BEFORE THE SURFACE TRANSPORTATION BOARD

STB Ex Parte No. 677 (Sub-No. 1)

COMMON CARRIER OBLIGATION OF RAILROADS – TRANSPORTATION OF HAZARDOUS MATERIALS

COMMENTS OF THE AMERICAN CHEMISTRY COUNCIL

Chairman Nottingham, Vice Chairman Mulvey, and Commissioner Buttrey The American Chemistry Council (ACC), which represents the leading companies engaged in the business of chemistry, is pleased to provide these comments to the Surface Transportation Board (Board) The railroad common carrier obligation is critical to our members and to the customers that they serve in key industries throughout the nation

ACC submitted comments in Ex Parte No 677, Common Carrier Obligation of Railroads, and participated in the Board's public hearing that examined various aspects of the railroad common carrier obligation In announcing this new sub-docket proceeding, the Board found that the record in Ex Parte No 677 had "raised many issues involving the obligation of railroads to haul hazardous materials, including toxic by inhalation hazards (TIH) " The Board noted that "For many hazardous materials, including TIH, rail is the safest and most efficient mode of transportation But, according to the railroads, the transportation of these materials subjects them to ruinous liability in the event of an accident " In these comments, ACC will address the concerns and questions identified by the Board

The Business of Chemistry

ACC members apply the science of chemistry to make innovative products and services that make people's lives better, healthier and safer They are committed to improved environmental, health, safety and security performance through ACC's Responsible Care® initiative, by means of common-sense advocacy designed to address major public policy issues, and with health and environmental research and product testing

The business of chemistry is a $664 billion enterprise, employing over 860,000 people and accounting for 10 percent of all U S merchandise exports Chemistry companies invest more in research and development than any other business sector The chemical products manufactured by our members are an essential part of every facet of our nation's economy More than 96 percent of all manufactured goods are directly touched by chemistry Products supplied by American chemistry are essential in manufacturing, agriculture, energy, transportation, technology, communications, health, education, defense, and virtually every aspect of modern society Basic industrial chemicals are the

raw materials for thousands of other products including plastics, water treatment chemicals, detergents, pharmaceuticals, and agricultural chemicals These applications include medicines and medical technologies that save lives, computers and other information technologies that facilitate expanding horizons of knowledge, food and water, automobiles, homes, and clothes, among myriad uses [1]

ACC's 130 members account for approximately 85 percent of U S capacity for the production of basic industrial chemicals and manufacture a wide array of products that are offered for shipment by railroads and other carriers The business of chemistry depends upon the railroads for the safe, efficient and secure transportation of 176 million tons of chemical products each year, accounting for $6 8 billion in annual rail freight revenues Chemicals constitute the third-largest customer category in terms of rail revenues, behind only coal and intermodal service, and the second-largest specific commodity carried by rail (many different commodity groups move in intermodal service) ACC and its members have a long-standing commitment to the safe transportation of hazardous materials, and we strongly support the comprehensive and uniform national hazardous materials regulatory program of the Department of Transportation (DOT), which is administered by the Pipeline and Hazardous Materials Safety Administration (PHMSA) and implemented in the rail mode by the Federal Railroad Administration (FRA)

The movement of chemicals, including those that are regulated by DOT as hazardous materials in transportation, are critical to the well being of our country and our way of life For most, there is no substitute This is no less true of TIH products than of other hazardous materials ACC has prepared, as Appendix A to these comments, a study of the TIH products that are shipped by rail and their critical uses in the United States Public health, personal safety national security and economic factors require that these products move by rail where that is the appropriate mode Board action that could impair the common carrier obligation with respect to those materials would clearly not be in the public interest

Scope of the Board's Examination

Before addressing the issues raised in the Board's June 4 notice, ACC would like to note that the common carrier obligation is not specific to the shipment of hazardous materials or of TIH products But it is difficult to comment on transportation policy issues without some frame of reference as to the commodities involved For example, as quoted above,

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[1] As background in terms of TIH materials, The Fertilizer Institute represents the anhydrous ammonia industry, although some individual ACC member companies have an interest in that widely used product In addition, while some ACC members produce or purchase chlorine, the Chlorine Institute (CI) is also participating in this docket Various ACC member companies manufacture and ship most, if not all, TIH materials other than anhydrous ammonia, and several of them will submit comments in this sub-docket Another important factor is that ACC members that do not produce a particular TIH material do require that chemical in order to conduct their own industrial operations Those companies therefore purchase various TIH products that they receive in tank car deliveries The views of such TIH customers (consignees) must be considered carefully, especially with regard to the importance of those materials throughout the U S economy, the downstream uses of products that are manufactured using TIH materials, and the potential impact of any impairment of the common carrier obligation ACC is confident that the Board will carefully consider all relevant comments from companies and organizations with an interest in this proceeding

the Board refers to the rail industry's stated concern about "ruinous liability in the event of an accident" ACC has engaged in high-level discussions with railroad leaders about those concerns, and it is fair to say that the focus has been primarily, if not exclusively, on TIH materials The same is true of a major safety rulemaking – discussed below – that is currently being conducted by FRA and PHMSA That docket deals specifically with rail transportation of TIH materials, not the much broader range of hazardous materials

ACC raised this matter with the Board in a motion filed on June 19, 2008, but has not seen any clarification of the scope of this sub-docket We will, however, address the topics identified in the Board's June 4 notice

A "specific potential policy solutions to the liability issue, including solutions modeled on the Price-Anderson Act of 1957"
B "the appropriate role of the Board in developing such a policy solution"
C "what constitutes a reasonable request for service involving the movement of TIH"?
D are there "unique costs associated with the transportation of hazardous materials"?
E if there are such costs, how do railroads recover them?
F "efforts by various federal agencies, including the Federal Railway Administration and the Pipeline and Hazardous Materials Safety Administration, to address the transportation of hazardous materials"

