

# Report and Comments on Tesoro Savage Draft Environmental Impact Statement

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## INTRODUCTION AND BACKGROUND

I am a policy analyst, researcher, educator, and consultant with more than three decades of experience assessing the risks associated with transporting hazardous materials. Over the course of my career, I have advised governmental legislative and regulatory bodies, national chemical and oil worker and rail unions, insurance companies, fire service associations, citizen organizations, and environmental groups on the unique health and safety hazards of shipping hazardous materials by rail, including crude oil. I have testified before both houses of the United States Congress, have presented as an invited lecturer in twelve countries on chemical facility and chemical transportation accident prevention, and have provided testimony and comments on specific projects involving crude-by-rail [CBR] release risks. I have provided specific analyses of risks associated with transporting crude oil by rail in and around cities across the United States, including Albany, New York; Washington, D.C.; and the San Francisco Bay Area. My CV is attached to this report.

I am familiar with much of the legislative and regulatory efforts in North America following Lac Mégantic and several other major crude-by-rail accidents, and I have submitted comments to the U.S. Department of Transportation on their ongoing rulemaking on High Hazard Flammable Trains. I have reviewed Draft Environmental Impact Reports and accompanying documentation in other jurisdictions with similar proposed projects for crude oil railcar unloading facilities. For example, I submitted critical comments on an environmental impact report prepared for a crude-by-rail project at the Valero Benicia refinery in California.

I have also provided expert written and oral testimony concerning the hazards and safety concerns of a proposal by Shell Refinery in Anacortes, Washington to build a crude-by-rail facility.

In preparation of this report, I have reviewed the relevant sections on dealing with rail safety issues of the Tesoro Savage Vancouver Energy Project [“the DEIS”] November 2015, including the Executive Summary, Chapter 4, Environmental Health and Safety, and Appendix E, Risk Assessment Technical Report.

#### SUMMARY OF DEIS FLAWS

- The DEIS analysis is inadequate, and despite admitted reliance on limited information, downplays the serious risk of an oil train fire and explosion. It never presents vivid estimates of oil train consequences for public safety nor considers the safety implications of BNSF routing selections.
- The DEIS’s Chapter 4 addresses in a summary way crude oil safety issues both at the proposed facility and in the rail haul to the facility, but throughout does not adequately address either environmental or public safety release event risks.
- The DEIS’s reliance on future compliance with federal and state standards does not necessarily ensure public safety. Both with the regulatory structures and with the industry standards summarized, Chapter 4 does not attempt to assess their effectiveness, nor the potential effectiveness of future improvements in tank car design or railroad operating procedures nor the risk posed by a delay in implementing Positive Train Control.
- The DEIS’s discussion of Emergency Response methods is inadequate and uninformative, neglecting even to mention the federal guidance indicating the near-

impossibility of local emergency responders effectively dealing with a serious CBR accident, and not assessing the effectiveness of such emergency response factors as foam stocks and Local Emergency Planning Committees.

- The DEIS fails to analyze the effectiveness of industry response plans or BNSF's own rail transportation and emergency response plans.
- Citing "insufficient data," the DEIS explicitly fails to assess key CBR risks, such as fire and explosion events. Thus, the full range of safety impacts remain unexamined, so that at-risk communities are left in the dark as to potential worst case scenario CBR releases.
- Facility disaster potentials are also downplayed in the DEIS, despite evidence from U.S. and Europe of the potential for significant disaster events, including massive "knock-on" multi-tank fire disasters.
- The DEIS's preferred method, probability analysis, is simply unavailable to be reviewed due to the admitted absence of adequate data. The DEIS analysis nevertheless uses incorrect rail data to low-ball CBR release risk probabilities and mis-characterizes unloaded CBR residue tank cars as "empty" and as non-hazardous.
- DEIS Appendix E's methodological approaches indicate systematic use of inadequate or unsupported analysis to downplay potential CBR impacts. Appendix E makes no real attempt vividly to display or to quantify potential consequences of a severe CBR derailment, either for human safety or for the environment.
- Instead, Appendix E focuses on calculations of spill release probability, which rest mainly on analysis of data regarding what historical CBR accidents have already happened, not on what could happen. Regarding fire and explosion events affecting human safety—the focus of this report—Appendix E simply declines to consider the

consequences, or probability, or route segment-specific vulnerabilities regarding these potential human safety consequences.

- Appendix E's evaluations of "several different types of 'worst-case discharges' (WCD)" [p. 9] depend on a dubious strategy of inventing from whole cloth various categories of WCD which are nowhere else used in any regulatory context in the U.S. to my knowledge. The newly-minted categories of "WCD" in Appendix E are explicitly designed to be less than the Worst Case Discharge required for all oil storage facilities and carriers [not railroads] under the 1999 Oil Pollution Act regulations.
- Appendix E relies on flawed, suspect, and inadequate data, often without giving its sources and without discussing their possible limitations, instead making sweeping and unsupported arguments for using inappropriate data anyway.
- In several key areas, the DEIS Appendix E makes unsubstantiated assertions and assumptions and relies heavily on BNSF data and on "expert judgment" [e.g., p. 54] as the basis for key decisions in estimating—in relative terms only—which parts of the assumed CBR rail routes might see the most frequent derailments. Key methodological strategies have no citations to earlier peer-reviewed literature, only to reports from the same researchers.
- Appendix E heavily emphasizes federal domination of regulation in all hazmat transportation safety matters, and federal preemptive limits on state regulation. It does not point out the severe deficiencies in the new regulatory efforts put forward by federal officials nor discuss possible stricter limitations on speed or on train length.

- Appendix E never discusses seriously a matter of keen interest to the at-risk public, continent-wide and in Washington State, namely the potential for risk-reduction transcontinental routing of CBR unit trains.

## DETAILED DISCUSSION

### I. THE DEIS ANALYSIS IS INADEQUATE AND DOWNPLAYS THE SERIOUS RISK OF AN OIL TRAIN FIRE AND EXPLOSION.

The overall DEIS, in both Chapter 4 and the underlying Appendix E, is deficient in avoiding analysis of and downplaying the seriousness of crude-by-rail (CBR) fire and explosion risks, both at the proposed Facility and on the rail line haul, and in declining to consider absolute potential derailment consequences in favor of presenting only relative derailment release impacts analyses which inadequately deal with oil spill environmental risks only. The DEIS has adopted these analysis strategies despite the availability of other examples and precedents in the facility and agency analyses mandated in key and longstanding U.S. disaster risk regulatory regimes such as the U.S. Community Right to Know laws, the Oil Pollution Act, and in previous CBR-related reports.

Admitting to “limited information,” the DEIS nonetheless suggests that the probabilities of serious derailment releases – a key component of overall CBR derailment risk -- were vanishingly small. The probability analyses use newly invented derailment spill impact categories, in combination with sometimes inaccurately cited and often inappropriately used historical CBR accident data.

Although the DEIS presents voluminous data supporting its chosen analyses, and suggests briefly that even less than a worst case release CBR derailment scenario could involve numerous releasing railcars and have serious impacts, it never vividly presents estimates (e.g., with Offsite Consequence Assessment maps) of potential CBR derailment public safety impacts.

The DEIS never discusses seriously a matter of keen interest to the at-risk public, nationally and in Washington State, namely the potential for risk-reduction routing of CBR unit trains. It simply accepts the BNSF routing decisions as given, despite recognizing some quite serious differences in risk in certain localities.

