ALLIANCE FOR NUCLEAR RESPONSIBILITY

PO Box 1328
San Luis Obispo, CA 93406
(858) 337-2703
(805) 704-1810
www.a4nr.org

February 1, 2016

Attn: Cindy Bladey, Chief, Rules, Announcements, and Directives Branch (RADB),
Division of Administrative Services, Office of Administration
Carol Gallagher
US Nuclear Regulator Commission

RE: Docket ID NRC-2015-0234
NUREG/CR-7209

COMMENTS ON: **A Compendium of Spent Fuel Transportation Package Response Analyses to Severe Fire Accident Scenarios, DRAFT**

The Alliance for Nuclear Responsibility (A4NR) wishes to provide the following comments to the NRC's draft report in the matter of spent fuel transportation safety viz. packaging and response to severe fire accident scenarios. A4NR is a utility ratepayer watchdog, with a primary focus on California's investor owned utility nuclear powerplants, both operating and decommissioned. With the decomissioning of San Onofre (SONGS) underway, and the older Humboldt Bay facility ongoing, ratepayers have a vested interest in the disposition of the high level radioactive waste now stored on California's seismically vulnerable coast, and its ultimate disposition outside state borders. If the waste from SONGS were to leave California by rail, any route would pass within the perimeter of the Los Angeles-Riverside-San Bernardino County corridor, potentially exposing millions of residents to risk.

Our principle concern is that the data the NRC is relying upon to make their assumptions regarding the risks and probability of rail-related accidents and fires is insufficient and outdated. While this study was released in 2015, the date upon which the NRC relies was collected between 1997 and 2008:

> The study found that the number of accidents involving the release of hazardous material has been decreasing and, because of that, accident

> data from the past12 years (1997 to 2008) were used to calculate current accident rates.[1]

In fact, the NRC is correct, and date from the National Transportation Safety Board and PHMSA would agree. However, in choosing 2008 as the end date for it's data collection, the NRC misses an alarming and more recent trend.

With the development of domestic gas and oil production, largely spurred by the growth in hydraulic fracturing ("fracking") for Bakken crude and shale oil, transportation of highly volatile crude via rail car increased exponentially in the years following the NRC's cutoff date of 2008.

As Reuters reported on January 9, 2014 in the wake of a fiery oil tank car derailment in New Brunswick, Canada, earlier that week:

> The number of tank cars loaded with crude oil has risen 100-fold since 2006, according to the AAR, [American Association of Railroads] and there has been a similar surge in tank car originations of ethanol. More tank cars are being loaded with crude and ethanol and travelling along more miles of track than ever before. As the number of barrel-miles travelled has grown exponentially, it is not surprising that risks have become more apparent. The number of serious derailments and conflagrations involving ethanol and crude has increased alarmingly. Between 2006 and 2011, a period of six years, almost 1.4 million tank cars travelled on the railroads loaded with ethanol, according to the task force. Just 163 (0.01 percent) were involved in derailments in 10 separate incidents. In 2013, however, around 400,000 tank cars were loaded with crude oil in a single year, with almost as many originated with ethanol. Taking the derailment rate as 0.01 percent, around 70 tank cars will derail each year. [2]

This more current data provides a more current and concerning basis on which to consider regulation than the NRC's sampling of 1997-2008:

> Using the railway accident data from the past 12 years (1997 to 2008) and this definition of severe fires, only nine such accidents were identified. (The specific causes were not identified for these nine accidents.) The occurrence of nine accidents over twelve years was used by the authors to estimate a frequency of occurrence of severe railway

---

[1] US Nuclear Regulatory Commission, *A Compendium of Spent Fuel Transportation Package Response Analyses to Severe Fire Accident Scenarios* (ML16015A016), January 2016, p.3-1

[2] Reuters, *Rail industry has underestimated risks of tank cars*, January 9, 2014

> fire accidents of 6.2x10-4 accidents per million freight train-km (1x10-3 accidents per million freight train-mi). [3]

In fact, the US Congressional Research Service report, "U.S. Rail Transportation of Crude Oil: Background and Issues for Congress" (December 2014) notes this shortfall in current data:

> Each mode of oil transportation—pipelines, vessels, rail, and tanker trucks—involves some risk of oil spills. Over the period 1996-2007, railroads consistently spilled less crude oil per ton-mile than trucks or pipelines.…However, the data in Figure 3 **precede the recent dramatic increase in oil transportation by rail**.[4] [emphasis added]

The Congressional Research Service (CRS) then adds:

> The increasing deployment of unit trains changes the risks involved in shipping oil by rail in two ways. **Unit trains of crude oil concentrate a large amount of potentially environmentally harmful and flammable material, increasing the probability that, should an accident occur, large fires and explosions could result**. This risk is similar to that of unit trains carrying ethanol, and maybe greater than that of mixed freight trains in which various hazardous materials, such as explosives and toxic-by-inhalation materials, are sequenced among other cars according to federal regulations.[5] [emphasis added]