ACC will first comment generally on the rail common carrier obligation in relation to the movement of TIH products and hazardous materials, and then turn to the Board's six questions

Common Carrier Obligation

Congress adopted the common carrier obligation, which is an essential provision of Federal law and is codified at 49 U S Code § 11101(a)

> A rail carrier providing transportation or service subject to the jurisdiction of the Board under this part shall provide the transportation or service on reasonable request

A railroad's common carrier obligation is not dependent upon what products the carrier would prefer to haul, nor upon what products the carrier holds itself out to haul, nor upon the carrier's risks or costs, nor even upon this Board's view of whether the common carrier obligation should exist in a particular case Instead, the courts have made clear that the duty of common carriers is rooted in the entire statutory scheme governing interstate commerce, including the national rail transportation policy, under which a strong rail transportation system is to be preserved "to meet the needs of the public and the national defense" 49 USC § 10101(4) As the Sixth Circuit Court of appeals held in the leading case of *Akron, Canton & Youngstown R Co v ICC*, 611 F 2d 1162 (6th Cir 1979), cert denied, 449 U S 830 (1980) "public needs must shape the boundaries of these duties"

Thus, the common carrier obligation is not affected by the fact that rail carriers have recently publicly declared that they would rather not haul certain hazardous products.

notably TIH materials, and that they are doing so only because their common carrier obligation requires it If anything, this recent history only confirms the railroads' understanding that their common carrier obligation does compel them to carry these products In addition, the fact that the railroads have been seeking relief from this obligation on Capitol Hill rather than before this Board confirms that the railroads have understood that this Board does not have the power to eliminate that obligation

Nor is the common carrier obligation dependent upon the fact that the railroads may have greater risks, which they contend translate into higher costs, associated with handling TIH or other hazardous materials, when compared with other products The court in the *Akron, Canton* case held that the Board's predecessor agency, the Interstate Commerce Commission (ICC), had correctly determined "that its inquiry into the risks involved in the transport of nuclear materials must be limited to determining if the shipments met the requirements of the DOT and the Nuclear Regulatory Commission (NRC) " The same principle must hold in this case Any deeper inquiry would usurp the functions of DOT in specifying the design of tank cars and in regulating the safe operating practices of rail carriers It is DOT, not this Board, which is charged with determining the optimal design for tank cars considering cost-benefit analysis, and the optimum feasible level of public safety to be achieved by minimizing risks from operating factors such as crew fatigue See especially, 49 USC §§ 5101 et seq (regulation of hazardous materials transportation), and implementing regulations, including, *e g*, 49 CFR Parts 171, 173, 174, and 179, and 49 USC §§ 20101 et seq (Federal rail safety laws) and implementing regulations, *e g*, 49 CFR Parts 200-244

The national rail transportation policy does contain certain general safety-related policies, namely "to promote a safe and efficient rail transportation system," 49 USC § 10101(3), and "to operate transportation facilities and equipment without detriment to the public health and safety," 49 USC § 10101(8), but under established rules of statutory construction, these extremely broad and general provisions cannot trump the specific statutory assignment to DOT regarding rail safety mentioned in the foregoing paragraph

As the *Akron, Canton* case held, the common carrier obligation is dictated by the public need for transportation [2] In *Akron, Canton*, both the ICC and the court reviewed evidence showing the importance of the rail transportation of spent nuclear fuel, given that a substantial amount of the electricity generated in the United States comes from nuclear power

ACC presents in Appendix A of these comments extensive evidence demonstrating the critical importance of TIH materials to the U S economy These products, which often have no substitute, are used in a wide range of economic sectors, such as manufacturing, agriculture, energy, transportation, technology, communications, health, and defense Those sectors, as shown in Table 1 of Appendix A, employ more than 1 3 million people and account for $357 billion in value-added

[2]This conclusion is consistent with the ultimate aim of the national rail transportation policy "to ensure the development and continuation of a sound rail transportation system with effective competition among rail carriers and with other modes, to meet the needs of the public and the national defense" 49 USC § 10101(4)

Also important in the *Akron, Canton* precedent is the clear finding that rail was the best, most economical and safest mode of transportation for nuclear waste Similarly today, railroads have often cited a statistical analysis showing that rail is "16 times safer than trucks" for the transportation of hazardous materials [3] Given the Board's obligation to consider the effect of its decisions on safety, the Board must be cognizant that attempting to ban the rail shipment of hazardous materials would deny shippers the most efficient and arguably the safest available mode Moreover, the safety record of hazardous materials shipments by rail is consistently improving As the railroad industry pointed out in comments in Ex Parte No 677, over 99 99 percent of all hazardous materials shipments by rail reach their destination without incident, and rail hazardous materials accidents have been reduced by 86 percent from 1980 through 2005 And, in light of several ongoing DOT rulemakings that are discussed below, rail transportation of hazardous materials promises to continue to become safer in the future

Hence, despite statements by some parties that there is a liability crisis, rail safety has improved and costs for casualty and insurance are declining [4] Still, as a technical legal matter, both the Court of Appeals for the Sixth Circuit and the Court of Appeals for the DC Circuit have stated that railroads, while obligated to carry hazardous materials, may seek to impose safety requirements going beyond those promulgated by DOT and other safety regulatory agencies (*Akron, Canton*, 611 F 2d at 1170 Consolidated Rail Corp v ICC, 646 F 2d 642, 650 (D C Cir) ["Conrail v ICC"], cert denied, 454 U S 1047 (1981)) To the extent the costs of such measures are passed on to shippers, however, they are subject to challenge on the basis of whether they are reasonable As the DC Circuit stated

