**RAILROAD OPERATIONS AND SAFETY BRANCH**
**OFFICE OF RAIL SAFETY**
**SAFETY AND ENFORCEMENT DIVISION**

*Tehachapi Pass, 2014*

# Annual Railroad Local Safety Hazard Site Report For Calendar Year 2013

## Pursuant to Public Utilities Code Section 7711

**July 1, 2014**

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## NOTE TO READERS

The California Public Utilities Commission (CPUC) is making two changes to this report. The first change is to combine two railroad safety reports. This will be the last Local Safety Hazard Site Report as a stand-alone report.

This Local Safety Hazard Site Report is mandated by Public Utilities Code Section 7711. Public Utilities Code Section 765.6 requires the CPUC to report on all railroad-funded CPUC actions taken to ensure the safe operations of the railroads. Due to efficiencies identified by the recent zero-based budgeting requirement, next year the CPUC will combine the reporting requirements and publish one comprehensive report.

This Local Safety Hazard Site Report required by Public Utilities Code Section 7711, is due on or before July 1 of each year. The code section requires the CPUC to report to the Legislature on sites on railroad lines in the state it finds to be hazardous, and also requires the CPUC to include a list of all railroad derailment accident sites in the state on which accidents have occurred within at least the previous five years. Derailment information is documented per **calendar year**.

The report of CPUC actions to ensure safe operations is due to the Legislature annually on or before November 30 of each year. Public Utilities Code Section 765.5 requires the CPUC to report on the expenditure of railroad user fees and chronicles the operations of the CPUC Railroad Operations Safety Branch during the previous **fiscal year**.

Due to the timing of the reports, the annual report that is due on or before November 30 will include the same derailment information as this report. In subsequent years, the singular report that includes the requirements of both Sections 765.5 and 7711 will provide unique annual information.

The second change will provide readers the ability to electronically search the railroad derailment data and eliminate the need to print over 85 pages of derailment information. In previous reports we have included a hard-copy list of all derailments in the state over the previous five years. To increase efficiency and decrease the unnecessary use of limited resources, a complete list of all reported railroad derailment accidents from 2009-2013 that have occurred in California is available on the CPUC web site at www.cpuc.ca.gov under the Railroad Safety page.

## EXECUTIVE SUMMARY

Public Utilities Code Section 7711 requires the CPUC to report to the Legislature on sites on railroad lines in the state it finds to be hazardous. It also requires the CPUC to include a list of all railroad derailment accident sites in the state on which accidents have occurred within at least the previous five years, describe the nature and probable causes of the accidents, and indicate whether the accidents occurred at or near sites that the commission has determined to be hazardous. This report, in addition to the electronically available list of all railroad derailment accidents over the past five years and the causes, fulfills those requirements.

The CPUC strives to identify and address railroad risks "beyond the regulations." The CPUC ensures that identification and mitigation or elimination of hazards is not limited to existing regulations and non-compliance with those regulations. Staff has implemented a new way to record perceived risks, large or small, and utilizes this unique procedure to remedy risks that pose a safety concern.

The risk assessment team has identified risks[1] associated with rail, such as railroad bridge integrity, inspection, and maintenance, and the effect on derailment risk regarding rail car placement in trains (track-train dynamics). These risks can multiply when identified at a local safety hazard site location. As such, the CPUC is working with the railroads to ensure they are complying with existing regulations as well as identifying and mitigating unregulated risks.

The sites on railroad lines the CPUC identified as hazardous were developed by D.97-09-045. After much discussion and many judicial interpretations on whether the CPUC had the authority to enforce train make-up rules at these sites to mitigate derailments, the courts ruled that the CPUC could adopt regulations requiring the placement of a track-defect detector, and could enforce specific railroad operating rules governing train make-up. Additionally, the railroads and the CPUC settled remaining issues regarding CPUC oversight of train make-up rules:

