risk assessment (screening) are part of current regulatory management programs or voluntary data development initiatives such as the HPV program; information from these initiatives will be used in their assessment in Canada.

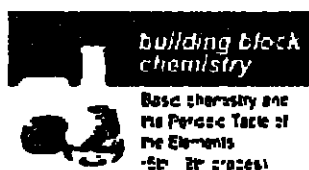
In late 2006 the European Union adopted a new, comprehensive chemicals policy known as REACH or the Registration, Evaluation and Authorisation of Chemicals. As part of industry's contribution to the implementation of this new chemicals policy, Euro Chlor is managing consortia for 10 chemicals. The consortia will develop scientific data needed to complete the REACH process.

Euro Chlor also has an active program aimed at providing accurate information on science issues. Euro Chlor publications are listed in the science section of *Chlorine Online* at www.eurochlor.org/science. Publications include:

- ▶ Science Dossiers on biodegradability of chlorinated solvents, chloroform in the environment, dioxins and furans in the environment, the proceedings of a Euro Chlor workshop on soil chlorine chemistry, hexachlorobenzene—sources, environmental fate and risk characterization, hexachlorobutadiene, how chlorine in molecules affects biological activity, natural organohalogenes, and trichloroacetic acid in the environment
- ▶ Key Science Information Sheets on bioaccumulation, children's exposure issues, dioxins, marine risk assessments, naturally-occurring organochlorines, water chlorination, and abbreviations used in ecotoxicology

Chlorine science for educators

The Chlorine Chemistry Division of ACC helps bring objective and balanced discussion of environmental and scientific issues related to chlorine chemistry to classrooms through its web site, *The Science Center* (www.science-education.org/). This site features lesson plans and classroom activities, provides educators with a forum where they can share information and discuss the latest issues, and provides users with a gateway to other educational resources on the internet.



3. Promoting sound management of chemicals ●

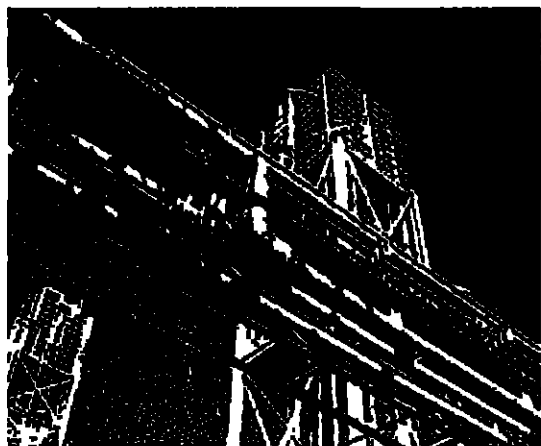
The sound management of chemicals on a global basis is an essential component of the industry's sustainability strategy. The International Council of Chemical Associations (ICCA) and WCC strongly support the objectives articulated at the 2002 World Summit on Sustainable Development, that the sound management of chemicals requires the use of "transparent, science-based risk assessment procedures and science-based risk management procedures" to achieve minimization of significant adverse effects on health and the environment by 2020."

SAICM: a framework for international action

To achieve these objectives, WCC and ICCA contributed actively to the development of the Strategic Approach to International Chemicals Management (SAICM), a policy framework for international action on chemicals. Adopted by the International Conference on Chemicals Management in February 2006, SAICM was developed through a multi-stakeholder and multi-sectoral approach.

The ICCA has launched two new voluntary initiatives: the *Responsible Care®* Global Charter and the Global Product Strategy to support the overall SAICM objectives. The *Responsible Care* Global Charter creates a long-term direction for the international chemical industry. It focuses on challenges such as sustainable development, effective management of chemicals along the value chain, greater industry transparency and increased global harmonization and consistency among *Responsible Care* programs around the world.

The Global Product Strategy—developed to expand industry's commitment to product stewardship—includes plans for product administration, a tiered process for risk assessment and management, as well as product performance focusing on working with customers. It also provides potential opportunities for industry partnerships with intergovernmental organizations, and for best practice sharing among countries.