> The mere assertion of safety as a justification for any particular expenditure by a railroad company is not conclusive upon the Commission's judgment of the reasonableness of that expenditure or the tariff based upon it The safety measures for which expenditures are made must be reasonable ones, which means first, that they produce an expected safety benefit commensurate to their cost, and second, that when compared with other possible safety measures, they represent an economical means of achieving the expected safety benefit

Conrail v ICC, 646 F 2d 642, 648 (DC Cir 1981) The DC Circuit emphasized that, given the comprehensive regulatory scheme overseen in that case by DOT and NRC (and in the current case by DOT's FRA and PHMSA), "a presumption arises that expenditures for safety measures not specified by these agencies are unnecessary and fail to satisfy the criteria of reasonableness " (646 F 2d at 650)

Any such proceedings regarding the reasonableness of extra railroad precautions would, of course, need to inquire into the costs of such measures, and would also need to receive evidence from the railroads quantifying the benefits of such measures in terms of reducing risk

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[3] The Association of American Railroads (AAR) has recently removed most references to this statistic from its web site, but it can still be found in archived AAR web pages

[4] See report by T O'Connor submitted as Exhibit 1 to CI's statement in this proceeding

While the Board may technically have the legal authority to pass upon the reasonableness of extra railroad safety measures, a separate question is whether the Board has the resources and expertise to, in effect, "second guess" the judgments of the federal rail safety agencies, principally FRA and PHMSA, who are specifically charged with ensuring safe transportation In essence the STB would be reconstituting itself as a new, third rail safety agency Particularly in light of the initiatives that PHMSA and FRA have already taken, we strongly doubt that this would meet the letter or spirit of the rail transportation policies "to allow, to the maximum extent possible, competition and the demand for services to establish reasonable rates for transportation by rail, 49 USC 10101(1) and "to minimize the need for Federal regulatory control over the rail transportation system," 49 USC 10101(2)

Any undertaking by the Board to enmesh itself in these issues would also have to take account of the various issues relating to different types of hazardous materials The term "hazardous materials" encompasses a wide range of products, including, for example, fireworks, many types of paint, nuclear waste, and literally thousands of industrial chemicals Current Federal regulations regarding the handling of the myriad types of hazardous materials run to thousands of pages This is not an undertaking that should be taken lightly and not an area where a few dozen pages of fairly general comments is going to provide adequate record support for regulatory intervention

A. Price-Anderson Act as a Model

The Board has asked for views on approaches to dealing with the "liability issue," noting the possibility of "solutions modeled on the Price-Anderson Act of 1957 " We understand that the rail industry is, in fact, taking steps to pursue such legislation

ACC does not believe that the Price-Anderson Act is a statute that would fit the railroad industry's annual transportation of 100,000 tank car loads of TIH materials To stretch the inapplicable Price-Anderson concept to cover all hazardous materials, which present many different types of risks and move in far greater quantity, would be even more inappropriate As others note in this sub-docket, Price-Anderson was enacted to allow the development of a prospective new industry involving the commercial use of nuclear energy The rail industry developed without such a special liability arrangement and continues to function well

In this docket, the Edison Electric Institute (EEI) is providing the Board with extensive information on the history and operation of the nuclear power industry under the Price-Anderson Act ACC recommends that thorough assessment and EEI's related policy suggestions for the Board's consideration

The Board has also requested comment on whether in the case of some hazardous materials shipments the railroads might divest themselves of some of their potential financial liability in the event of a rail accident that releases hazardous materials ACC believes that this would be unwise because it would remove strong incentives on the railroads to continue to improve that safety of hazardous materials shipments The business of chemistry strongly supports the fundamental public policy that liability should rest on the party whose operational control most directly affects safety That is not a policy that was

invented by counsel for plaintiffs in class-action litigation Nor does it favor one sector of society over another Each participant in the production, sale, loading, movement, unloading, and use of hazardous materials should be responsible for its own actions That applies to ACC members as well as to others, as it should

B. Board's Role in Developing Policy Solutions

Any change in railroad liability, or any revision of the statutory common carrier obligation, must come through Federal legislation Although Congress can deal with those essential legal relationships, ACC respectfully points out that the Board does not have that ability We recognize the Board's sincere interest in this complex public policy issue But it would be entirely inappropriate seek change through an unwarranted agency re-interpretation of what is a "reasonable request" for TIH or hazardous materials t service

To the extent that this proceeding may enhance public understanding, that is to be commended If the Board wishes to consult further with other Federal agencies, or chooses to make its own recommendations to Congress, that would also be appropriate But statutory change must come through the normal legislative process, in which elected officials address issues with input from interested members of the public

C. Reasonable Request for TIH Transportation Service

In posing this question, which is limited to the transportation of TIH materials rather than all hazardous materials, the Board implies that it might act to define the shipment of TIH products as "unreasonable " The Board's June 4 notice states that "The common carrier obligation, however, is not absolute, and service requests must be reasonable " ACC agrees, but strongly urges the Board not to embark on a dangerous an inappropriate effort to influence the course of industry discussions or legislative action The shipment of hazardous materials has been considered reasonable for decades, and the rail common carrier obligation was upheld by the ICC For the purposes of hazardous materials transportation, "reasonable" means in conformance with Federal safety regulations As DOT recently stated in proposing new TIH rail safety regulations

> Railroads, as common carriers, are generally required to provide transportation services in a reasonable manner, and they may not impose unreasonable requirements as a condition precedent to providing rail transportation services Accordingly, [action that would] restrict the movement of railroad tank cars that meet DOT standards must be reasonable, and, if challenged, the burden is on the railroad to establish the reasonableness of the restriction See Akron, Canton & Youngstown R R v ICC, 611 F 2d 1162, 1169 (6th Cir 1979), see also Consolidated Rail Corp v ICC, 646 F 2d 642, 650 (D C Cir 1981), cert denied, 454 U S 1047 (1981)