## II. ANALYSIS OF CHAPTER 4: CRUDE OIL SAFETY CONSIDERATION, POTENTIAL RELEASE SCENARIOS, AND IMPACT ANALYSIS.<sup>1</sup>

The DEIS's Chapter 4 addresses in a summary way crude oil safety issues both at the proposed facility and the rail haul to the facility, but throughout does not adequately address either environmental or public safety release event risks. It mentions briefly very early on [p. 4-1] that "crude oil releases could also result in fire and/or explosion," only to disregard these risks, on the flimsiest of rationales [p. 4-25], for nearly the rest of the entire document. This report will focus mainly on how the DEIS overall treats these potential public safety fire and explosion release risks, and mainly in the rail sector, but also with some reference to the DEIS Chapter 4's treatment of similar Facility risks, since such treatment illustrates by analogy, and sheds significant light on, the important tendencies in the DEIS to downplay chemical disaster risks in both sectors.

### A. Compliance with Federal and State Standards Does Not Necessarily Ensure Public Safety.

The DEIS Chapter 4 summarizes the existing federal and state safety standards and regulatory structures, first in regard to the proposed facility [pp. 4-2, 4-3] and then in regard to the rail haul [p. 4-4]. The implicit assumption throughout in this uncritical survey is that these standards and structures are effective and adequate, although the DEIS briefly outlines some evidence of agencies and officials pursuing urgent and significant improvements in these. It only

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<sup>1</sup> The Chapter 4 discussion of risks is based centrally on the DEIS's Rail Spill analysis in Appendix E, discussed in the latter part of this report.

briefly mentions the most recent Washington State legislation HB 1449 on Oil Transportation Safety and the new proposed requirements from the Washington UTC [p. 4-5] in implementing the bill.

Chapter 4 does not highlight any critiques from legislators and others who have characterized the current standards and regulations as inadequate, and the new federal safety regulations as also falling far short of the needed significant improvements.

Chapter 4 also summarily lists current facility and rail Industry Safety Standards [pp. 4-6,4-7]. The facility standards are all, as should be expected, generic for chemical storage facilities, since crude by rail unit train unloading facilities are relatively so new, whereas the line haul rail safety standards have newly been hastily revised by the rail industry, and by federal and state governments, in view of the many recent CBR derailments.

Both with the regulatory structures and with the industry standards summarized, Chapter 4 does not attempt to assess their effectiveness. Chapter 4 also uncritically outlines the federal specifications for the new tank car DOT Specification 117 without any new assessment of whatever quantitative improvements in tank car derailment puncture and fire event survival the brand-new design of flammable rail cars might in future bring, and with no citation of previous DOT estimates of such improvements.

Chapter 4 similarly cites a long list [p. 4-9] of BNSF\_voluntary rail safety operating standards (some extending beyond federal standards) and emergency response and community outreach efforts, with no measures of their effectiveness nor reliability across the whole Western U.S. spread of the BNSF rail system, nor of their permanence.

Regarding its discussion of Positive Train Control [p. 4-9, 4-10], a crucially important new safety measure mandated by Congress, Chapter 4 mentions that BNSF (like the other U.S.

railroads) was definitely not going to meet the deadline set for December 31, 2015 and that subsequently, Congress in late 2015 gave the railroads an additional three to five years to do so. The safety impact of this long delay on risks in future Washington CBR transportation remains unexamined.

B. The DEIS's Discussion of Emergency Response Methods Is Inadequate and Uninformative.

In similar fashion, Chapter 4 outlines [pp. 4-10ff] various levels of current government agency "Accident Prevention and Response Plans" without any effort to assess the effectiveness of such planning in either prevention or response, from previous performance and actual events or in hypothetical release scenarios for the future.

For a "Crude Oil Fire and/or Explosion," Chapter 4 simply asserts that BNSF and all other emergency response entities "would implement" their emergency response plans [pp. 4-41ff]. DEIS Chapter 4 admits that "The proposed Facility would not have a fire brigade." [p. 4-45].

Chapter 4's discussion of response to a crude oil [non-ignited] spill along the rail corridor initially focuses on emergency response procedures and the potential for firefighting foam applications to prevent ignition. It does not cite the ample evidence that fire service sources have indicated that foam operations have very limited potential for dealing with serious crude oil fire events.

Mentioning a possible "Crude Oil Fire and/or Explosion," but without discussing the scale or characteristics of historical or potential events of this kind, Chapter 4 in two paragraphs states that "BNSF resources" would be mobilized, and possibly involve "contract firefighters" and "a local fire chief or other Incident Commander." There is no discussion of how effective (or ineffective) such measures have been in previous CBR incidents. The subsequent discussion

[pp. 4-46 ff] acknowledges that huge emergency response resources may be needed, and that “defensive” firefighting may be implemented.

Notably, there is no explicit mention in Chapter 4 nor even a citation in the references for Chapter 4 of the respected U.S. DOT Emergency Response Guidebook,<sup>2</sup> with its blunt advice, well-known and complied with by the North American fire service, that if even one tank car of crude oil is involved in a fire, firefighters should evacuate and back off 1/2 mile and let it burn. This life-saving necessity rules out any effective use of foam in “offensive” firefighting, even if the huge quantities of water needed were available, as well as some other likely proposed “additional firefighting measures.” [cf. p. 4-21].

Chapter 4 mentions [p. 4-15] the state’s county-based system of Local Emergency Planning Committees [LEPCs] and lists each LEPC’s contact person. But Chapter 4 does not indicate that the state has done any kind of assessment of the LEPCs nor of what state officials privately have acknowledged are the widely differing capabilities of these volunteer and usually “unfunded federal mandate” LEPC organizations [personal phone interview, 12/16/15]. Two U.S. EPA national surveys of LEPCs in 1999 and 2008 concluded that LEPCs varied substantially in their activities and capabilities, and that they did a poor job of [what Congress intended to be their main task] communicating risk to the public.<sup>3</sup>

C. The DEIS Fails to Analyze the Effectiveness of Industry Response Plans.

Chapter 4’s discussion of Industry Response Plans and capabilities [both for facility and for rail haul] likewise does not assess the effectiveness of these [p. 4-17], e.g., from historical

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<sup>2</sup> The ERG’s Guide 128 deals with the hazards of crude oil and other like flammables; it is available at [http://phmsa.dot.gov/pv\\_obj\\_cache/pv\\_obj\\_id\\_7410989F4294AE44A2EBF6A80ADB640BCA8E4200/filename/ERG2012.pdf](http://phmsa.dot.gov/pv_obj_cache/pv_obj_id_7410989F4294AE44A2EBF6A80ADB640BCA8E4200/filename/ERG2012.pdf).

<sup>3</sup> The two national EPA surveys of LEPCs are available at: <http://www.epa.gov/epcra/nationwide-survey-local-emergency-planning-committees>.

events in Washington or elsewhere, nor provide any example of any agency testing systematically such industry plans and capabilities on a regular basis.

Under Proposed Facility Plans [p. 4-18ff], Chapter 4 mentions [p. 4-19] a proposed “Facility draft operations SPCC Plan” that includes scenarios including a “large spill event,” without divulging what this event would be. EFSEC will reportedly be assessing this plan, as well as the forthcoming Fire and Explosion Prevention and Response Plans” [p. 4-20]

DEIS Chapter 4 notes also that “a draft Facility Response Plan is not currently available for review.” Other significant items cited in this section also remain unavailable for public scrutiny, and will not necessarily be provided in the future, so it is speculative for the DEIS to list these as significant risk reduction factors. The DEIS does acknowledge significant emergency response deficiencies by mentioning what other reviews are underway, the findings of which have not informed this DEIS. [p. 4-21].

D. Rail Transportation and Response Plans Remain Unanalyzed.

Similar inadequate DEIS analyses can be seen in the section 4.3.9 on Rail Transportation Plans. Chapter 4 relies heavily on what BNSF itself has asserted that it can provide, again with no assessment of the actual or predicted capabilities of BNSF.