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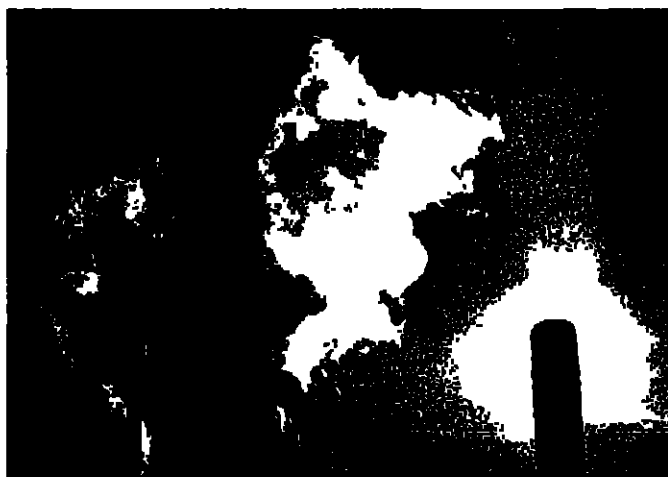
Capacity building for environmental protection

Under the SAICM framework, WCC and its member companies are committed to further reducing potential risks associated with exposure to chlorinated chemicals in products, by-products and wastes. In particular, WCC has a range of initiatives to help developing countries implement the Stockholm Convention on POPs.

- ▶ **National Implementation Plans** WCC is providing financial and technical support for the UN Environment Program/Global Environment Facility (UNEP/GEF) 12 country pilot project. The project will help participating countries (Barbados, Bulgaria, Chile, Ecuador, Guinea, Lebanon, Malaysia, Mali, Micronesia, Papua New Guinea, Slovenia and Zambia) develop national implementation plans for the POPs convention, including national source inventories for the 12 identified POPs and National Action Plans for managing pesticides and by-product POPs. The outcome of this project will guide further GEF and World Bank funding for implementing the POPs Convention.
- ▶ **Development of BAT/BEP Guidance** WCC is an active participant in the Expert Group that is developing guidance on best available techniques (BAT) and best environmental practices (BEP) to reduce the formation and release of unintentional POPs.
- ▶ **Additional POP** WCC is actively engaged in the processes for evaluating additional chemicals under the Stockholm Convention and the UNECE Convention on the Long Range Transport of Atmospheric Pollutants (LRTAP) to ensure that all available risk assessment data on chlorinated substances is provided.
- ▶ **Dioxin Toolkit** WCC has provided technical support for the development and update of the UNEP Dioxin Toolkit. Currently in its second edition (2005), the toolkit lists many sources of dioxins and provides emission factors (emissions per unit of activity), with a particular focus on industrial processes. It is designed to help countries prepare scientifically robust inventories of dioxin sources and prioritize actions that will reduce emissions from the largest sources.

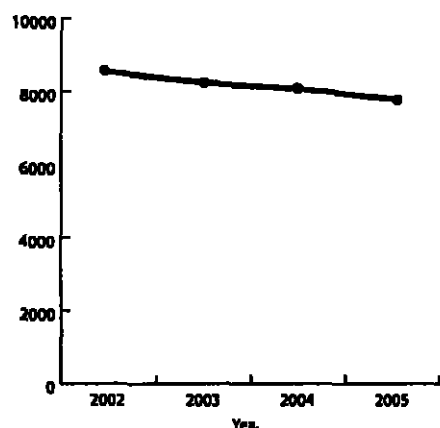
"I would like to acknowledge with gratitude the World Chlorine Council's support and contribution for implementation of the Stockholm POPs Convention 12 Country Pilot Project. The WCC's support and expertise represents an important contribution to this project."