The above statement is from Docket No FRA-2006-25169, published on April 1, 2008, in Volume 73 of the Federal Register, at page 17825 DOT continued with the following interpretation of what would be "reasonable" in the context of TIH tank car safety

> Two of the factors that the Surface Transportation Board and the courts consider are whether there are Federal safety standards on point and whether a railroad has the ability to seek changes to these standards to meet the safety concerns of the railroad See Consolidated Rail, 646 F 2d at 651 In fact, DOT has established safety standards for tank cars carrying PIH [Poison Inhalation Hazard, equivalent to TIH] commodities and, pursuant to this [DOT] rulemaking, is proposing enhanced standards for tank-head and shell puncture resistance systems for these cars Through participation in this rulemaking, railroads and other interested parties have the ability to influence the enhanced safety standards ultimately adopted by DOT

In fact, comprehensive DOT safety regulations are in place for the rail shipment of hazardous materials – including TIH products As noted below, FRA and PHMSA are actively engaged in enhancing the already-safe transportation For STB to enter into that technical area, which Congress has clearly assigned to DOT, would not be productive or appropriate Compliance with DOT regulations is the reasonable way to tender shipments to a rail carrier

D. Are There Unique Railroad Costs for Transporting Hazardous Materials?

The liability cost issue, while certainly a legitimate concern, may be a somewhat exaggerated problem ACC has been evaluating railroad liability but is not aware of any financial evidence on the record to document the situation ACC member companies, in the face of extraordinary rate increase for shipping a TIH product approached their rail carriers regarding potential liability-sharing arrangement No railroad has, to our knowledge, responded Other parties that have raised the same matter with rail carriers have also received the same lack of response

Although ACC has heard from companies in the railroad industry about high and rising costs related to hazardous materials transportation, no specific data have been provided ACC members have also been told that the costs for insurance or liability are the basis of freight rate increases for hazardous materials, and especially for TIH products

The *Akron, Canton* case also leaves open the possibility that the Board might seek to apportion liability as between the railroads and the shippers But that decision was written prior to the partial rail deregulation culminating with the Staggers Rail Act of 1980 Today's national rail transportation policy calls upon the market to set rates free of Board intervention whenever possible, subject to the ability of shippers to challenge rates where the rail carrier has market dominance and the rate is unreasonably high If railroads truly have high costs associated with insuring against possible accidents involving the release of hazardous materials, they have wide latitude to recoup those costs through their ratemaking [5]

[5] Under the Board's Uniform Rail Cost System (URCS), the allocation of costs is highly technical in nature If there were to be any consideration of potential changes to URCS relating to liability costs, that would require technical expertise and in-depth consideration, which should be part of a separate proceeding

E. Recovery of Unique Costs

Without specific cost information from the railroads, it would not be appropriate for ACC to comment on how such costs (if any) are recovered

F. Federal Agency Efforts to Address Rail Hazardous Materials Safety

As discussed earlier, the business of chemistry has a long-standing commitment to the safe and secure transportation of hazardous materials ACC strongly supports DOT's comprehensive national hazardous materials regulatory program

We understand that DOT will participate in this proceeding and are pleased that the record will include perspectives on the rail transportation of hazardous materials from Federal safety officials Given the Board's concern about liability related to the release of TIH materials, it is important to recognize what DOT has accomplished over the past several years [6]

In May 2005, then-Secretary of Transportation Mineta announced the National Rail Safety Action [7] That Plan covered key areas for safety enhancement, such as the reduction of accidents caused by human factors (which accounted for 38 percent of rail accidents) and improvements in track safety (cause for 34 percent of rail accidents) Coming shortly after the Graniteville accident, the Plan specifically addressed hazardous materials safety and emergency response

FRA's human-factor rule was issued in February 2008 Other non-regulatory FRA initiatives address "close call" incidents that did not become rail accidents, as well as research on crew fatigue Track safety, dark territory[8] and FRA compliance and enforcement programs have been addressed [9] Hazardous materials emergency response capabilities have been strengthened by providing additional information resources to first responders ACC's Chemical Transportation Emergency Center (CHEMTREC®) participates in one such pilot project [10]

Highly significant for this sub-docket is DOT's docket (FRA-2006-25169) That rulemaking deals with TIH rail tank car safety and is being conducted jointly by FRA and PHMSA Included in the proposed rule are speed limits for trains carrying TIH shipments and new tank car crashworthiness standards On July 3, ACC and a number of other organizations petitioned DOT to issue an interim federal regulation that would allow

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[6] Three key events to keep in mind are the releases of TIH materials in rail accidents at Minot, North Dakota, in 2002, Macdona, Texas, in 2004, and Graniteville, South Carolina in 2005

[7] Federal Railroad Administration Action Plan for Addressing Critical Railroad Safety Issues (May 16, 2005)

[8] Dark territory consists of non-signaled track segments, which was a contributing factor in the Graniteville TIH accident

[9] Another focus for FRA has been grade-crossing safety, although that is not specifically related to hazardous materials transportation

[10] National Rail Safety Action Plan Final Report 2005-2008 (May 2008)

shippers to lease or purchase new TIH tank cars while FRA and PHMSA continue their work on the primary rulemaking ACC and its members worked cooperatively with other parties – including tank car suppliers and rail carriers - to develop that joint petition This illustrates how different industries can work together to address important issues

