Comments on the Draft Environmental Impact Report for the Valero Benicia Crude-by-Rail Project

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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 bodies, national chemical and oil worker unions, insurance companies, universities, and environmental groups on the unique health and safety hazards of shipping hazardous materials—including crude oil—by rail. I have testified before both houses of the United States Congress, and have presented as an invited lecturer in twelve countries on chemical transportation accident prevention. As a pro bono consultant, 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 and Washington, D.C.

I am familiar with Valero's proposal to begin accepting crude oil shipments by rail at its Benicia refinery. I have reviewed the draft Environmental Impact Report (EIR)'s discussion of the hazardous impacts associated with this proposal, including a report by Dr. Christopher Barkan and others, purporting to calculate the probability of crude oil release due to tank car derailment on the portion of the rail route between Roseville and Benicia (Appendix F to the draft EIR).

The draft EIR fails to fully analyze, disclose, and mitigate significant hazardous impacts of shipping crude oil by rail to the Benicia refinery. First, the probability analysis referenced in the draft EIR and explained more fully in the Barkan Report fails to consider multiple important risk factors, described in detail below. As a result of these omissions, the draft EIR incorrectly concludes that the probability of crude oil release, and thus the potential for significant impact, is low. Second, the draft fails to adequately disclose and analyze the consequences of events it considers low-probability, thereby ignoring that even low-probability impacts can be significant if their consequences are sufficiently grave. Because it assumes that hazardous impacts from crude by rail transport are insignificant, the draft EIR also fails to require any of the various possible mitigation measures.

I. There are gaps in the draft EIR's analysis of the probability of a crude oil release from rail cars; as a result, it overlooks potentially significant hazardous impacts.

The draft EIR's conclusion that hazardous impacts related to transporting crude oil to the Benicia Valero refinery are not significant stems directly from the

Barkan Report's conclusion that the risk of a crude oil release from rail cars is low. However, the Barkan Report is flawed and overlooks important risks. Several of the Barkan Report's major omissions follow below.

A. The draft EIR fails to disclose the probability of a release on railroad miles outside the Roseville to Benicia route.

To begin, the Barkan Report looks only at the probability of crude oil release due to tank car derailment between Roseville and Benicia; it contains no discussion whatsoever of the risk of release on the longer route before arriving in Roseville through perhaps much more challenging California landscapes. The formula the Report uses to calculate probability shows that the greater length of track a tank car travels, the higher its probability of release. *See* App. F at 2. Yet it makes no attempt to calculate the length of track the tank cars will travel within or beyond California before arriving in Roseville, let alone the conditions along that route. Given that there are limited potential rail paths that the tank cars could take, the draft EIR could easily have analyzed the risks along the longer route; it simply chose not to.

B. The draft EIR's probability calculation fails to take into account specific physical features of the Roseville-Benicia route, beyond what classes of track are present.

Even for the segment of the rail route the Barkan Report does analyze, it fails to look at risk factors related to local conditions along the route. The Barkan Report's probability analysis takes into account one physical characteristic of the track between Roseville and Benicia: the type of "track classes" present, as defined by the Federal Railroad Administration (FRA). *See* App. F at 2-4, 6-7. The Report contains no discussion of the many other potential segment-specific infrastructure risk issues associated with the track structures and roadbed present, such as dangerous curves, washout potentials, trestles or tunnels, etc.

It is well-established that local route conditions can pose serious derailment risks. For example, it is clear that specific route characteristics were centrally important in the Lac-Megantic, Quebec crude oil train derailment and fire on July 2, 2013. Although the draft EIR dismissively pigeon-holes the cause of the Lac-Megantic accident as "human error," *see* Draft EIR at 4.7-19, the disaster was also the result of infrastructure issues involving downhill grades and the presence of

curves/switches in the downtown area. Local conditions also influenced the derailment and oil spill in Lynchburg, Virginia on April 20, 2014.[1]

The Barkan Report's neglect of route-specific factors and the history of accidents, violations, etc. along the Roseville-Benicia route is especially puzzling given that Dr. Barkan's own past work acknowledges the importance of looking at local features when assessing risk. For example, in a 2003 study, Dr. Barkan noted that "[t]he severity of a particular hazardous materials accident" relates to "the particular circumstances and location of the release."[2] In that same study, Dr. Barkan vividly highlighted the very top risk factors in accident causation on a given stretch of track as including broken rails and welds and buckled track—neither of which is discussed for the Roseville-Benicia route.

Instead, the Barkan Report attempts to estimate the probability of derailment in a specific local area by combining the local track class data point with generic national data on release rates derived from previous accidents of all kinds. A closer look at specific infrastructure features of the Roseville-Benicia route is required to reach any fair estimate of probability of accidental crude oil releases, especially given possible new operations challenges caused by the expected heavy volumes of unit trains.

C. The draft EIR fails to calculate the probability of release along particularly vulnerable segments of the Roseville-Benicia route, other than the Suisun wetlands.