– Director, UNEP Chemicals

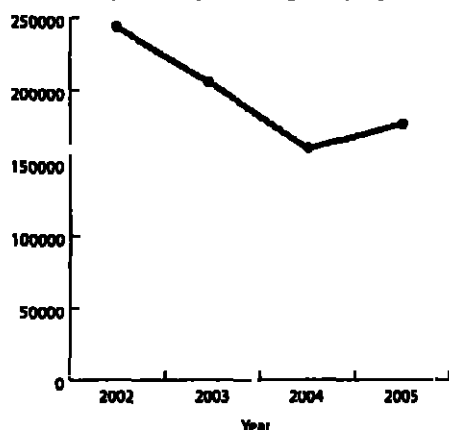


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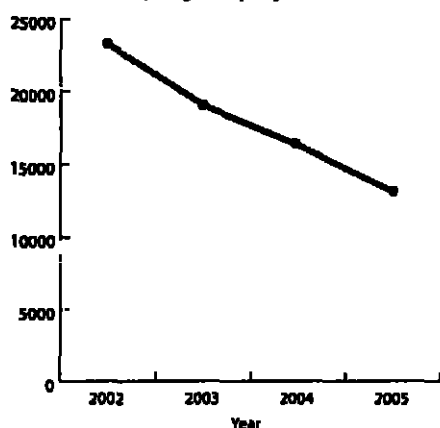
Chlorine Production Capacity—Mercury Cell Technology (1000s tonnes of chlorine per year)



Mercury Consumption (kilograms per year)



Mercury Emissions to Air and Water (kilograms per year)



UNEP global mercury chlor-alkali partnership

The mercury cell process is one of the three types of manufacturing processes utilized by the chlor-alkali sector for the production of chlorine and caustic soda. In response to safety and environmental concerns about the use of elemental mercury, the industry has been moving to mercury-free technologies as existing plants reach the end of their economic lives. The WCC estimates that there are 135 mercury-cell plants operating worldwide. In Japan, all mercury-based chlor-alkali production was phased out by 1987. In the U.S., there will only be six mercury plants remaining in operation by the end of 2007, accounting for about 9% of domestic production. In Europe, mercury cells accounted for 48% of European capacity in 2005 and Western European producers have committed to close or convert all mercury cell plants by 2020.

WCC has been an active supporter of the UNEP Global Mercury Programme and has made a sustained effort to help mercury-based chlorine producers around the world reduce mercury uses and emissions. WCC member associations and experts provided technical support for a Russian mercury workshop and coordinated tours of chlor-alkali facilities in Germany, Spain and Italy for representatives of the Russian chlor-alkali industry. As part of its information-sharing efforts, WCC has also held specialized workshops on mercury cell technology in Argentina, Brazil, and India.

WCC has adopted commitments for the responsible handling of equipment and mercury after a plant shuts down or converts to mercury free processes. Companies have agreed not to sell or transfer mercury cells to any third party for re-use, except to replace worse performing equipment and reduce mercury emissions. Companies have also committed to use good practices and techniques to appropriately handle the transport, storage and disposal of metallic mercury that arises after shut-down of the cells in order to minimize emissions and spillage into the environment. Recognising that there remain legitimate uses for mercury that provide value for society, WCC believes that preference should be given to programs which favor re-use of existing mercury over production of new virgin mercury.

Starting in 2006, WCC is submitting annual reports to UNEP summarizing regional mercury use, consumption, and emissions by mercury cell facilities. The charts to the left reflect data from the U.S., Europe, India, Brazil and Argentina (accounting for approximately 80% of global mercury cell capacity).



4. Promoting resource conservation

Resource conservation is an important—and challenging—element of sustainability for industry. WCC's commitment to sustainable development includes the goal of energy and water conservation. As with other chemical sectors, chlor-alkali production is highly energy intensive, with electricity being an essential component in the electrochemical reactions involved. The industry uses energy resources both for fuel in the manufacturing process and as a raw material for electrolysis. While using natural gas, natural gas liquids, oil and coal to power its plants and processes, it also draws upon those same resources as primary ingredients in products. Efficient energy use has been an economic imperative for decades, leading companies to develop technologies to capture by-product hydrogen as a fuel or raw material for other production units, and to adopt co-generation of electricity during production processes. Water quality and scarcity concerns are driving similar innovations to reduce water consumption.

Energy efficiency and greenhouse gas emissions

Through the American Chemistry Council's *Responsible Care*® initiative, U.S. chlorine producers aim to strengthen energy efficiency and environmental performance. ACC Member companies have pledged an 18% reduction in greenhouse gas intensity by 2012 (using 1990 as a baseline), which is an important first step in addressing greenhouse gas emissions from chlorine production.

As part of its sustainability program, Euro Chlor has set a goal of a 5% reduction in the industry's energy consumption by 2010, based on both electricity and steam. As of 2005, a 3.7% reduction had been achieved.