Other voluntary programs and constructive partnerships exist to deal with hazardous materials Chemical shippers and receivers work closely with their rail partners on safety and security matters These efforts range from location-specific handling of TIH tank cars to industry wide initiatives, such as TRANSCAER® (Transportation Community Awareness and Emergency Response) In terms of hazardous materials in the context of rail security, ACC has participated on many initiatives with the railroad. FRA and the Transportation Security Administration (TSA) were involved in a recently completed rail routing regulation for hazardous materials In addition, ACC has commented on TSA's proposed security rule that will apply to shipments of TIH products Railroads have also chosen to participate in ACC's Responsible Care® initiative, which encompasses safety, health, environmental performance and security

Conclusion

On behalf of the business of chemistry, ACC thanks the Board for this opportunity to provide comments in this important docket The public interest requires that common carrier obligation be preserved in order to maintain essential rail service to shippers and receivers of hazardous materials We have supplied the Board with information that highlights the importance of TIH products to the U S economy and to our way of life

For reasons stated above, the business of chemistry does not believe that the Price-Anderson Act provides the necessary model for dealing with hazardous or TIH materials, and points out that Congress is the proper forum for consideration of such matters A reasonable request for service is that a shipper tender its traffic in DOT-approved hazardous materials packagings (tank cars for bulk TIH shipments) We await conclusive cost data from the railroads on the record And we applaud FRA and PHMSA for their many relevant safety initiatives

Thomas E Schick
Senior Director – Distribution
Regulatory and Technical Affairs
American Chemistry Council
1300 Wilson Boulevard
Arlington, VA 22209
tom_schick@americanchemistry com
703-741-5172

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APPENDIX A

Analysis of the Removal of Rail Common Carrier Obligation for TIH Materials

Introduction

This paper presents an analysis of the potential economic and societal effects if the common carrier obligation did not require railroads to carry hazardous materials, including toxic inhalation hazard (TIH) materials The approach is twofold 1) a qualitative assessment of the primary, secondary, tertiary and further uses of these materials and their essentiality to the economy, and 2) a quantitative assessment of economic activity at risk

TIH Materials

Under the Hazardous Materials Regulations of the Department of Transportation (DOT), TIH materials are gases or liquids that are known or presumed on the basis of tests to be toxic to humans such that they pose a hazard to health in the event of a release during transportation

According to DOT, "railroads moved just over 100,000 carloads of PIH [TIH] materials" in 2005.[1] Anhydrous ammonia and chlorine together account for approximately equal amounts, for a combined 80% of TIH tank car shipments Ethylene oxide is a distant third, accounting for about 10% of TIH shipments [2] Hydrogen fluoride is fourth in volume and sulfur dioxide is fifth ACC understands that the top five TIH materials account for about 95% of the total, with all other TIH materials making up the balance Although the TIH material volumes are modest, these materials are critical inputs for a wide variety of products and services

Business of Chemistry

The business of chemistry is a $664 billion enterprise, employing over 860,000 people in all 50 states, and accounting for 10% of all US merchandise exports More than 96% of all manufactured goods are directly touched by chemistry Products supplied by American chemistry are essential in manufacturing, agriculture, energy, transportation, technology, communications, health, education, defense, and virtually every aspect of modern society Basic industrial chemicals are the raw materials for thousands of other products including plastics, water treatment chemicals, detergents, pharmaceuticals, and agricultural chemicals These applications include medicines and medical technologies that save lives, computers and other information technologies that facilitate expanding horizons of knowledge, food and water, automobiles, homes, and clothes, among myriad uses

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[1] Department of Transportation, Pipeline and Hazardous Materials Safety Administration, Docket No FRA-2006-25169, Hazardous Materials Improving the Safety of Railroad Tank Car Transportation of Hazardous Materials, Notice of Proposed Rulemaking, 73 Fed Reg 17818 (April 1, 2008), page 17831

[2] Department of Transportation, Pipeline and Hazardous Materials Safety Administration, Docket No FRA-2006-25169, Regulatory Impact Analysis (March 19, 2008), page 11

The business of chemistry depends upon the railroads to deliver 176 million tons of chemical products each year, accounting for $6 8 billion in annual freight revenues, making chemicals the second-largest commodity group in terms of contribution to rail revenues, behind only coal (Intermodal traffic, which is the second-ranked rail revenue contributor, is not a specific commodity) Although no mode of transportation is 100% safe, rail has proven to be a generally safe mode

The common carrier obligation of railroads is critical to American chemistry in shipping intermediate and finished products as well as delivering raw materials Were the railroads not to provide service for TIH products, that would clearly disrupt large sections of American commerce because chemistry is essential to our modern economy and way of life

The Criticality of TIH Materials

The following is a qualitative assessment of the criticality of these TIH materials in a number of applications These are listed in order of the number of rail car shipments

Anhydrous ammonia is one of the largest volume chemicals produced in the United States Most ammonia produced in the United States is used to make fertilizer Ammonia is applied directly as a fertilizer and it is used to make other nitrogenous fertilizers such as ammonium nitrate, urea, ammonium phosphates and ammonium sulfate (Nitrogen is essential for plant growth) Ammonia is thus essential for crops such as corn and wheat It is the least costly and most effective source of nitrogen fertilizer for American farmers There is no viable substitute in maintaining the nation's food supply The largest consuming states are California, Illinois, Indiana, Iowa, Kansas, Minnesota, Nebraska, and North Dakota Corn is the largest direct consumer of directly applied ammonia One of the products of corn is ethanol, which is not only an important source of revenue for railroads, with over 82,000 rail shipments in 2005, but also an important part of our national energy policy Industrial uses for ammonia include the making of acrylonitrile (to make resins and acrylic fibers, which are used to make apparel, blankets, and upholstery), caprolactam (to make nylon 6 for use in such products as clothing, parachutes, and rope), and aniline (to make rubber processing chemicals) Ammonia is used in the continuous cycle cooling units found in large-scale commercial air conditioning and refrigeration at large, cold storage facilities Other uses include pharmaceuticals (sulfa drugs, vitamins, etc), cosmetics, adhesives, feed supplements, home and industrial cleaners, pulp and paper production, metallurgy, and in the production of sodium azide propellants for air bags Coal-burning electric power plants use ammonia for abatement of nitrogen oxides from power plants, thus allowing these facilities to comply with the Clean Air Act emissions standards Minor uses include the making of explosives and the production of rocket fuel For most industrial users there is no substitute for ammonia