In a table of rail tank car accidents (attached as **Figure 1**), the CRS notes that from 2013 to 2014 there were at least eight newsworthy tank car derailments, of which 6 resulted in fireballs or explosions that burned for more than 30 minutes. This list does not include:

- Two ethanol train accidents in 2011 both resulting in highly visible fireballs, one in Illinois and one in Ohio
- The Feburary 16, 2014 Mt. Carbon, West Virginia tank car explosion
- Two incidents in 2015 resulting in tank car fires and explosions: Galena, Illinois (March 5, 2015) and Heimdal, North Dakota (May 5, 2015)

Photographs of these more recent tank car fires/explosions are attached as **Figure 2**.

Taken as a whole, the accidents of the years 2011-2015 make clear that the NRC's assumption that, "The occurrence of nine accidents over twelve years was used by the authors to estimate a frequency of occurrence of severe railway fire accidents of 6.2x10-4 accidents per million freight train-km (1x10-3 accidents per million freight train-mi)" is

---

[3] US Nuclear Regulatory Commission, *A Compendium of Spent Fuel Transportation Package Response Analyses to Severe Fire Accident Scenarios* (ML16015A016), January 2016, p.3-1

[4] US Congressional Research Service report, "U.S. Rail Transportation of Crude Oil: Background and Issues for Congress" (December 2014), p. 10.

[5] Ibid., p. 12.

badly out of date, out of touch with current realities, and in need of major revision, as we have now experienced 10 major accidents over five years.

The NRC, in its evaluation, also used the following assumption:

> The approach taken in this study (NUREG/CR-7034 2011) was to identify historic railway fires as a severe fire if they had a reasonable potential to approach a fully engulfing fire under the 10 CFR 71 definition. In their analysis, the two criteria for this were, 1) that a railcar "must have been substantially engulfed in a fire that persists for an extended period of time", and 2) that the principal source of fuel for the substantially engulfing fire must have been derived from another railcar."[6]

A4NR suggests that the NRC consider and evaluate all the above mentioned incidents during the period 2011-2015 to see if they fit the two principal criteria. Without attempting to prejudge the conclusions, based on the visual evidence of the fires portrayed in attached **Figure 2**, it appears that these incidents would meet the criteria.

Further, the NRC document states:

> Historically many of the fires resulting from rail accidents have involved the leakage of flammable gas (such as propane), rather than a liquid. A flammable gas cannot form a pool. If ignited, flammable gas leaking from a tank car will generally result in a localized pressure fire that is incapable of engulfing a spent fuel transportation package.[7]

However, as the CRS report also makes evident, the more recent half-decade of rail accidents involve highly volatile Bakken crude and other shale oil products that are both liquid and flammable. Therefore, the NRC's "historical" assumption in this paragraph needs to be revised.

Finally, the NRC notes:

> Federal regulations issued by the DOT, in 49 CFR 174.85, require very specifically defined spacing between rail cars carrying radioactive materials and hazardous materials of any kind, including flammable liquids. Typical requirements specify that a rail car carrying radioactive material must be separated from cars carrying other hazardous material by at least one buffer car. A rail car carrying a spent fuel

---

[6] US Nuclear Regulatory Commission, *A Compendium of Spent Fuel Transportation Package Response Analyses to Severe Fire Accident Scenarios* (ML16015A016), January 2016, p.3-1

[7] US Nuclear Regulatory Commission, *A Compendium of Spent Fuel Transportation Packag Response Analyses to Severe Fire Accident Scenarios (ML16015A016), January 2016, p.3-3*

> package would not be coupled directly to a tank car carrying flammable or combustible liquid.[8]

All of the NRC's above referenced assumptions may be true. However, the "uncertainty" they fail to capture is that the special, unique "waste train" (buffered within its own consist) will likely at some point in its journey need to pass by an oil tank train, be switched through a rail yard containing oil tank trains, or find itself stopped alongside or holding on a rail siding while an oil tank train passes. While it may be possible to segregate the waste-holding railcar within its own train, it may not be possible to segregate it from other trains carrying potentially explosive liquids on the thousands of miles of railroad that crisscross the nation and link reactor sites with potential waste repositories. The probability—and possibility—of an accident occurring at one of these locations needs to be factored into any study or analysis.

Moving high level radioactive waste will be a growing concern as more reactors continue to shut down and enter the decommissioning phase. California has seen this with 3 major facilities—Humboldt, Rancho Seco and San Onofre. On-site storage on our seismic coast presents hazards and challenges; yet moving waste away from our state presents a different set of concerns. None of the answers will be easy, and ratepayers have justifiable anger and mistrust of the federal agencies (DOE, NRC and Congress) that have allowed the problem to exist for decades without resolution. The NRC draft document that is the subject of this critique is but one of many in the long road to solving the problems of radioactive waste. As we hope to have made clear, it deserves the only the most recent and robust data from which to draw conclusions. We look forward to further engagement in the process.