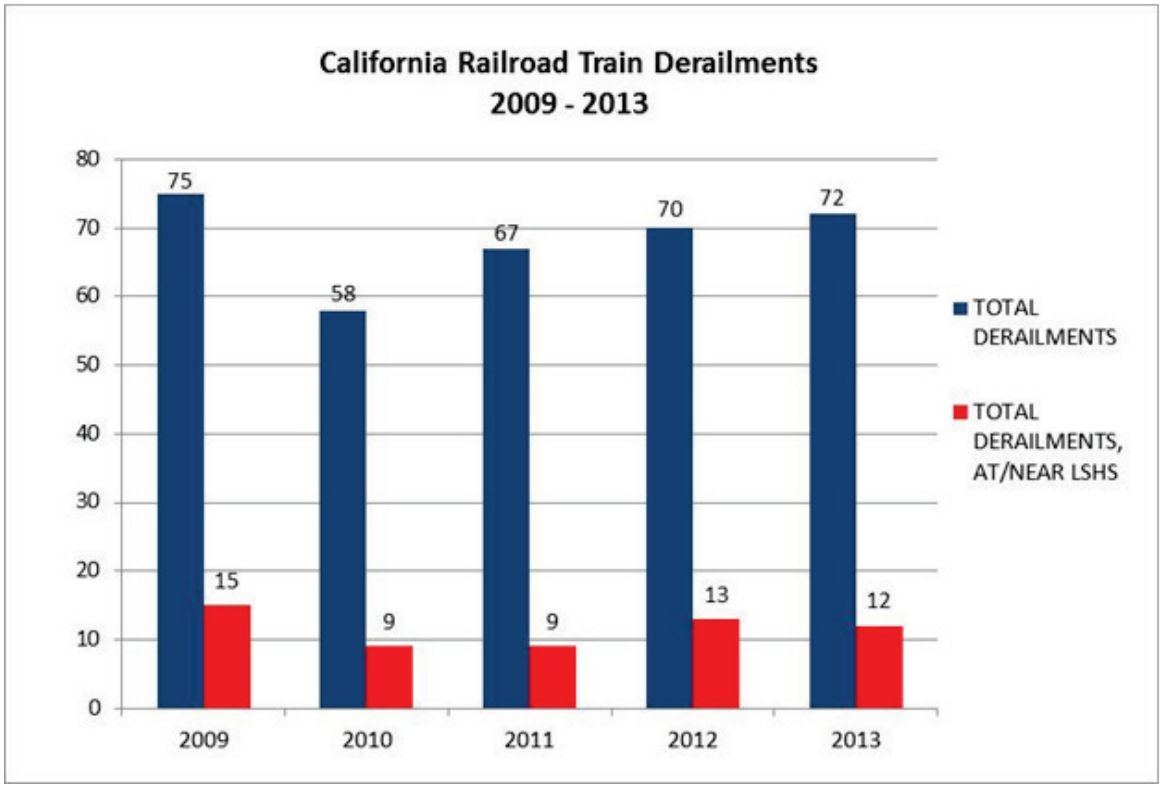
- The railroads are required to notify the CPUC staff of any changes to their train make-up rules; and,
- The railroads are required to describe and explain the process used to arrive at those changes, including the engineering criteria used to determine the rule's derailment-prevention effectiveness.[2]

Within the previous five calendar years, California has experienced 342 derailments. Of that amount, 58 derailments, or 17 percent, have occurred at or near local safety hazard sites. For this report, "at or near" includes any location of railroad track along the railroad right-of-way that is contained in the segment of railroad designated to be a local safety hazard site, including the distance of track one mile on each side of the local safety hazard site.

[1] Risk is defined as the probability (chances) of an accident multiplied by the consequences if there were an accident. Thus, logically the highest risks would be those with high probabilities and great consequences; however, historically the risks manifest as accidents with the greatest societal concern tend to be the high-consequence events, most of which are rare.

[2] CPUC Decisions D.97-090-45 and D.06-02-013, and decisions and orders of the Ninth Circuit Court of Appeals and the United States District Court for the Northern District of California, Case Nos. 01 15141, 01-15531, and C-97-03660 TEH, respectively.

*Westbound freight train entering Tunnel #3 in Tehachapi Pass (Local Safety Hazard Site No.16)*




*Source: Federal Railroad Administration, Office of Safety Analysis*

The primary reasons for the derailments at the sites were attributed to problems with the track. Track problems can include gage widening due to worn rail, or defective or missing crossties, spikes, or fasteners. The second most common cause of derailments is operational factors, including train make-up or placement.

Most of the original local safety hazard sites are on main line track that have or will have positive train control (PTC) equipment installed. CPUC rail safety inspectors have been monitoring progress for PTC design and installation, noting that the first installation in the nation was in the Los Angeles Basin on Metrolink system tracks.

The California Energy Commission reported that crude oil shipments into California by rail have increased by 158 percent from September to December 2013. In early 2013, the primary source of the crude oil was imported from North Dakota. Toward the end of 2013, crude oil imports from Canada dramatically increased.

The inclusion of information on crude oil is intended to increase awareness of ever-changing risks posed by the operations of railroads in California. The specific crude oil information is also intended to prevent future disastrous train derailments, such as the 1991 tank car derailment in Dunsmuir that prompted this annual local safety hazard site report. All domestic imports, as well as Canadian imports that enter via railroad destined for oil refineries, will traverse local safety hazard sites in tank cars. As such, these increases have heightened the CPUC's awareness of the volumes and potential risks of crude oil being transported by way of railroad into and through California.