Chlorine is a naturally-occurring element that is essential to life It is a high volume chemical produced in the United States and its use in American chemistry is pervasive, with the chlorine molecule involved in 60% of the industry's products According to the American Water Works Association, 84% of large drinking water systems (those serving more than 10,000 people) use elemental chlorine disinfection Drinking water chlorination has been used for 100 years and is the major factor in preventing cholera and other

waterborne disease Chlorine disinfectants are also used extensively in food production and healthcare settings to guard against life-threatening germs Chlorine is used directly in paper manufacturing, and in the production of certain lightweight metals (titanium and magnesium) used in aircraft Indirectly, it is used to make a variety of important building-block chemicals, such as trichloroethylene, phosgene, chlorinated hydrocarbons, neoprene, polyvinyl chloride (PVC), hydrogen chloride, and ethylene dichloride In turn, these are used to ultimately produce thousands of industrial and consumer products According to the Chlorine Institute, chlorine chemistry is essential to 85% of all pharmaceuticals, 25% of all medical plastics, 70% of all disposable medical applications, and 95% of crop protection chemicals Some indirect applications include the production of wool, flame retardant materials, and special batteries (lithium and zinc) Chlorine is also used in the processing of fish, meat, vegetables, and fruit The largest end uses of chlorine include the making of ethylene dichloride, vinyl chloride monomer, and PVC resins (used to make a variety of products such as medical bags and tubing, adhesives, protective clothing, pipes, siding for homes, and raincoats)

Ethylene oxide is primarily used to make ethylene glycol (which is used to make polyester fibers/resins and antifreeze) The next largest application is in the making of surfactants and detergents This chemical is also used to make other chemicals, such as ethanolamines (used for gas conditioning and soap production) and glycol ethers (used to make paint, brake fluids, aircraft fuel additives) Ethylene oxide is also used as a petroleum demulsifier, as a fumigant and humectant, in the making of rocket propellant, and as a sterilizing agent for medical supplies (bandages, sutures, and surgical implements) and industrial applications

Anhydrous hydrofluoric acid is the source for virtually every product containing a fluorine molecule Nearly 30% of all agricultural chemicals and 20% of pharmaceuticals contain a fluorine molecule Hydrofluoric acid is mainly used for the production of fluorocarbons, which are in turn used as refrigerants, foam-blowing agents, aerosol propellants, and solvents While ammonia (also a TIH material) is a substitute for fluorocarbons used in refrigeration, there are few if any substitutes for fluorocarbons used in insulating foam applications Fluorocarbons are also precursors to fluoropolymers and fluoroelastomers Polytetrafluoroethylene is used in wire and cable insulation, aircraft/aerospace, electronics applications, and in non-stick coatings for cookware and bakeware Fluoroelastomers exhibit high heat resistance and low permeability and are used in valves and seals for automotive and aircraft applications Nearly 20% of hydrogen fluoride produced is used in primary aluminum production Nearly 5% is used to make high-octane blending components for gasoline, where it is critical in today's clean fuels Other uses include stainless steel pickling, treatment of titanium and zirconium, uranium fuel refining, semiconductor manufacture, glass etching, and as an additive in liquid rocket propellants Uranium is further processed to provide fuel rods for nuclear reactors and electric power generation

About 40% of the **sulfur dioxide** produced in the United States is made into sodium hydrosulfite, which is used to bleach paper and textiles Nearly a quarter is used by the pulp and paper industry to stabilize pulp Agriculture and food production accounts for about 15% of production It is used as a preservative and an antimicrobial in the production of corn syrup, wine, and beer Sulfur dioxide is also used in water treatment to remove

residual chlorine It is used to treat water at chrome-plating facilities by converting chromate to less toxic compounds Sulfur dioxide is also used in metal and ore refining, oil recovery, and as a catalyst in the production of phthalic anhydride used to make plasticizers (used in medical equipment, tarpaulins, cable jackets) and unsaturated polyester resins (plastics for use in construction, corrosion-resistant tanks/pipes, boats) Two-thirds of **sulfuric acid** (hydrogen sulfate, battery acid, electrolyte acid) production is used to make phosphate fertilizer A relatively small amount is used in copper refining and other metallurgical uses Other uses include production of high-octane gasoline, methyl methacrylate, caprolactam, and in the production of lead-acid batteries Methyl methacrylate is used to manufacture window glazing, lighting fixtures, taillight lenses, disposable medical equipment, laminates, polymeric optical fibers, and appliances and other consumer products Caprolactam is used to manufacture nylon 6, used in tire cord and carpets

The largest use for **methyl mercaptan** (or methanethiol) is as an intermediate for amino acids (methionine) used in poultry and swine feed As an important component for animal feeds for the nation's poultry and pork industry, any disruption in the methyl mercaptan supply chain will have adverse effects on the price of animal products Methyl mercaptan is also used to produce jet fuel additives, fungicides and as a catalyst

Hydrogen chloride (or hydrochloric acid) is used to make vinyl chloride and alkyl chlorides, and used in polymerization, hydrochlorination, isomerization, alkylation, and nitration reactions It is also used in steel pickling (it is increasingly being used in place of sulfuric acid) and in food processing (in the making of high fructose corn syrup and dextrose)