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Corporate initiatives

A number of projects are underway at WCC-affiliated companies with the aim of improving energy and water efficiency

Hydrogen projects

- ▶ Akzo Nobel Base Chemicals started up a Proton Exchange Membrane (PEM) fuel cell system at a chlorine electrolysis pilot plant in early 2007. The project is in partnership with a PEM-fuel cell stacks producer. This is the first step towards development of fuel cell power plant in the 50 MW range at the firm's Rotterdam site. PEM fuel cells, which convert hydrogen into electricity, have been installed with expected electrical efficiency of 50-55%
- ▶ In 2004, The Dow Chemical Company and General Motors Corporation officially opened a new alternative energy facility adjacent to Dow's Freeport, Texas chlorine plant. The joint venture uses hydrogen, created as a byproduct of chlorine manufacture, in fuel cells that provide energy back to the production facility. Eventually, the companies plan to install 400 fuel cells that will generate 35 megawatts of electricity

Energy from wastes:

- ▶ Since the mid-1990s, there have been high-performance incinerators at Solvay's sites making use of the energy content from most of the unwanted chlorinated and fluorinated organic by-products produced. Since the early 1990s, the proportion of hazardous waste given to subcontractors for disposal in landfill has more than halved to about one-quarter. Organic wastes with a high energy content are processed using increasingly sophisticated methods, with a growing part played by recycling and incineration to make use of the energy content

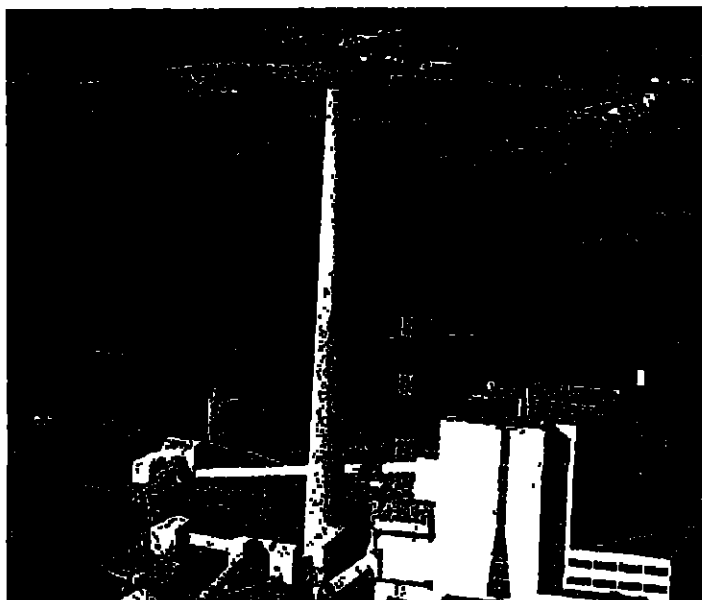
Innovative chlorine recycling

- ▶ In 2008, Bayer MaterialScience is due to complete construction of the world's largest hydrochloric acid recycling plant at its Shanghai facility, where the company plans to build world-scale isocyanate production plants. It will be the first time that the company uses the innovative oxygen depolarised cathode (ODC) technology to produce chlorine in a world-scale facility. Bayer's first ODC hydrochloric acid electrolysis unit, with much smaller capacity, started up in Brunsbüttel, Germany, in 2003. The experience gained there paved the way for the new plant in China. The key advantage of the ODC process, described as "a quantum leap in the manufacture of chlorine from hydrochloric acid," is that it saves energy, consuming about 30% less electricity than the diaphragm process used by Bayer for many years

Water conservation

- At its Stade complex in Germany, Dow produces chlorine for use in propylene oxide production and other processes. These processes use 30 million m³ of water taken from the Elbe and five million metric tonnes of salt per year. Through its *Responsible Care*® activities, Dow sought to conserve these resources, improve environmental performance and reduce operational costs. It has achieved a world first with development and implementation of a closed loop process for brine, chlorine and propylene oxide production. The project resulted in conservation of 7m m³/year of river water and 600,000 metric tonne/year of salt and a 23% reduction of annual salt discharge and of total organic carbon discharge to the river Elbe, with €500,000/year savings in waste water fees. Moreover, the €3.3m project costs were recovered by pay back of wastewater fees after approval by the authorities in early 2004.