The DEIS’s mapping of the BNSF locations [p. 4-22] of the railroad’s own 220 hazmat responders includes no effectiveness history or measures. Some counties along the Washington state routes reportedly have no public hazmat teams, and the mapping of BNSF’s specialized hazmat response equipment [p. 4-23] widely scattered all throughout the BNSF system in the Western U.S. should have led the DEIS to an assessment of what can be considered an adequate emergency response capability to a CBR derailment event in a Washington location.

Chapter 4 does cite recent CBR-related state surveys of response preparedness organizations which are quite sobering in revealing large gaps [p. 4-48], but it deflects attention

and state accountability by quoting the similarly sobering 2014 national US DOT/PHMSA document<sup>4</sup> and stating such gaps are “not unique to Washington.” Not being uniquely unprepared for an oil train spill and fire does not lessen the importance of emergency response planning. The PHMSA guide briefly mentions [on pp. 9, 12 and 16] the U.S. Department of Transportation Emergency Response Guidebook [the Orange Book,” or ERG], but does not highlight its blunt advice regarding ½ mile evacuation if even “one CBR tank car is involved in a fire,” and says it should be used for “the initial phases of an incident.”

DEIS Chapter 4 includes some severe and appropriate state-level emergency response-related precautions and suggests that even nationally in case of a severe CBR release event “*most emergency response organizations will not have the available resources, capabilities or trained personnel to safely and effectively extinguish a fire or contain a spill...*” [p. 4-49], a conclusion underscored by the recent state agency reports on emergency response capabilities in Washington State.<sup>5</sup>

E. The DEIS Fails to Assess Key CBR Risks.

Summarizing briefly the assumptions in its overall methodology [see also discussion in Appendix E, below], DEIS Chapter 4 concedes explicitly that it will not attempt to assess key CBR risks. It states as a fact [pp. 4-24ff] that the operations of a unit train crude oil unloading facility as proposed by Tesoro Savage are so relatively new a phenomenon that their risks cannot be rigorously or statistically [“meaningfully”] predicted from the available historical data. The DEIS does not even try at all to outline such risks, at least by analogy, e.g., by citing cases of

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<sup>4</sup> [http://www.phmsa.dot.gov/pv\\_obj\\_cache/pv\\_obj\\_id\\_D49E5CEF1AC2AB4A887FDA7364FDD00E87BE0200/filename/Petroleum\\_Crude\\_Oil\\_CERG.pdf](http://www.phmsa.dot.gov/pv_obj_cache/pv_obj_id_D49E5CEF1AC2AB4A887FDA7364FDD00E87BE0200/filename/Petroleum_Crude_Oil_CERG.pdf).

<sup>5</sup> Washington State Marine and Rail Oil Transportation Study (March 1, 2015), <https://fortress.wa.gov/ecy/publications/documents/1508010.pdf>.

U.S. chemical unloading facility accidents investigated by U.S. NTSB,<sup>6</sup> at least to indicate some important features of such unloading facility risks.

Likewise, for rail line haul risks, Chapter 4 employs a similarly evasive series of rationales in the same section to justify not having its independent analysis [Appendix E] seriously or vividly address the likelihood of fire and explosion risk either at the proposed terminal facility or along the rail lines:

*There is insufficient data on spill-related fires and explosions to support a meaningful statistical analysis of the likelihood of fire and/or explosion resulting from a spill or accident, and therefore fire and explosion risk was not addressed in the independent analysis.*

[pp. 4-24, 4-25 (emphasis added)]

It is not safety “conservative” for the DEIS to fail to consider the massive derailment release impacts that could occur at some track locations, e.g., in cities or along key waterways, as well as the much less serious impacts that could at others. The DEIS is averting its gaze from the potential releases in favor of a relative impacts study of the different environmental vulnerabilities along the routes.

Chapter 4 does suggest briefly the wide range of types of crude oil that CBR shipments to the Facility could carry, including Bakken and Canadian tar sands dilbit, with differing and not negligible toxic and flammability potentials that could cause different accident impacts. [p. 4-33 to 4-36]. But there is no discussion of the effectiveness of stabilization methods for crude oil cargoes, whether current or future.

And Chapter 4 outlines abstractly, without suggesting corresponding consequences, only a brief typology of the “crude oil fire and/or explosion events” that could occur [p. 4-35, 4-36].

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<sup>6</sup> <http://www.nts.gov/Search/pages/Results.aspx?k=chemical%20unloading>.

Even in abstractly listing these fire events, Chapter 4 neglects to acknowledge the only published academic study of a CBR major fire event, a 2014 University of Illinois Urbana Champaign study that suggests that perhaps the major danger [as survivors vividly described at Lac-Mégantic] from a major crude oil derailment event could be “Rivers of Fire,” huge flows of burning oil into downslope areas from the derailment scene.<sup>7</sup>

The DEIS assumes spill scenarios in Table 4-13 that indicate a ½ mile zone on each side of the rail line is “potentially affected,” without discussing the exact impacts or quantifying their costs in life and property. Using assumptions, modeling, or expert analysis detailed in Appendix J [river spill scenario environmental modeling, which this report does not cover] – the DEIS outlines some “assumed” impacts, namely, estimates of impacts [only] on the rivers of CBR spill scenarios of different scale, e.g., spill slicks on the Columbia River from one to 13 River Miles. Note that in Table 4-13, even “very large crude oil spills” and “small fire events” in all the categories of facility, vessel, and rail releases, are assumed to be “contained” within bermed areas or “controlled” on the release site. [See also p 4-54 for the facility, rail or vessel oil spill potential event scenarios used in environmental resource [river] impact analysis]. But even for potential river spills, Chapter 4 makes no estimates of quantified consequences, e.g., which it could perhaps have found from previous calculations under Washington State’s spill damage compensation formulas. Chapter 4’s Table 4-14 for rail transportation Scenario Spill Volumes [without fire or explosion] indicates a range from 10% of 1 railcar to a 28 full rail car spill. [p. 4-55], with no details of the consequences.

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<sup>7</sup> Proceedings of JRC2014 Joint Rail Conference (April 2-4, 2014), Colorado Springs, CO, USA. JRC2014-3851, DRAFT FLAMMABLE LIQUID FIRE CONSEQUENCE MODELING, Jesus Aguilar Serrano, Mohd Rapik Saat, available at <http://ict.uiuc.edu/railroad/articles/Files/Conference%20Proceedings/2014/JRC2014-3851.pdf>.

F. A Full Range of Safety Impacts Remains Unexamined.

The DEIS Chapter 4, unlike in its analysis of assumed river spills impacting the environment, with potential derailment fire and explosion events threatening public safety makes no quantified estimates of even of the geographical range of such impacts, only vague estimates that such impacts could “spread beyond the immediate area.” [p. 4-54]:

*Derailment of multiple railcars could result in explosions of multiple railcars, with debris and large fire that spread beyond the immediate area. An accident resulting in an oil spill and associated large fire that would not be easily controlled.*

DEIS Chapter 4’s inadequate, brief discussions of fire and explosion hazards – remarkably lacking in quantitative detail, are scattered through different sections, but the main analysis for public safety impacts is buried deep in the document in a short Section 4.7.9 on Environmental Health. This section summarizes potential CBR unloading facility and derailment risks to public safety, but in only very general terms, with no reference to experienced or potential CBR or closely analogous accidental release scenarios, much less with any maps detailing the spatial extent of estimated public safety impacts.

At-risk American communities are used to thinking they have a right to know in ample detail the scope of the chemical disaster release risks they face from local high risk facilities. By contrast to this inadequate DEIS treatment of fire and explosion risks, U.S. EPA guidance documents have for three decades provided detailed Offsite Consequence Analysis methodologies for high risk chemical facilities and for the 4100 U.S. LEPCs. These Risk Management Program [RMP] analyses are available from the LEPCs or from special regional federal reading rooms, estimate the extent of hypothetical [not limited to what has already occurred] chemical release Worst Case Scenarios [and alternative release scenario] events such

as fires, explosions, and toxic gas clouds and their impacts on local human and environmental “receptors” potentially impacted.