Sulfur trioxide (or sulfuric anhydride) is used to produce surface-active agents such as linear alkylbenzene sulfonates, alcohol sulfates and alcohol ether sulfates, that are used in detergents Sulfur trioxide is also used in the production explosives and solar energy collectors Sulfuric acid is produced by the reaction of sulfur trioxide and water Sulfuric acid is used to produce fertilizers, explosives, and lead-acid batteries, and is used in oil refining and metallurgy

The largest use for **acetone cyanohydrin** (a-hydroxyisobutyronitrile or 2-methyllactonitrile) is as an intermediate for methyl methacrylate used in window glazing, lighting fixtures, etc Acetone cyanohydrin is also used to produce methacrylic acid (a monomer for high-volume resins), dimethylhydantoin (fungicides) and 2-aminoisobutyronitrile

About half of all **hydrogen cyanide** (hydrocyanic acid) produced goes into adiponitrile and is used in the manufacture of nylon 66 resin, an engineering thermoplastic Because of nylon's high tensile strength, flame retardance and heat deflection properties, it is used in automotive and truck parts, electrical and electronic parts, industrial machinery parts, and in other consumer goods About one-quarter of hydrogen cyanide produced is used to make acetone cyanohydrin, which is used to make methyl methacrylate Methyl methacrylate is used to manufacture window glazing, lighting fixtures, taillight lenses, disposable medical equipment, laminates, polymeric optical fibers, and appliances About 10% of hydrogen cyanide produced is used to make sodium cyanide, which is used by the

mining industry for gold recovery Some sodium cyanide is used in electroplating, caffeine synthesis, and pharmaceutical manufacture Other products that are made using hydrogen cyanide include soaps, kidney dialysis products, herbicides, and coatings

About two-thirds of **phosphorous trichloride** is used in glyphosphate herbicides and organophosphate insecticides A small amount (13%) is converted to phosphorous oxychloride, which is used in plastics and elastomers, functional fluids (fire resistant lubricants and hydraulic fluids for industrial machinery and aircraft), and pesticides Another 12% is used to produce surfactants Phosphorous trichloride is used in the textile, pulp and paper, photography, and electroplating industries Other uses include plastics and elastomer additives (antioxidants, heat stabilizers, flame retardants) and oil additives.

A derivative of sulfur trioxide, **chlorosulfonic acid** (sulfuric chlorohydrins) is used to make detergents, pharmaceuticals, dyes, pesticides, intermediates ion-exchange resins, anhydrous hydrogen chloride and smoke producing chemicals

About 85% of **methyl bromide** (bromomethane) produced is used as a soil and space fumigant For this purpose, it is sometimes used with chloropicrin (also a TIH material) It is also used as a chemical intermediate Various derivatives are used to make pharmaceuticals and agricultural chemicals It is also used as an extraction solvent for vegetable oils By international agreement (to protect the ozone layer), methyl bromide production was to be phased out in industrial countries

Dimethyl sulfate (methyl sulfate) is primarily used as a methylating agent for amines and phenols End-use products derived from dimethyl sulfate include surfactants, fabric softeners, water treatment chemicals, pesticides, pharmaceuticals, dyes, and photographic chemicals It is less often used as a sulfonation agent, catalyst, solvent, and stabilizer.

Chloropicrin (trichloronitromethane, nitrotrichloromethane, nitrochloroform) is a rodenticide used in grain elevators, bins, and other storage places It is also applied to soil as pre-planting soil fumigant for control of fungi, verticillium wilt, nematodes, insects and weed seeds Used in field bean crops and with fruits, tomatoes, tobacco, potatoes, other field crops (peanuts, sugar beets, etc), lawns and turf, and as a fumigant for structural pest control Chloropicrin is a possible alternative for methyl bromide Other uses include organic synthesis and as crystal violet dye It has also been used as a tear gas agent

Allyl alcohol is used to make glycerol, herbicides (acrolein), and various resins and plasticizers Used in the manufacture of flavorings and perfumes, it is also an intermediate for many pharmaceuticals It is also used as a military poison

Bromine is a very reactive chemical It is used primarily as a chemical intermediate, it is used to make a wide spectrum of commercial products These products include flame retardant additives, fire extinguishing agents, well completion fluids, water treatment chemicals, fumigants (methyl bromide), dyes, pharmaceuticals, photographic chemicals, and rubber products (automobile tires)

Titanium tetrachloride (or titanium chloride) is primarily used to make pure titanium metal (which is used to make aircraft parts, athletic equipment, and medical devices) and

titanium dioxide (which is a pigment used in paints and foods and a whitening agent used in toothpaste) It is also used to make a variety of titanium catalysts, which, in turn are used to make various plastics, fibers, rubbers, and films Minor uses include certain military uses (smoke screens)

Hexachlorocyclopentadiene (or perchlorocyclopentadiene) is used to make fire-retardant chemicals—chlorendic anhydride (used in fire-resistant polyester resins) and Dechlorane® Hexachlorocyclopentadiene is also used in the production of insecticides, including dienochlor and endrin, and as an intermediate for resins, dyes, and pharmaceuticals It is also an intermediate in shock-proof plastics

Hydrogen sulfide is used to make sulfuric acid (phosphate fertilizers, copper processing), sodium hydrosulfide (pulp processing for Kraft paper, copper mining, dye manufacturing, desulfurization of rayon and cellophane and leather tanning), sodium sulfide (leather tanning, polysulfide elastomers and plastics, dyes, pulp and paper, lubricating oils, wastewater treatment, photographic reagent, etc), calcium polysulfide (a fungicide), sulfur chlorides and fluorides, and mercaptans (used in lubricating oils and cutting fluids)