Technological improvements and an industry-wide commitment to reuse waste streams are critical factors in the continuing effort toward sustainability. As for other activities, many of the initiatives to promote resource conservation take place at the regional level, where they can be tailored to fit local priorities. Examples are described in regional inserts that complement this report.

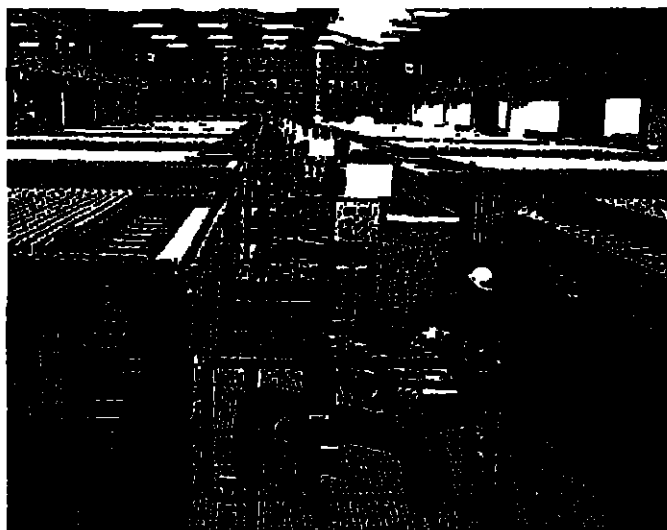


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5. Improving safety performance

While chlorine-based products provide great benefit to society, the industry acknowledges the safety hazards of some aspects of its chemistry. Elemental chlorine is a poisonous gas that can irritate the respiratory system, mucous membranes, eyes and skin. As a liquid, chlorine causes skin and eye burns on contact. Hydrochloric acid and hypochlorous acid, both corrosive and potentially dangerous if mishandled, can be formed when chlorine gas reacts with moisture. Through the WCC safety program, the industry works to achieve continuous improvements in global safety performance, both at facilities and during transportation. Key initiatives include:

- ▶ Incident Reporting Program, initiated by the WCC Global Safety Team in 2002, is intended to improve safety incident record-keeping globally. This program documents chlorine related-incidents (including accidental emissions and near misses) at both fixed facilities and in transportation. The information is compiled and reported to WCC members to provide lessons that may help prevent future incidents. Currently, most of the data reported is from Europe and North America. Human error and corrosion of equipment were the two most common factors reported in the database. A challenge for WCC is to improve reporting from other regions and make this a truly global database of incidents.
- ▶ Designation of Chlorine Safety Stewards at major chlorine-producing companies. Using information and tools developed by WCC, these Safety Stewards help promote safety improvements within their own company facilities. This includes distribution of posters and manuals for the safe operation of equipment and handling of chlorine products. Materials, such as the WCC Safety Poster, have been translated into multiple languages for global use.
- ▶ Sharing safety guidelines across national and regional associations, dissemination of safety information through the WCC Global Network, and promotion of safety to end-users through the ICCA *Responsible Care*® program. An example of this type of initiative was the conference in Beijing in April 2006 (see Chapter 6).



Safety at production facilities

Within chlor-alkali plants and downstream production facilities, management of chlorine is especially important to protect employees, the local community and the environment. Facilities continuously work to improve equipment design, process control procedures and employee training. As a result, the chlor-alkali industry is one of the safest of all manufacturing sectors. In 2004, U.S. chlorine producers had a workplace injury and illness incidents rate that was 67% lower than the average for U.S. workers, and 76% lower than for other manufacturing industries.

Transportation safety

Safe transportation of chlorine continues to be a high priority. In the U.S., the Chlorine Institute has worked in partnership with the railroads and government since 1924 to help improve transportation safety. Voluntary safety guidelines and strict government regulations cover all aspects of chlorine transportation by rail. Numerous safeguards—such as enhanced mechanical integrity, employee training and additional inspections—aim to help prevent accidental releases.

CHLOREP: A model for emergency response

For more than 30 years, the Chlorine Institute has helped emergency responders prepare for and respond to chlorine emergencies in the U.S. and Canada through its Chlorine Emergency Response Plan (CHLOREP). This program has been studied and benchmarked against the chlorine industries of many countries around the world. CHLOREP quickly mobilizes industry expertise to an accident site involving chlorine. Trained emergency teams from chlorine producing, packaging and consuming plants are on alert on a 24-hour basis to handle chlorine emergencies. Any carrier, customer, or civil authority can obtain basic emergency information and be put in contact with the closest CHLOREP regional team by phoning emergency dispatch agencies—CHEMTREC in the U.S. or CANUTEC in Canada.