Often the worst case scenario modeled in a facility’s Risk Management Program is a release from a chemical tank car on the site of the covered facility. The DEIS Chapter 4 treatment of fire or explosion risks, by contrast, is simplistically vague, although suggesting potential “major” impacts, left unelaborated. [pp. 4-85, 4-86].

G. Facility Disaster Potentials Are Also Downplayed.

A close look at Chapter 4’s treatment of CBR facility disaster risks is useful for assessing its similar approach to CBR derailment risks. Regarding the potential for significant CBR unloading facility accidents, even for the milder category of “spills” vs. fire and explosion events, Chapter 4 downplays facility spill, fire, and explosion disaster risks even though such risks are well-known in the high-risk hydrocarbon industry. Instead, the DEIS relies on its assertion of insufficient data for this new type of CBR unloading facility to underlie their preferred risk assessment approach of a statistical probability analysis [ p. 4-25].

In fact, the sole 3 ½ page report that Chapter 4 cites is simply a hurried Safety Alert from U.S. agencies that cannot be relied upon as an authoritative source. EPA and OSHA jointly produced this 1997 safety alert in the face of a spate of fatal catastrophic flammable storage tank accidents in the 1990s, citing not a single serious study analyzing the occurrence or potential consequences of similar accidents from the U.S. or anywhere else, and presented no data overall on accident probabilities. Since the agencies did at least reference serious fire and explosion accidents then being experienced in the U.S., the 1997 Safety Alert discussion is quite sobering and does not support the complacent “unlikely to fail” summary conclusion in the DEIS. The

joint federal agency Safety Alert also contains no serious analysis of what federal or state safety standards were or were not effective in preventing or mitigating such events.<sup>8</sup>

The DEIS's neglect of potential catastrophic fire and explosion risks is underscored by ample evidence that petrochemical storage tank disasters continue to occur worldwide. The authoritative analyses of Marsh & McLennan industry consultants, in their 23rd edition of "The 100 largest Losses in the Hydrocarbon Industry" (2014), strongly suggest an accelerating pace of costly disasters.<sup>9</sup>

The 100 Largest Losses report indicates that even the industry sector of terminals and distribution -- in which ignition probabilities are arguably far smaller than in the complex facilities such as refineries and petrochemical/gas processing plants -- accounted for fully 5% of the total cost of these largest losses.

The 2005 Buncefield flammable [gasoline] storage tank farm multi-tank disaster in the U.K., cited briefly above in the Marsh & McLennan report, completely shocked industry and government experts who thought a reportedly well-regulated U.K. major hazard industry had eliminated the potential for such a disaster to occur after major disasters such as the 1974 Flixborough explosion. The subsequent major hazard U.K. Health and Safety Executive investigation of the 2005 Buncefield disaster, however, revealed significant systemic deficiencies in the critical risk management systems of the facility and showed the real potential at many similar major hazard storage facilities for "knock-on impacts" [one container on fire causing containment failures in others nearby] and for failures of secondary containment. [See Appendix

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<sup>8</sup> <http://www.epa.gov/sites/production/files/2013-11/documents/cat-tnks.pdf>.

<sup>9</sup> <https://uk.marsh.com/Portals/18/Documents/100%20Largest%20Losses%2023rd%20Edition%202014.pdf>.

II below] The DEIS does not consider any such knock-on accidents at the proposed facility in which crude oil unloading operations might be involved or impacted.<sup>10</sup>

Similar failings to those uncovered by UK HSE in the Buncefield disaster case have more recently been bluntly outlined as also systemic and dismayingly prevalent in the US petrochemical industry, through recent sharply critical reports of the U.S. Chemical Safety Board on refinery disasters here.<sup>11</sup> The US had its iconic major hazard disaster ten years after Flixborough, in the American company Union Carbide's urban gas disaster in 1984 in Bhopal India, with several more in intervening years, but with Congress able to enact only two Community Right to Know laws as a response, the US has arguably had a more hands-off and much less protective federal government role in major hazard disaster prevention than the traditionally more intrusive governments in the UK and Europe generally with their EU-mandated Seveso Directive regimes.

The reaction to the Buncefield disaster by some experts underscores the inadequacies of the DEIS Chapter 4's failures seriously to address CBR proposed Facility risks, especially fire and explosion hazards. Some who do seriously consider such risks in flammables storage facilities caution a pessimistic approach rather than relying uncritically either on inadequate current industry standards and actual practices [the latter were outlined but unassessed by the DEIS], or on the relatively low numbers of very large accidents that have already occurred.

For example, a UK academic article by Atherton and Ash in 2014 raised strong issues with the use of probabilistic risk assessment or PRA, which often [optimistically] resulted in predicting very low probabilities of serious releases. The authors recommended an alternative

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<sup>10</sup> <http://www.hse.gov.uk/comah/buncefield/buncefield-report.pdf>.

<sup>11</sup> <http://www.idevmail.net/link.aspx?l=3&d=86&mid=414620&m=1280>.

approach, what might be called a “pessimistic” approach to risk assessment, regarding the likelihood of major chemical hazard releases in a context of inadequate safety standards.<sup>12</sup>

H. The Probability Analysis Is Unavailable in the Absence of Adequate Data.

The DEIS Chapter 4 has a middle section with a somewhat more detailed outline of its probabilistic methodology for estimating potential spill size in CBR transportation to the facility [limited to rail haul within the state of Washington]. Any kind of robust probability analysis, however, must be supported by ample, reliable, and relevant data, which in this case is glaringly unavailable. The most detailed discussion in methodological Appendix E indicates its dependence on a multi-stage but rather simple probability analysis, although one generating many pages of data. [p. 4-27].

The lack of such data is one of the major weaknesses of quite sophisticated chemical disaster Probabilistic Risk Analyses practiced in several nations.<sup>13</sup> When publicly challenged on this point in a probing 12/18/15 Washington media article, the DEIS authors readily suggested the DEIS is a “draft” document based on “limited sources of information.”<sup>14</sup>

I. The DEIS Analysis Uses Incorrect Rail Data.

The underlying “commissioned independent risk analysis” in Appendix E [to be discussed in more detail later] also crucially depends on often inappropriate “historical” data on rail accidents, and it downplays very large, less frequent accidents. Chapter 4 is deficient in consistently relying [e.g., see p. 4-28] on FRA statistical data on rail accidents with all kinds of hazmat railcars and for the period of 1975 to 2014. These data largely involve small numbers

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<sup>12</sup> [http://www.lightningsafety.com/nlsi\\_11s/Causes-of-Failures-in-Bulk-Storage.pdf](http://www.lightningsafety.com/nlsi_11s/Causes-of-Failures-in-Bulk-Storage.pdf).

<sup>13</sup> <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.202.7445&rep=rep1&type=pdf>.

<sup>14</sup> <http://www.spokesman.com/stories/2015/dec/18/critics-say-oil-trains-report-underestimates-risk>.

[relative to unit trains] of hazmat cars usually traveling in mixed-freight, or manifest trains, not the CBR unit trains that are very long, very heavy and harder to handle than manifest trains.

[Some historical North American exceptions involving dedicated trains in chemical transportation would be – in Canada – the Ultra Train that travels through Montreal and the dedicated Chemical Train that Dow Chemical regularly used to ship from the Gulf Coast up the Mississippi River route to its flagship plant in Midland Michigan.]

The Chapter 4 analysis relies in several instances on dubiously relevant data – for example, on “all derailments” nationally and in Washington. And it relies on what Chapter 4 terms “historical data [which] includes DOT 111 and CTC 111 tank cars” -- the older, discredited puncture-prone CBR fleet. This data apparently does not include even the post-2011 introduction of substantial numbers of CPC 1232s, much less the miniscule number of any newer design cars only beginning to be constructed and deployed in the fleet. The DEIS states its assumption [pp. 13, 33] that freight railcars and freight trains all behave the same, an assumption that is flatly incorrect.