Yours truly,

/s/

Rochelle Becker
Executive Director

[8] Ibid.

Oil by Rail Derailments in 2013 and 2014

Lac Mégantic, Quebec—On July 5, 2013, a train with 72 loaded tank cars of crude oil from North Dakota moving from Montreal, Quebec, to St. John, New Brunswick, stopped at Nantes, Quebec, at 11:00 pm. The operator and sole railroad employee aboard the train secured it and departed, leaving the train on shortline track with a descending grade of about 1.2%. At about 1:00 AM, it appears the train began rolling down the descending grade toward the town of Lac-Mégantic, about 30 miles from the U.S. border. Near the center of town, 63 tank cars derailed, resulting in multiple explosions and subsequent fires. There were 47 fatalities and extensive damage to the town. 2,000 people were evacuated. The initial determination was that the braking force applied to the train was insufficient to hold it on the 1.2% grade and that the crude oil released was more volatile than expected.

Gainford, Alberta—On October 19, 2013, nine tank cars of propane and four tank cars of crude oil from Canada derailed as a Canadian National train was entering a siding at 22 miles per hour. About 100 residents were evacuated. Three of the propane cars burned, but the tank cars carrying oil were pushed away and did not burn. No one was injured or killed. The cause of the derailment is under investigation.

Aliceville, Alabama—On November 8, 2013, a train hauling 90 cars of crude oil from North Dakota to a refinery near Mobile, AL, derailed on a section of track through a wetland near Aliceville, AL. Thirty tank cars derailed and some dozen of these burned. No one was injured or killed. The derailment occurred on a shortline railroad's track that had been inspected a few days earlier. The train was travelling under the speed limit for this track. The cause of the derailment is under investigation.

Casselton, North Dakota—On December 30, 2013, an eastbound BNSF Railway train hauling 106 tank cars of crude oil struck a westbound train carrying grain that shortly before had derailed onto the eastbound track. Some 34 cars from both trains derailed, including 20 cars carrying crude, which exploded and burned for over 24 hours. About 1,400 residents of Casselton were evacuated but no injuries were reported. The cause of the derailments and subsequent fire is under investigation.

Plaster Rock, New Brunswick—On January 7, 2014, 17 cars of a mixed train hauling crude oil, propane, and other goods derailed likely due to a sudden wheel or axle failure. Five tank cars carrying crude oil caught fire and exploded. The train reportedly was delivering crude from Manitoba and Alberta to the Irving Oil refinery in Saint John, New Brunswick. About 45 homes were evacuated but no injuries were reported.

Philadelphia, Pennsylvania—On January 20, 2014, 7 cars of a 101-car CSX train, including 6 carrying crude oil, derailed on a bridge over the Schuylkill River. No injuries and no leakage were reported, but press photographs showed two cars, one a tanker, leaning over the river.

Vandergrift, Pennsylvania—On February 13, 2014, 21 tank cars of a 120-car train derailed outside Pittsburgh. Nineteen of the derailed cars were carrying crude oil from western Canada, and four of them released product. There was no fire or injuries.

Lynchburg, Virginia—On April 30, 2014, 15 cars in a crude oil train derailed in the downtown area of this city. Three cars caught fire, and some cars derailed into a river along the tracks. The immediate area surrounding the derailment was evacuated. No injuries were reported.

In March and April 2013, there were two derailments of Canadian Pacific trains, one in western Minnesota and the other in Ontario, Canada; less than a tank car of oil leaked in each derailment and neither incident caused a fire.

The increasing deployment of unit trains changes the risks involved in shipping oil by rail in two ways. Unit trains of crude oil concentrate a large amount of potentially environmentally harmful and flammable material, increasing the probability that, should an accident occur, large fires and explosions could result. This risk is similar to that of unit trains carrying ethanol, and maybe greater than that of mixed freight trains in which various hazardous materials, such as explosives and toxic-by-inhalation materials, are sequenced among other cars according to federal regulations.[39] On the other hand, while unit trains concentrate a voluminous quantity of potentially dangerous material, they may offer safety benefits from avoiding the decoupling and

[39] These requirements are codified at 49 C.F.R. Section 174.85.

EXPLOSIVE OIL-RAIL TANK CAR ACCIDENTS, 2013-2015 **A4NR FIGURE 2**

December 31, 2013, Casselton, ND

July 6, 2013 Lac Megantic, Quebec

February 16, 2014, Mt. Carbon, WV

April 30, 2014, Lynchburg, VA

March 5, 2015, Galena, IL

May 5, 2015, Heimdal, ND