In Europe, bulk chlorine has been shipped for almost 60 years without a single fatality. More than 90% is used at the site of manufacture, and is not transported at all. However, since chlorine has so many essential uses, it is inevitable that some must be transported. Railways are the main method of transport, accounting for 77% of chlorine movements in Europe (excluding pipeline). Road transport for bulk supply is used only in the UK and, to a limited extent, in Spain.

Stringent safety measures are implemented during transport. Chlorine is carried in specially-designed steel containers, ranging from cylinders carrying a few kilograms of chlorine to road and rail tank cars containing 20-60 metric tonnes. The industry will continue to build on its strong safety record with continuous improvements in transport and distribution.

The chlor-alkali industry will continue to work with governments and railways to explore ways to improve the safety and security of rail shipments and to address the causes of any incidents. It will also continue to cooperate with researchers and tank car manufacturers to improve the structural integrity of chlorine tank cars.

Latin American congress on transportation

In 2005, Clorosur organized a Latin American congress of chlor-alkali and derivatives transportation aimed at sharing best practices from several countries. The event also aimed to foster closer relationships between the various parties involved in the chlor-alkali production chain in Latin America, by promoting a broad debate between producers and their marketing and distribution partners.

Extending safety to the end-user

The chlorine industry is committed to promoting safety at all stages of product lifecycles, from production to end-use and disposal. This includes helping to educate end-users on safe handling practices. An example is the *Charters of Co-operation* program between the European Chlorinated Solvent Association (a part of Euro Chlor) and national groups representing chlorinated solvent users. Fourteen charters are in place in six countries with the aim of supporting *Responsible Care*® and use of best practices throughout the industry. In dry cleaning and industrial degreasing, improved practices and increased recycling mean that volumes of solvents sold have fallen markedly while usage has risen.

OxyChem tackles safety in Chile

Occidental Chemical Corp (OxyChem) health, environment and safety (HES) programs aim to reduce and manage risks and promote safe production, distribution, use and disposal of products. Product risk assessment is based on the internationally recognized Global Chemicals Management Policy (GCMP) framework. A case in Chile exemplifies GCMP's effectiveness. Chilean authorities had a problem with street vendors selling a compromised version of bleach in discarded soft drink containers, which created a serious public safety hazard. OxyChile worked together with distributors to improve packaging and labeling standards for household bleach. Also, OxyChile funded the development and distribution of information on the safe handling and use of bleach that accompanied all product shipments, and worked with others to establish a voluntary self-verification process for proper product use. The improved practices helped reduce emergency incidents relating to accidental ingestions by 50% in the first year.

6. Continuously improving performance through *Responsible Care*®

Commitment to and faithful implementation of the *Responsible Care* program—a global industry performance initiative to help safeguard employees, the environment and neighboring communities—is a condition of full WCC membership. By promoting continuous improvement in environmental, health and safety (EH&S) performance and open communication about all achievements, this provides a natural link to sustainable development. *Responsible Care* has been adopted in countries representing 76% of chlorine production, efforts continue to extend it to WCC corresponding members and all other producers, which remains a major challenge for the future.

WCC programs and activities

- ▶ Stewardship workshops—WCC offers workshops on environmental, health, and safety issues for chlor-alkali producers around the globe. With a focus on developing countries and countries with economies in transition, workshops have been held in Argentina, Brazil, China, India, Russia and Southeast Asia. WCC was a keynote speaker at the 2004 *Asia Chlor-Alkali Conference*. Through these events, WCC reached companies accounting for some 37% of global production and 90% of producers outside of North America, Western Europe, and Japan.
- ▶ Development of best practices—WCC is working with the United Nations Environment Programme to develop guidance on best available techniques (BAT) and best environmental practices (BEP) for processes involving chlorine. These are designed to minimize formation and release of unintentional by-products and provide guidance for the environmentally sound management of wastes. Euro Chlor has also worked extensively on similar guidance for the European Union.
- ▶ Industry policies/positions—WCC has developed industry positions on key issues, such as management of persistent, bioaccumulative and toxic substances (PBTs), management of unintentionally produced persistent organic pollutants (POPs), and management of end-of-life mercury cells and decommissioned mercury. These policies will help promote EH&S improvements and responsible application of chlorine chemistry.