Chapter 4 also cites historical data [p. 4-28] that misses the recent rises in some aspects of experienced railcar accidents. Looking back many years at overall falling hazmat accident rate trends can hardly relieve the anxieties of the public which has witnessed the alarming numbers, the recent spate of often spectacular fire events in CBR unit train accidents in North America. Recent upticks in some accident indicators, moreover, also give reason for concern. As the New England Center for Investigative Reporting noted on May 20 2015 in “Rail safety fact check: Fires, spills up despite industry claims.”<sup>15</sup>

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<sup>15</sup> <http://necir.org/?s=crude+oil+trains> (“accidents involving fires have at least doubled in the past year,” and “hazardous materials releases have increased two years in a row.”).

J. “Empty” Tank Cars Are Not Actually Empty.

The DEIS Chapter 4 also dismisses the risks of railcars it calls “empties” as if they did not often [perhaps nearly always] include substantial residues, reportedly up to 3000 gallons, of crude oil and hydrocarbon vapors which are potentially very dangerous in a derailment, and which require that the railcars continue to be placarded as hazardous:

- Worried City of St Louis Fire Chief Dennis Jenkerson and Missouri legislators reportedly successfully negotiated a routing arrangement with the CBR railroads to force them to re-route fully loaded CBR railcars around the City neighborhoods where residents have protested loudly, such as Holly Hills.<sup>16</sup>
- Also, US DOT in its Safe Transportation of Energy Products online Q&A page, question 19, says that the Amended Emergency Order – Docket No. DOT-OST-2014-0025 applies to residue CBR shipments.<sup>17</sup>
- The general US DOT hazmat placarding regulations<sup>18</sup> appear to allow non-placarding of railcars with less than 1001 lbs. of residual cargo of flammables. The reportedly continued placarding of “empty” CBR railcars en route to the oil fields may indicate that they usually contain more than 1001 lbs.
- Finally, PHMSA’s recent website slide presentation on Hazardous Materials Transportation Placarding Requirements has a slide with the same placarding message.<sup>19</sup>

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<sup>16</sup> <http://www.ksdk.com/story/news/local/5-on-your-side/2015/07/27/five-on-your-side-trains-st-louis/30717249/>.

<sup>17</sup> Q19: Does the EO pertain to residue shipments?

A19: Yes. Unless the tank car has been sufficiently cleaned of residues and purged of vapors to remove any potential hazards, the EO applies. <http://www.phmsa.dot.gov/hazmat/osd/qanda>

<sup>18</sup> <https://www.law.cornell.edu/cfr/text/49/172.504>.

<sup>19</sup> [http://www.phmsa.dot.gov/pv\\_obj\\_cache/pv\\_obj\\_id\\_058C261A5CEE28873576D096AB614E27E8DE1A00/filename/Placarding\\_Requirements\(04-07\).pdf](http://www.phmsa.dot.gov/pv_obj_cache/pv_obj_id_058C261A5CEE28873576D096AB614E27E8DE1A00/filename/Placarding_Requirements(04-07).pdf).

The DEIS Chapter 4 also low-balls the experienced derailments and the potential largest CBR derailments and suggests that the probabilities of the largest release are vanishingly low. As seen in Appendix E, the analysis does not estimate the frequency for spills larger than one [p. 4-29] involving 28 loaded railcars that results in a “20,000 bbl (WCD) or less” --- and the elapsed years [between releases] for this spill is estimated to be 21,959 years. The Lac-Mégantic release, which came within a couple of years of the initiation in North America of massive transcontinental unit train CBR traffic, was much larger.

The lack of serious analysis in the DEIS Chapter 4 is perhaps shown best in its dismissive treatment of the use of Worst Case Scenarios for considering the range of consequences of a CBR derailment release. The DEIS downplays such risks in the rail accident context, instead – as Appendix E indicates -- inventing out of whole cloth absolutely brand-new categories of WCD accidental releases and focusing on these.

### III. ANALYSIS OF DEIS APPENDIX E ON METHODOLOGY

As Appendix E<sup>20</sup> is primarily focused on river spills, its full analysis and methodology is therefore not a key focus of this report, but its methodological approaches indicate systematic use of inadequate or unsupported analysis to downplay potential CBR impacts.

The DEIS Appendix E, which describes in some detail the methodology which underlies and feeds into the more summary analyses in DEIS Chapter 4, is deficient in several key ways, which taken together indicate a systematic inadequate and unsupported analysis to downplay potential CBR impacts:

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<sup>20</sup> The page citations in this section are from Appendix E.

A. Failure to explain or quantify consequences.

Appendix E makes no real attempt vividly to show or to quantify potential consequences of a severe CBR derailment, either for human safety or for the environment. Instead, it focuses on calculations of spill release probability, which rest mainly on analysis of data regarding what historical CBR accidents have already happened, not on what could happen. It does not try to argue from precedents in other DEISs or reports that this is an appropriate way to meet the Washington state law mandate to consider potential public safety and environmental impacts.

Regarding fire and explosion events affecting human safety – the focus of this report and a key CBR risk concern of many following numerous North American fiery derailments – Appendix E simply declines to consider the consequences, or probability, or route segment-specific vulnerabilities re these potential human safety consequences.

Regarding impacts on the environment – a key concern of many Pacific Northwest area citizens, and even though considered in Appendix E to a much greater depth than public safety events – Appendix E provides no thorough consideration of actual consequences, much less any vivid informational display of these, e.g., through historical examples or through GIS mapping of potential spill impacts [as other DEISs have done regarding spread of oil spills on water bodies].

B. The New Minted “Effective WCD” Analysis Is Flawed.

Appendix E candidly outlines its general methodological approach at the beginning [p.8], heralding two key and very problematic analysis strategies:

- ignoring fire and explosion hazards [limiting its focus to oil “spills”]
- defining environmental impacts by outlining only the existing relative determinations by state WA agencies available on the “sensitivity of the receiving environment” at various sectors of the rail routes

Appendix E [again, only within the context of environment-impacting oil “spills”, not human safety-impacting “fires or explosions”] does not highlight that its evaluations of “several different types of ‘worst-case discharges’ (WCD)” [p. 9] depend on inventing from whole cloth various categories of WCD which are nowhere else used in any regulatory context in the U.S. to my knowledge.

Its brand-new concept of a “theoretical WCD” – based on a single historical all-railcar release event which it does not identify – and which Appendix E judges to be “extremely unlikely” – is actually not at all unimaginable, given the large number [88% of the total derailed] of cars which released cargo in the July 6, 2013 Lac-Mégantic disaster, which event inexplicably is only misleadingly mentioned in Appendix E. Lac-Mégantic is not the worst case one could imagine for several reasons -- for example, there are elevated tracks in some cities like Spokane WA and Richmond VA which could see whole-train falling rail car CBR derailments in which every single car conceivably could release.

Appendix E’s newly-minted “Effective WCD” is calculated for dubious reasons, implying that emergency response planning and environmental impact assessments need some new “realistic” categories of spills from a potential CBR accident. It does not cite any fire service or emergency planning officials’ calls for invention of such categories, nor any participation from them in creating them. And the methodology piggybacks instead on regulations from a remotely related regime, the relative environmental sensitivity calculations from Washington state law involving financial compensation for spills. Its justification for this creative categorization [p. 64] is that there is no “regulatory WCD volume” for railroads hauling crude oil.

Appendix E seems accurately to summarize the applicable current federal jurisdictional laws, and points out that the current “WCD planning volume” for railroads [given their well-known loophole in the Oil Pollution Act] is for only the required basic [not the comprehensive] Oil Spill Response Plan, namely only 3500 gallons, or 83bbl. [p. 66] – about 1/10 of the typical 30,000-gallon railroad tank car.