Ethyl chloroformate (ethyl chlorocarbonate) is used as an intermediate in making diethyl carbonate, floatation agents, polymers, and isocyanates Diethyl carbonate is a solvent for nitrocellulose, and for synthetic and natural resins

Dinitrogen tetroxide (nitrogen tetroxide, nitrogen dioxide) is used to produce nitric acid and as an oxidizer for spacecraft/rocket fuels, catalyst, oxidizing agent, nitrating agent, and a polymerization inhibitor for acrylates Nitric acid is used in the manufacture of ammonium nitrate (a fertilizer providing nitrogen essential for plant growth), explosives, dyes, cellulose nitrate (used in automotive lacquers, rocket propellants, printing inks, flashless propellant powder, explosives), ore flotation, urethane polymers (used for sound and other insulation), rubber processing chemicals, and reprocessing spent nuclear fuel Acrylates are used to manufacture acrylic polymers used in medical instruments, signs, headlight lenses, nonwoven fabrics, adhesives, and automotive coatings, and as ion exchange resins, absorbents in chromatography, among myriad uses

Quantitative Assessment

The following is a quantitative assessment of the criticality of these TIH materials in a number of applications The analysis focuses on the value-added and employment associated with products and services ultimately dependent upon these TIH materials The list of products and services reflects those gathered in the qualitative assessment Many of the chemical intermediates, however, are not included, due to the unavailability of data In some cases, data were taken from the 2002 Economic Census, which is published by the Bureau of the Census of the Department of Commerce Lack of data also precluded inclusion of a number of distinct end-use applications (coatings, rocket fuel, parachutes, etc) Many downstream activities were not included as well For example, primary magnesium and titanium are included but magnesium and titanium products are not included

Sources for data on value-added and employment include the following from the Department of Commerce 1) Bureau of Economic Analysis (BEA) data on Gross Domestic Product (GDP) by Industry, and 2) the Annual Survey of Manufactures by the Bureau of the Census The value-added concept for the latter undercounts true value-added (as defined by the BEA) because of definitional differences In absence of a proper measure, however, it represents the best available information at this time

Table 1 presents the value-added and employment data for those industries and economic activities that are ultimately dependent upon TIH materials The data represent 2005 economic activity and employment for these industries The data are adjusted to reflect that share of the economic activity of the sector that is dependent upon these TIH materials For example, ammonia is used in coal-burning electric power plants in selective catalytic reduction to comply with Clean Air Act emission standards The value-added figure (and employment) reflects that electricity generated using coal accounts for only 49% of all electricity generated The remaining share is from other fuels The value-added (and estimated employment) of these other sources is not included in the estimates in Table 1

The data in Table 1 illustrate the criticality of TIH materials in a number of applications The value-added provided by the TIH material consuming industries amounted to $357 billion This was equivalent to 3% of US GDP Employment in these industries totaled 1 35 million people These figures do not include all economic activities where TIH materials are critical inputs

Summary

Removing the railroad common carrier obligation to provide "transportation or service on reasonable request" for hazardous materials (including TIH materials) would place at risk a sizeable share of the US economy This would adversely affect essential sectors of US manufacturing, agriculture, energy, transportation, technology, communications, health, and defense

TABLE 1

Value-Added and Employment in Industries for Which TIH Materials Are Critical

	Revenues $million	Value-Added $million	Employment 000
Agriculture & Food			
Corn	$22,198	$8,891	34 3
Wheat	$7,171	$2,878	13 3
Poultry Processing	$47,819	$27,159	226 4
Pork Processing	$28,183	$7,201	70 6
Vegetable Oils	$9,640	$1,869	7 2
Corn Syrup	$9,290	$3,864	8 7
Nitrogen & Related Fertilizers	$8,563	$3,603	11 1
Crop Protection	$13,370	$9,021	9 9
Cold Storage	$3,084	$1,891	49 3
Energy, Minerals & Water			
Ethanol	$2,866	$832	2 2
Electricity (from Coal)	$163,873	$101,129	197 3
Water Treatment	$5,860	$3,616	36 0
Gold Mining	$2,854	$2,003	9 3
Building & Other Materials			
Plastic Building Products	$14,852	$6,521	46 6
Foamed Plastics	$16,849	$7,487	67 3
Primary Aluminum	$4,865	$1,773	8 7
Copper Refining	$3,818	$1,357	1 4
Titanium	$850	$341	1 8
Magnesium	$170	$68	0 4
Electroplating, Steel Pickling & Coating	$22,661	$12,943	126 6
Explosives	$1,190	$578	5 6
PVC & Other Plastic Resins	$14,866	$5,350	11 7
Acrylic & Other Adhesives	$2,246	$1,106	5 1
Various Chemical Specialties	$24,887	$13,932	59 3
Industrial Products			
Air Bags	$3,420	$1,326	1 2
Batteries	$6,662	$3,122	25 1
Rope	$816	$4,230	4 1
Wire and Cable	$4,790	$886	7 3
Tire Cord	$1,184	$369	4 1
Dyes	$6,682	$3,684	12 3
Printing Inks	$5,087	$2,051	12 1
Hydraulic Fluids	$2,047	$1,020	2 1
Fire Extinguishers	$991	$591	5 7
Selected Non-Woven Fabrics	$1,549	$823	4 8
Health Care & Other Consumer Products			
Pharmaceutical Preparations	$113,635	$86,816	141 0
Disposable Medical Products	$22,262	$15,583	74 3
Cosmetics	$9,887	$5,677	13 4
Non-Stick Cookware	$1,595	$848	4 9
Nylon Carpet	$12,963	$4,409	29 0
TOTAL	$625,575	$356,849	1,351 5