Recognizing growth in China

Due to the growing importance of China's chlor-alkali industry, a conference on *China Chlor-Alkali Industry Sustainability* was held in Beijing (April 2006). Jointly sponsored by WCC, the Global Vinyl Council, the Chinese Petroleum and Chemical Industry Association and the Chinese Chlor-alkali Association, this was attended by 120 experts. Sessions covered

- ▶ Key regulatory and policy issues facing global and Chinese chlor-alkali and PVC industries
- ▶ Sustainable development for the chlor-alkali and PVC industries
- ▶ Safety, environmental and health issues, covering best environmental practices and best available techniques from around the world

Reducing the industry's environmental footprint

Although there remain opportunities for further progress in future, industry can point to reductions in environmental releases from chlor-alkali processes. In the U.S., there have been decreases in environmental levels of PBTs and POPs. In the first four years of dioxin reporting to the U.S. Environmental Protection Agency's Toxics Release Inventory, dioxin releases to air and water by the chlorine sector declined by 70%. A combination of government regulation and technology innovation has reduced dioxin emissions by the chlorine sector and downstream industries.

Since Toxics Release Inventory reporting began in 1988, U.S. chlorine industry emissions of 16 chlorinated compounds have declined by 83%, even as chlorine production increased. In addition, levels of dioxin in food—which account for 95% of human exposure to dioxin—have been cut in half over the past seven years in the U.S.

In Europe, Euro Chlor has collected data on emissions to air and water for 22 chlorinated substances since 1985. This data includes all the chlorinated products in the European Pollutant Emission Register (EPER) list and several others. Between 1985 and 2005 there was a 93.6% reduction in the total tonnage released to air and 99.5% in that released to water. A target of a 50% reduction to air and 75% to water has been set for 2010 compared to a 2001 baseline.

Euro Chlor companies have also gathered data on emissions of mercury from their operations since 1977. A voluntary target of 1.0 gram of mercury per metric tonne (g Hg/t) of mercury cell capacity was set in 1998 to be reached on a national basis by 2007. The participating countries were initially those in Western Europe. Efforts are now being made to extend this to countries that joined the EU in 2004. Data for 2005—including Eastern and Western European plants—show that emissions dropped from 1.09 to 1.05 g Hg/t chlorine capacity, with Western plants' average now less than one g Hg/t capacity.

Brazilian chlor-alkali producers remain firmly committed to reducing use of mercury and asbestos in production technologies. The industry associations, Clorosur and Abiclor, spearheaded an initiative to raise awareness of the need to minimize emissions of POPs among other industry sectors—such as aluminum, pulp and paper, and steel—and their advocacy has resulted in the launch of a National Industry Confederation program.

The stewardship ethic of the *Responsible Care* program continues to provide a firm foundation for sustainability in the chlor-alkali industry around the world.



Responsible investment index recognizes *Responsible Care*®

In June 2006, FTSE4Good, a Responsible Investment Index calculated by the FTSE Group, recognized the requirements of *Responsible Care* as helping companies fulfill many of the FTSE4Good environmental inclusion criteria. To be included, companies need to meet relevant criteria in areas of environmental sustainability, upholding human rights and stakeholder relations. Over 30 American Chemistry Council members and *Responsible Care* partner companies are currently listed on FTSE4Good.

Hazardous chemical safety management project

To enhance safety performance in Chinese chemical enterprises, The Dow Chemical Company and the China State Administration of Work Safety (SAWS) agreed to a three-year (2006-08) safety management project for hazardous chemicals. Nineteen small and medium size enterprises chosen to pilot the project in the first year are applying Dow's safety management concepts and methods while building their standardized safety management systems. They have increased safety-related investment in areas including staff training, risk assessments to improve production facility safety, increasing product safety control, improving hazard communication, and heightening awareness of their responsibility to the public.