Footnote 8 for Table 5 shows that the new categories of “WCD” in Appendix E are designed to be less than the Worst Case Discharge required for all oil storage facilities and carriers [not railroads] under the 1999 OPA regulations:

*There is no regulatory definition of Average Most-Probable or Maximum Most-Probable Discharge for railroads as there is for vessels and facilities. These categories are included here solely for the purpose of the environmental analysis conducted in other parts of this study to coincide with the concepts of AMPD and MMPD volumes for vessels and facilities. [p. 14]*

Finally, in the last two pages of Appendix E, “Risk Mitigation through Response Preparedness” [pp. 88-89] it outlines only briefly some serious “fire and explosion” risks in connection with potential CBR spills, and is laudably blunt in describing significant “challenges” [without describing or quantifying potential spill impacts] to effective emergency response.

While it is good that Appendix E takes account [p. 10] of “potential [oil] spillage [into river environments] across the entire rail corridor [in WA State],” its methodology does not describe or take account of [e.g., by citing some historical examples] actual potentially severe environmental consequences [what a spill could do to some key ecosystems] in the varying locales along the routes. It only calculates the relative impacts of spills in various geographic

areas along the rail routes, as previously ranked by other agencies, for compensation purposes, into categories by their “environmental sensitivities.” [pp. 15ff].<sup>21</sup>

Appendix E describes potential impacts from two major types of crude oils, Bakken crude [without citing previous experienced accidental releases] and dilbit [pp. 38-42] , but regarding the latter, only with very brief references to a few recent studies, including a 2013 Government of Canada study of dilbit release behaviors which suggested that public concerns for “sinking” oil after the Kalamazoo River disaster were “for the most part, exaggerated” [p. 40 and cf. also pp 44 ff] This opinion is rebutted by the recently released National Academy of Science report *Spills of Diluted Bitumen from Pipelines: A Comparative Study of Environmental Fate, Effects, and Response* (Dec. 2015).

The Appendix E methodology for “Geographic Analysis of Potential Spill Impacts” [pp. 16 ff] is difficult to understand, with key assumptions and key sources left unexplained until a later section [pp. 44-54], for example:

- a. The “impact scores” assigned to major river impact zones [p. 16]
- b. The analysis of five BNSF subdivisions for track conditions. [p.18]
- c. The weights assigned to determine derailment probabilities in each BNSF subdivision. [p. 19]

In all these areas, the DEIS makes unsubstantiated assertions and assumptions and relies heavily on BNSF data and on “expert judgment” [e.g., p. 54] as the basis for key decisions in estimating -- in relative terms only -- which parts of the route might see the most frequent derailments.

Key methodological strategies have no citations to earlier peer-reviewed literature; instead the DEIS mainly relies on a previous report by the same consultants for another Washington agency

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<sup>21</sup> See the Washington State legislative context cited here, on compensation for spills damaging sensitive habitats: <http://apps.leg.wa.gov/wac/default.aspx?cite=173-183-400>.

[p. 19], and a couple of technical seminar presentations which the authors made on their methodology in Environment Canada's 2009 conference.

Appendix E presents the final results of its multi-step, essentially relativistic geographical analysis in Table 36, [p. 63], concluding that *“Based on this analysis, the highest risk based on probability and environmental impacts is to the Columbia River with a worst-case discharge diluted bitumen spill.”*

C. Appendix E Relies on Flawed Data.

Appendix E relies on flawed, suspect and inadequate data, often without giving its sources and without discussing their possible limitations. It often uses the data in inappropriate ways – e.g., using categories lacking relevance to the current issues at hand, and sometimes Appendix E authors virtually admit candidly as much. For example, in calculating General Derailment Frequency [pp. 11 ff], Appendix E employs categories such as:

- a. All freight accidents within a period -- as if accident and release rates for mixed freight manifest trains and unit trains are incontrovertibly comparable.
- b. All hazmat cargo derailments – as if some of these did not involve tank cars with hazmat cargoes that require railcar designs much stronger than the dominant DOT-111s, e.g., the cars for TIH cargoes, which stronger cars presumably would release at somewhat lower rates than CBR railcars.
- c. Time periods [e.g., “1975-1999” on p. 12] that pre-date the introduction and rapid growth of the use of crude oil unit trains and in massive volumes.
- d. Time periods that no doubt span very different realities in North American railroads' operating practices and regulations, and which pre-date recent changes in these since the periods discussed.

- e. It lowballs the CBR derailment oil releases at Lac-Mégantic [pp. 35], indicating only “>879 bbls” were released. It says that Lac-Megantic had 72 total tank cars, and 63 derailed cars, but only 5 [8%] “with spillage”, so only “7 percent spilled from total train.”<sup>22</sup>

Appendix E does not cite the only academic study of this disaster which estimated a release of 1.5 million gallons, causing 47 fatalities, extensive property damage and lake pollution.

Appendix E in several places mentions what it asserts [without substantiation] are “conservative” estimates, e.g., twice on p. 11, without giving sources and in fact asserting its lack of appropriate data and asserting therefore what are sweeping and unsupported arguments for using inappropriate data anyway, [e.g., p. 11 ]:

*The derailment analyses for federal and Washington are based on all varieties of freight trains, not necessarily crude by rail (CBR) trains. The reasoning behind this approach is that are not enough data on CBR train derailments alone to allow for a statistically-valid analysis. CBR traffic has been underway at a large scale only in the last few years. In addition, derailments occur regardless of the cargo content of the freight cars. Track conditions, rail operating procedures, and other factors unrelated to cargo content are the factors that determine derailment frequencies and locations.*

Appendix E’s discussion of “Risk Mitigation through Prevention” [pp. 67 ff] heavily emphasizes federal domination of regulation in all hazmat transportation safety matters, and federal preemptive limits on state regulation. It mentions three types of prevention measures that would be crucial to lower risks: Positive Train Control, stronger tank cars, and limits on cargo volatility. It presents a long list of, but does not point out the severe deficiencies in, the new efforts put forward by federal officials in these areas and others such as braking and thermal protection systems [pp. 68-69] and industry-wide and BNSF-specific voluntary efforts on

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<sup>22</sup> See Transportation Safety Board of Canada: Lac Mégantic Runaway Train and Derailment Investigation Summary. <http://www.tsb.gc.ca/eng/rapports-reports/rail/2013/r13d0054/r13d0054-r-es.asp>.

wayside detectors, etc. [pp. 69-87]. It does not discuss stricter limitations on speed or on train length.

Appendix E never discusses seriously a matter of keen interest to the at-risk public, continent-wide and in WA State, namely the potential for risk-reduction routing of CBR unit trains. It simply accepts as givens the BNSF routing decisions it describes, despite recognizing some quite serious differences in risk in certain localities, such as sensitive water environments and cities. Appendix E [p. 42] admits that raised trestles or bridges [as exist in Spokane, for example] could cause greater derailment spill impacts than the experienced CBR accidents so far on relatively level ground.

Current federal law, Public Law 110-53 Section 1551, mandates that railroads should be analyzing for their most risky hazmat cargoes [now including CBR trains] available alternative routes and selecting the “safest and most secure” route -- within High Threat Urban Areas only. But the law allows each railroad secretly to make these and its overall transcontinental routing decisions, using a hugely flexible set of 27 routing factors, and – a crucial loophole -- without forcing a railroad to interchange its cargoes with those competitor railroads which have safer routes. Such interchange agreements are the absolutely routine lifeblood of the North American rail system, with an estimated 6.5 million interchanges annually. Federal DOT officials have, in the context of their 2014 Draft Regulatory Impact Analysis on CBR cargo regulations, stated that urban risk reduction routing could lower risks significantly, but that currently it is impossible to tell whether railroads are prioritizing safety, and only the “modest” re-routing has been observed by the federal regulators.<sup>23</sup> [See Appendix I below.]