The Barkan Report analyzes the probability that a crude oil release will occur anywhere along the Roseville-Benicia train route. It does not ask whether local track

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[1] *Va. oil train derailment is latest "wake-up call": expert*, CBS/AP, May 1, 2014, http://www.pennlive.com/midstate/index.ssf/2014/05/oil_tankers_fall_into_james_ri.html ("Grady Cothen, a former Federal Railroad Administration official, said given the recent wet weather in Virginia and the accident's location near a river, it's possible that soft subsoil may have weakened the track, Cothen speculated.").

[2] Christopher Barkan et al., *Railroad Derailment Factors Affecting Hazardous Materials Transportation Risk*, Transportation Research Record 1825, Paper No. 03-4429 at 67 (2003) (hereinafter "Barkan 2003"), available at http://railtec.illinois.edu/cee/pdf/Barkan_et_al_2003.pdf.

conditions or other factors make an accident on any subsection of that route more probable, with one exception: the report does derive a specific probability of crude oil release on the section of track that passes through the Suisun wetlands. However, the Suisun wetlands are not the only vulnerable location along the Roseville-Benicia route. Other sensitive off-track receptors, such as high-population density centers, schools, hospitals, etc., may make the consequences of a crude oil release at certain locations particularly grave. Neither the Barkan Report nor the draft EIR discloses any of these other sensitive areas along the train route. Nor do they analyze whether the specific risk to such areas may be heightened.

D. The probability calculation fails to consider the most recent data available on crude-by-rail accidents, or the risks specific to operation of crude oil unit trains.

The Barkan Report also ignores potentially significant hazardous impacts because its probability calculation does not take into account the unique risks that crude oil unit trains pose. Unit trains tend to be longer and heavier than traditional shipping trains. As explained by the United States Department of Transportation, crude oil unit trains

> are longer, heavier in total, more challenging to control, and can produce considerably higher buff and draft forces which affect train stability. In addition, these trains can be more challenging to slow down or stop, can be more prone to derailments when put in emergency braking, and the loaded tank cars are stiffer and do not react well to track warp which when combined with high buff/draft forces can increase the risk of derailments.[3]

A credible probability analysis depends crucially on a complete, relevant dataset. No analysis of the probability of a crude oil release from a unit train can be

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[3] Dept. of Transportation, Pipeline and Hazardous Materials Safety Administration, Draft Regulatory Impact Analysis for Hazardous Materials: Enhanced Tank Car Standards and Operational Controls for High-Hazard Flammable Trains; Notice of Proposed Rulemaking, July 2013 ("Draft RIA") at 24.

complete without data from 2010 and later, when transportation of crude oil in unit trains took off in the United States. However, the Barkan Report derives its probability calculation from historical train and railcar accident data that pre-dates 2010. It does not explain why this outdated accident data is applicable to predicting the behavior of longer, heavier unit trains; nor is it clear how such data is relevant.

As just one example, the Report calculates a train derailment rate (one variable in its probability equation) from pre-2010 accident statistics in the FRA's Rail Equipment Accident database. App. F at 2-3. According to the FRA database, the average speed of a train involved in a reported accident was 27 miles per hour. But modern unit trains travel much faster: freight railroads have recently announced their intention to voluntarily *reduce* the speeds of unit trains carrying crude oil to 50 miles per hour, or 40 miles in "high-threat" urban areas.[4] Dr. Barkan's prior work indicates that speed is one of the most important factors determining whether a derailment will lead to a significant hazardous materials accident.[5]

Likewise, the Barkan Report's analysis assumed that in an average derailment event, six individual cars would derail, again based on the outmoded FRA accident data. App. F at 5. The Report contains no discussion of how realistic this assumption is for crude oil unit trains, which contain more cars on average. National data on train accidents from 2010 and later is available. The Department of Transportation, for example, recently used 2006 through 2013 data to estimate the severity of accidents from crude oil unit train derailments in a recent rulemaking.[6] The draft EIR simply chose to ignore the most recent, most relevant data.

The draft EIR and underlying analysis made no attempt to otherwise account for the acute dangers that are particular to unit train operation. Multiple professional outlets have recognized the huge difference in risk between transporting crude oil by unit train and traditional rail shipment, including the Association of American Railroads' August 2013 Circular OT-55N (dated August 5,

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[4] Association of American Railroads, *Freight Railroads Join U.S. Transportation Secretary Foxx in Announcing Industry Crude By Rail Safety Initiative*, Feb. 21, 2014, https://www.aar.org/newsandevents/Press-Releases/Pages/Freight-Railroads-Join-U-S-Transportation-Secretary-Foxx-in-Announcing-Industry-Crude-By-Rail-Safety-Initiative.aspx

[5] *See* Barkan 2003, at 64.

[6] Draft RIA at 25.

2013) and the National Traffic Safety Board's April 2014 Safety Forum. Various federal safety studies and federal agency directives have also cited unit trains as a key safety concern. In fact, Dr. Barkan's own prior scholarship suggests that special characteristics of unit trains are important to assessing risk. Adequately predicting the probability of accidental release of crude oil from a rail line would require an assessment of the particular operations, behavior, and risk of flammable unit trains, especially their history and potential for multi-car derailment. The Barkan Report and draft EIR do no such thing.