To guide the safety management work in Chinese chlor-alkali enterprises, technicians and experts are using the Chlorine Institute's chlorine safety management manual, as well as Dow's safety management methods. A Dow Process Safety Leader led a training session on safe chlorine production and storage, and relevant U.S. statutes for emergency plans, emergency evacuation processes, elements of emergency response plans, and incident simulation.

Chemistry and nature project

Solvay Indupa (Brazil) created a chemistry and nature project in 1997 to help stimulate debate on sustainability among elementary schools and other communities near the company's chlorine plant in the city of Santo André (including Rio Grande da Serra, Ribeirão Pires and Paranapiacaba, in the Greater São Paulo area). This region includes many low-income families in an area of rapid urban growth, and faces significant social and environmental challenges. The project developed sustainability teaching materials, using accessible, age-appropriate formats such as comic books, cartoons and games.

From 2003, the project also invested in teacher education and other initiatives such as a Clube Escola-Cidadã (Citizen-School Club), where students, teachers and parents from two schools meet community leaders and other residents to discuss social and environmental issues. Solvay provides meeting space and educational materials. Each approved Clube project receives funding; activities have included environmental remediation of streams, community vegetable gardens, selective waste collection, planting of trees in public areas, a local cultural festival, and professional courses for district cleaning teams. To date, some 30,000 students, teachers and community leaders have taken part.



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WCC members

Producer Associations

Asociacion Nacional de la Industria Quimica (Mexico)
www.aniq.org.mx/

Canadian Chlorine Chemistry Council
www.cfour.org

Chlorine Chemistry Division of the American Chemistry Council
www.americanchemistry.com/chlorine

Chlorine Institute
www.cl2.com

Clorosur
www.clorosur.org

Euro Chlor
www.eurochlor.org

Indian Chemical Manufacturers Association
Japan Soda Industry Association
www.saiji.jp

Korea Chlor-Alkali Association
Plastics and Chemicals Industries Association of Australia
www.pacia.org.au

Taiwan (China) Acid & Alkali Industry Association

Product Sector Associations

Asia-Pacific Vinyl Network

European Council of Vinyl Manufacturers
www.ecvm.org

Halogenated Solvents Industry Alliance
www.hsia.org

Vinyl Council of Australia
www.vinyl.org.au

Vinyl Council of Canada
www.plastics.ca/vinyl

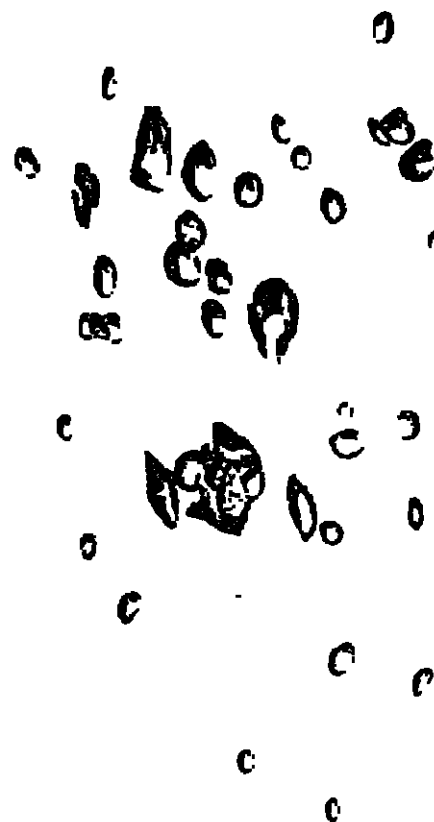
Vinyl Environmental Council (Japan)
www.vec.gr.jp

Vinyl Institute
www.vinylinfo.org

Corresponding Associations

RusChlor, the Russian chlor-alkali association
China Chlor-Alkali Industry Association [pending]

WCC is a committee of the International Council of Chemical Associations, the worldwide voice of the chemical industry (see www.icca-chem.org)



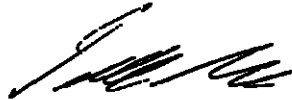
 **WORLD chlorine council**

Exhibit E

Redacted

Certificate of Service

I hereby certify that I have on this 4th day of February 2008, served a copy of the foregoing Complainant's Opening Evidence on Paul Moates and Paul Hemmersbaugh, Sidley and Austin, 1501 K Street, NW, Washington, D.C. 20005, via hand delivery and email.



Jeffrey O. Moreno