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<sup>23</sup> US DOT Draft Regulatory Impact Analysis (July 2014) pp. 56-57, 69-70, available at <http://www.regulations.gov/#!documentDetail;D=PHMSA-2012-0082-0179>.

## **Appendix I. A Note on Current Hazmat Routing Regulations**

U.S. Department of Transportation regulators proposed to include CBR trains within the existing framework mandated in Public Law 110-53, Section 1551 for the most dangerous hazmat cargoes [listed in Appendix H of the Final Rule] as seen in US DOT Docket PHMSA-2012-0082 (HM-251): Hazardous Materials: Enhanced Tank Car Standards and Operational Controls for High-Hazard Flammable Trains [HHFT].

Despite the DOT regulators' optimism, this regulation does not require any railroad actually to re-route around a single city, so merely folding CBR trains into this existing framework, which dates from 2007 and which allows enormous flexibility for railroad decision-making, may have resulted in fact in virtually no increased risk reduction. The railroad routing analyses and route selections are allowed by the law to be kept secret.

*US DOT Draft Regulatory Impact Analysis July 2014 pp. 56-57, esp. pp 69-70:  
<http://www.regulations.gov/#!documentDetail;D=PHMSA-2012-0082-0179>.*

### *Benefits/Effectiveness:*

*As noted above, Glickman et al analyzed the risk reduction benefits that might be achieved by rerouting hazardous material rail shipments to lower risk routes using a rail simulation model. [Glickman, Theodore S. Erkut, Eghan, and Zschocke, Mark S. 2007. The cost and risk impacts of rerouting railroad shipments of hazardous materials. Accident Analysis and Prevention.] The authors found that substantial risk reductions could be obtained for modest or no increase in shipment mileage. In some cases, their modeling identified lower-risk routes that actually decreased mileage. Obtainable risk reductions obviously vary depending on the shipment's origin and destination, but the aggregate conclusion for all routes analyzed was that a 22 percent risk reduction could be obtained with an increase of roughly 5 percent in total shipment mileage.*

*It is important to note that risk can be minimized practically in two ways: one is to run shipments over the highest-quality track, i.e. track that poses the lowest risk for derailment, collision, or other train accident. The other way risk can be reduced is to reduce exposure to train accidents. Rerouting can address either or both of these risk factors, but in some cases one factor must be traded off against another.*

*For instance, rail track may be better maintained in high population density areas, therefore, accidents may be more likely in a rural area. However,*

*should a hazardous material train accident occur in a high population urban area, the consequences may be much more severe than in a less populous area because more people are at risk of exposure, injury or death. In addition property value loss and the amount of infrastructure that may be destroyed is much higher in urban, high population areas.*

*This proposal requires railroads to balance these factors to identify the route that poses the lower risk. As such, they may, in certain cases, choose a route that eliminates exposure in areas with high population densities but poses a risk for more frequent events in areas with very low densities. In other cases the risk of derailment may be so low along a section of track that, even though it runs through a densely populated area, it poses the lowest total risk when severity and likelihood are considered. Glickman's estimate of safety improvements achievable by routing changes is based on an examination of how routing might vary as a rail carrier applies progressively heavier weights on various safety factors. In practice, it is impossible to know how much weight rail carriers will give to safety when making routing decisions. As noted above, based on past routing plans submitted by rail carriers to FRA for approval, application of the routing requirements resulted in modest changes to company routing decisions. It is therefore unclear to what extent these requirements would improve safety. However, PHMSA believes applying these routing requirements to HHFTs would have some effect. Even if very small, reductions in the risk of an adverse event due to the improved routing of HHFTs could produce benefits that outweigh the costs. For example, our current estimate of the total undiscounted lower-consequence damages of crude and ethanol derailments over the coming 20 years is expected to be \$4.5 billion.*

*\* \* \**

*Route planning and route selection provisions currently required for explosive, PIH, or radioactive materials are not required on HHFTs. Although voluntary actions were taken by the crude oil carriers from the Secretary's Call-to-Action, codification of these provisions is necessary. Codification is also a check on higher risk routes or companies. There is nothing in place/no incentive to require continued compliance with voluntary actions.*

*If the proposed rule is not adopted, railroads would not be required to conduct route risk analysis nor would they be required to reroute shipments over lower-risk routes. Specific identified criteria for the route and alternate route analyses may not be uniformly considered by all railroads, and written analyses of primary and alternate routes including safety and security risks would not be required. The costs to society, the government, and the rail industry of an accident involving a HHFT are high. If no action to better evaluate routing decisions, the threat of catastrophic accidents in large populated areas or other sensitive environments will continue.*

## **Appendix II. The 1974 Flixborough UK Flammables Explosion Disaster**

The Flixborough disaster was an explosion at the Nypro chemical plant close to the village of Flixborough, England, on June 1, 1974, killing 28 and seriously injuring 36. About 40 tons of the plant's 400-ton store of cyclohexane leaked from the pipe and formed a vapor cloud 320-650 feet in diameter. The cloud, on coming in contact with an ignition source (probably a furnace at a nearby hydrogen production plant) exploded, completely destroying the plant. Around 1,800 buildings within a mile radius of the site were damaged.

The fuel-air explosion was estimated to be equivalent to 15 tons of TNT and killed all 18 employees in the nearby control room. Nine other site workers were killed, and a delivery driver died of a heart attack in his cab.

Observers have said that had the explosion occurred on a weekday, more than 500 plant employees would likely have been killed. Resulting fires raged in the area for over 10 days. It was Britain's biggest ever peacetime explosion until the Buncefield Depot explosion in 2005. Substantial destruction of property was recorded in Flixborough itself, as well as in the neighboring villages. Significant structural damage affected a village eight miles away, and the blast was heard and felt twenty-five miles away.<sup>24</sup>

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<sup>24</sup> <https://www.youtube.com/watch?v=8A1xSCUtB-M>

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Public interest and environmental safety advocate, national policy analyst and lobbyist, trade union strategic researcher, educator and consultant, based in Washington, D.C., with skills, technical expertise and national, local and international contacts in a wide range of issues and strategies. Recognized international analyst in nuclear waste storage and transportation and industrial chemical use, transportation and accident prevention, emergency planning and homeland security. Consultant to the major U.S. chemical and oil worker unions, environmental groups, insurance companies and university and governmental bodies including the District of Columbia Council. Campaigns and accomplishments have covered a wide range:

- Analyzed safety problems and advocated national and grassroots action strategies for chemical hazard assessment, emergency planning, accident prevention, and public access to information. Educated citizens, workers and public officials in scores of petrochemical communities on generic industrial safety issues and on existing risk documents such as worst-case accident scenarios. Advocated many specific safety improvement activities by companies and governments.
- Conceived, initiated and with allies advocated successfully for new legislation enacting a major new federal regulatory program on prevention of chemical accidents: The Clean Air Act Amendments of 1990 impact an estimated 15,000 U.S. chemical and oil facilities and provide an estimated \$3 billion of worker safety training and new risk documents for workers, government officials and the public.
- After 9/11 raised nationally and in major target cities the issue of urban transportation of ultrahazardous cargoes providing attractive targets/weapons for terrorists. Campaign included new re-routing bills introduced in 10 cities and 3 states, testimony in city council hearings, supporting materials solicited from experts, submission of expert affidavit for court case, community presentations, national overview articles in trade press and chapters in books, op-ed pieces and promotion of coverage by local and national media. Wrote and lobbied for national rail hazmat re-routing legislation signed by the President on August 3, 2007, and led subsequent efforts to improve the law and regulations.