E. Instead of relying on real-world data about crude-by-rail accidents, the Barkan Report uses a method of calculating the resistance of tank cars to puncture that is non-transparent, untested, and unreliable.

As explained above, many of the variables the Barkan Report uses to calculate the probability of a crude oil release are deficient because they ignore the most recent, most relevant data on unit train derailment. Another variable—the conditional probability of release (CPR), or imperviousness of a derailed car to puncture—is suspect for additional reasons. The Barkan Report derives its CPR value from non-transparent industry sources, in some places without citation to any specific documents. The method used to derive the CPR is quite new and relatively untested in the scientific literature. Moreover, calculated CPR values are particularly unreliable as a proxy for the resistance of 1232 tank cars, which the Barkan Report assumes will be used to transport crude to Benicia. As discussed at the National Transportation Safety Board's April 2014 Safety Forum, there is simply not enough data from crashes involving 1232 cars to constitute a strong empirical basis for CPR projections. At that forum, Todd Treichel, the director of the RSI-AAR Railroad Tank Car Safety Research and Test Project stated, "The 1232 cars, the CPC-1232 cars in particular remain fairly scarce in our data, so the specific question how have they performed in accidents so far doesn't really confirm or dispute the CPR estimates until there are many more cars that have been derailed in many more types of accidents."[7] The Barkan Report does not disclose this weakness in its chosen

[7] NTSB Rail Safety Forum: Transportation of Crude Oil and Ethanol, Washington, D.C., April 22, 2014, transcript at 82, available at http://dms.ntsb.gov/pubdms/search/hitlist.cfm?docketID=56186

methodology. Nor does it provide any explanation of why CPR values based on other types of cars in the national dataset should be applied to 1232 tank cars.

F. The draft EIR fails to consider whether some risk factors should be weighted more heavily than others in assessing the probability of hazardous impact.

The Barkan Report and draft EIR fail to take into account many factors, described above, that suggest that the proposed crude-by-rail project has significant hazardous impacts. Even among the risk factors it does consider, the Barkan Report does not discuss or rank which factors are most important, and by how much, in accounting for releases from trains. Diminishing the weight given to the most important risk factors necessarily skews a risk analysis toward underestimating the risks present.

G. The draft EIR's method of calculating risk is not safety conservative.

Despite all the foregoing omissions and oversights in its analysis, the Barkan Report asserts that it is method of calculating the probability of a crude oil release is "probably" safety conservative. App. F. at 8-9. There is no reason to think this is the case, and in fact, as detailed above, there are many reasons to think the analysis underestimates the potential public safety risk inherent in Valero's proposal.

The short life of the crude-by-rail industry in North America has already seen a number of serious crude oil releases. The Barkan Report makes no effort to suggest that the probability of release derived from its equation is either higher or lower than real-world release rates. Instead, the Report touts the overall decline in hazardous materials release rates from trains over the past decades. But that trend is irrelevant, and even misleading, without taking into account the recent history of crude-by-rail operations.

II. The draft EIR fails to take into account the potential significance of foreseeable low-probability, high-impact risks of transporting crude oil by unit train.

Even if the probability of a crude oil release between Roseville and Benicia were as low as the Barkan Report says it is, the draft EIR's conclusion that there are no potentially significant hazardous impacts is unjustified. The draft EIR assumes that the potential significance of a crude oil release is based solely on probability that the release will take place. However, the existence of a potentially significant impact stems not just from the probability of the impact, but also its foreseeable consequences. Put most simply: risk = consequence x probability.

The Barkan Report neither discloses nor analyzes the consequences of any of the risks it identifies. The draft EIR's hazardous impacts section contains a brief description of the fallout from major crude-by-rail accidents at Lac-Megantic; Lynchburg, Virginia; Aliceville, Alabama; and Casselton, North Dakota. Draft EIR at 4.7-6 to 4.7-8. However, it fails to disclose or analyze the reasonably foreseeable local impact of a comparable accident between Roseville and Benicia. For example, at Lac-Megantic, 63 tank cars derailed, releasing 1.6 million gallons of crude oil, which then ignited, killing 47 people. Draft EIR at 4.7-8. The City of Davis has a population 10 times greater than Lac-Megantic, and is almost 10 times as densely populated. A Lac-Megantic-style inferno in Davis would be devastatingly significant even if, as the draft EIR assumes, it would only happen once in 111 years.

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Based on the foregoing, I conclude that the draft EIR and underlying Barkan Report fail to disclose and analyze the potentially significant hazardous impacts of transporting crude oil by rail to the Benicia Valero refinery: first, by failing to consider evidence tending to show that the probability of a crude oil release is higher than the draft EIR posits, and second, by ignoring the impacts of low-risk, high-consequence events. The final EIR must account for and mitigate these significant impacts.