**2004-present Consultant on chemical accident and terrorism risks.**

Projects for various clients included: proposed oil refinery expansion to use Hydrogen Fluoride in Bakersfield CA (comments on DEIS and community protest led to revised proposal without HF); analysis for Will County IL of proposed 10-fold expansion of rail freight including hazmat cargoes through 30 populated Chicago suburbs; analysis of terrorism risk scenarios in publications by Columbia University and insurance company; media research on regional rail

hazmat risks; analysis of transportation risks of nerve gas chemicals; comment on CA state task force on railroad safety; analysis of chlorine transportation routes; for City of Savannah, analysis of LNG trucking risks and recommendations for local hazmat flow study; analysis of risks of major petrochemical port in South America; plus pro bono consulting, most recently on crude oil by rail issues in Albany NY and Washington DC.

**2003-2005 Director, Target Cities Re-Routing Project, Friends of the Earth, Washington, D.C.**

Initiated foundation-funded project to reduce safety and terrorism risks in transportation of ultrahazardous industrial chemical cargoes through High Threat Target Cities, with beginning focus in the Nation's Capital. Analyzed issues and regulations and advocated successfully for enactment of local DC Council Bill 15-525 banning the most dangerous cargoes; did technical, legal and regulatory analysis for fact sheets, Council testimony and slides; led alliance of union locals, tourist industry, emergency room physicians, environmentalists and public health associations in promoting the bill; did outreach and community presentations to Local Emergency Planning Committees, Metropolitan Washington Council of Governments, George Washington University occupational health forum, and media shows. Met with major stakeholders such as chemical shippers, city agencies, and railroads. Analyzed the issues and initiated introduction of re-routing ordinances in 10 other target cities, including St. Louis, Minneapolis, Memphis, Buffalo, Albany, Cleveland, Baltimore, Boston, Chicago and state legislatures of New York State and Tennessee. As the issue reached the national level in 2005 and again in 2007, helped write re-routing legislation for several committees of the House and Senate, and commented on the 2006 proposed twin rail security regulations from the Transportation Security Administration/DHS and US DOT. Consulted with target city governments, TV investigative reporters, national media, citizen groups. Invited expert presentation on dangerous cargoes to US Coast Guard's Chemical Transportation Advisory Committee, May 2006, Philadelphia PA and in roundtable "Railroad Routing of Hazardous Materials Expert Panel" hosted by ATSDR/DHS/SRB, September 2006 Atlanta GA. Wrote op eds and articles for trade journals and for book: James J.F. Forest (ed.), "Homeland Security" by Praeger Security International, 2006, Volume 3.

**2004-2005 Consultant, International Brotherhood of Teamsters Rail Conference, Washington, D.C.**

Analyzed rail safety, transportation security, and Liquefied Natural Gas facility security issues for the Research and Strategic Initiatives departments. Initiated project for survey and publication "High Alert" on chemical security issues in rail yards.

**2001-2002 Consultant, Bio-Terrorism Technology, Public Technology Inc., Washington, D.C.**

Analyzed availability of emerging technologies from federal laboratories for detection and decontamination of biological agents for use by local officials in a terrorism context. Analyzed technical and testing data, provided summaries, wrote comparisons of the technologies and recommendations for an ongoing system of third-party assessment and user needs surveys that

could help local officials wisely spend public funds on new capabilities.

**2000-2001 Research Director, Roofers International Union, Washington, D.C.**

In the service of an organizing campaign with residential construction workers in the Southwest U.S., did strategic corporate analysis on major homebuilder corporations. Wrote homebuilder corporate profiles and White Paper on worker justice issues. Advocated strategies on sprawl, retirees and healthcare, and networked with union retiree groups, Interfaith Councils, AFL-CIO and other allies. Did web analysis and advocacy for the campaign website, campaign leaflets, etc.

**1999-2000 Director of Environmental and Public Safety Policy, Center for Y2K and Society, Washington, D.C.**

Analyzed and publicized the potentially catastrophic systemic safety risks that Y2K posed to major national infrastructures such as petrochemical, water supply and food industries, to at-risk communities and to democratic decision-making. Wrote technical and policy analyses and policy and action-oriented recommendations content for Center's website. Advocated safety improvements in national and local forums and in weekly conference calls with allies.

**1995-1997 D.C. Coordinator, Nuclear Waste Citizens Coalition, Washington, D.C.**

Coordinated the work of a coalition of national and regional groups, from both commercial nuclear power plant communities and nuclear weapons site communities. Analyzed issues of centralized interim storage and transportation of irradiated fuel. Did technical research and organized and led Congressional advocacy, convened meetings of member groups, and wrote weekly fact sheets, analyses and recommendation on the issue.

**1994-2002 Consultant, nuclear waste and chemical accident prevention policies**

Clients included Public Technology Inc., Oil Chemical and Atomic Workers International Union, United Steelworkers of America, International Chemical Workers Union, Operating Engineers International Union, Friends of the Earth/England and Wales, National Environmental Law Center, Environmental Working Group, Labor Ministry of Brazil, Greenpeace International. Provided analysis for curriculum and delivered content at chemical accident prevention training programs, advocated for safety improvements at conferences on chemical accident prevention policy and programs, advocated for worker and citizen action implementing the new US chemical accident prevention laws.

**1989-1994 Director of the Toxics Project, Friends of the Earth, Washington, D.C.**

Responsible for analysis, policy development, lobbying and advocacy in chemical accident prevention, risk assessment, air toxics emissions, right-to-know issues, hazardous materials transportation and multinational corporate accountability.

- Built ad hoc partnerships of activists, workers, state and local officials and media contacts in chemical communities and provided technical and strategy analysis and recommendations. Founded and initially steered the Working Group on Community Right-To-Know, comprised of national and local environmental groups and labor unions. Wrote and published foundation-funded “The Community Plume” publication with analyses and fact sheets, to recommend strong roles for federally-mandated Local Emergency Planning Committees.
- As a safety analyst and policy expert, addressed international conferences on chemical accident prevention. Served as environmental advocate with the U.S. government delegations and developed recommendations for safety improvement in conferences with industry and government participants in London, Manchester, Stockholm, Berlin, Boston, Milan, Goa and Ahmedabad (India), and Tokyo.
- Worked with the environmental and labor coalition that in 1991-94 lobbied OSHA and EPA, advocating regulations to implement the Clean Air Act Amendments of 1990. Provided analysis and recommendations for testimony in Congressional hearings and wrote technical comments on proposed regulations.
- As an OSHA grant-funded consultant to the three major U.S. petrochemical labor unions, trained groups of workers in several cities on chemical accident risks and accident prevention. Advocated in Congress for two major unions for new worker safety training funds.
- *International advocacy:* gave invited presentations on chemical accident prevention and community right-to-know policy and legislation to government and industry officials, universities and citizens groups in Brazil, Canada, Lithuania, Latvia, Bulgaria, Mexico, India, Vietnam, Thailand, Germany, Argentina, and Australia.

**1979-1988 Director of the Nuclear and Hazardous Materials Transportation Project at the Environmental Policy Institute, Washington, D.C.**

Spearheaded environmentalist efforts, educated the public and advocated for safety improvement by the government and corporations on issues of nuclear and hazardous materials storage and transportation.

Worked with Capitol Hill, several regulatory agencies, national trade associations, national media, environmental NGOs, labor unions, petrochemical industry, investor groups, and funders to develop recommendations in testimony before several House and Senate committees.

**1978-1979 Research consultant, Ohio Public Interest Campaign.**

Working under a federal grant, researched and wrote final evaluation of a four-year project on plant closings in Ohio.

**1972-1978 Assistant Professor of Sociology, George Mason University, Fairfax, Virginia.**

Taught political sociology, social problems, sociology of war and peace, social theory.

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- Fire Chief Fire Magazine blog 9 21 10 "Coming to a City Near You" on rail security
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## **EDUCATION**

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