As a proactive response, the Railroad Operations Safety Branch formed an interdisciplinary team of federally certified CPUC railroad safety inspectors, named the Crude Oil Reconnaissance Team (CORT). The CORT team actively monitors and inspects the increased building and transportation activities to ensure all crude oil facilities comply with federal and state safety laws, in addition to mitigating risks that are not defined in regulations.

Public Utilities Code Section 7711.1 requires the CPUC to collect and analyze near-miss data generated from incidents occurring at railroad crossings and along the rail right-of-way. Near-miss is defined as a runaway train or any other uncontrolled train movement that threatens public health and safety. The CPUC expanded the definition of near-miss to capture additional public safety risks, such as train-auto near-miss incidents. Los Angeles County experienced the most reported near-miss incidents, followed by Fresno, Imperial, and Riverside.

The CPUC federally certified railroad inspectors continue to mitigate risks and look "beyond the regulations."

*A freight train derailment, and subsequent tank car fire, which occurred in Tunnel #9, Tehachapi Pass, at Local Safety Hazard Site No. 16 in February 2010. The cause was track-related.*

## I. INTRODUCTION AND BACKGROUND

Monitoring and analyzing accidents in the areas identified to be local safety hazard sites maintains and improves safety of the railroad system in California. Through increased inspections of railroad track and prompt investigations of train accidents, CPUC presence requires railroads to comply with rules and regulations at local safety hazard sites and implement remedial action. If no action is taken, the CPUC railroad safety inspectors recommend appropriate penalties as a result of non-compliance.

Public Utilities Code Section 7711 was promulgated in 1991 following a freight train derailment near Dunsmuir, California.[3] The derailment punctured a rail tank car, which resulted in a hazardous materials leak consisting of 19,000 gallons of metam sodium, a concentrated herbicide, into the Sacramento River. The toxic herbicide killed all vegetation and all fish and other aquatic animals in the water downstream from the spill, with some invertebrate species becoming extinct. Additionally, several hundred persons, including residents, were exposed to the contaminated river water and/or to toxic fumes requiring medical treatment. That same month, another train derailed near Seacliff and released liquid hydrazine. Other rail accidents increased public and legislative concerns, including those involving derailments, runaway trains, and injuries and fatalities.

The following month, the CPUC ordered an investigation into the Dunsmuir and Seacliff derailments. The CPUC investigation concluded that the Dunsmuir derailment was caused by track-train dynamics and the positioning of cars in the train.[4] In addition, the investigation found the Cantara Loop, a ten-mile section of railroad track that included the derailment site, to be a local safety hazard site.

## II. SAFETY CULTURE AND RISK MANAGEMENT

Safety culture and risk management are paramount to the CPUC culture and mission. As a result of the San Bruno natural gas explosion on September 9, 2010, an Independent Review Panel recommended that the CPUC move to performance-based regulatory oversight of the public utilities it regulates. In addition, it directed the CPUC to be "equally, if not more vigilant," concerning the regulated entities' actions that affect the health and safety of the public to ensure the public utilities' actions and programs are in line with those of a prudent operator.

In response to the Independent Review Panel's report, all CPUC divisions are engaged in proactive risk management practices. Risk management practices encompass firm regulatory oversight by looking beyond the regulations toward more comprehensive overall safety oversight. The CPUC Railroad Operations Safety Branch has devised a new risk management reporting structure to allow its inspectors to capture all identified risks, in addition to regulatory enforcement required by the Federal Railroad Administration, California laws, and CPUC General Orders.

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[3] California Public Utilities Code, Article 10: Railroad Safety and Emergency Planning and Response. Chapter 766, Statutes of 1991.

[4] Railroad operators must place loaded and empty cars at strategic locations in the string of rail cars ("consist") to ensure no excessive forces that could derail a train are generated by the locomotives' pulling or braking power.

For example, in uphill movements, if empty cars are placed on the head-end of a heavy train, with too much power these lightweight cars could be pulled sideways through the inside of a curve, called "stringlining," as they were in the 1991 Cantara Loop derailment and other derailments here and at other identified local safety hazard sites.

In downhill movements the weight of the train pushing against a braking locomotive could cause such lightweight cars to derail to the outside of the curve, called "jackknifing," as has happened in other derailments in the Cantara Loop segment as well as at other identified local safety hazard sites in the state.

The CPUC risk assessment team was created to proactively detect and mitigate risks that may have the greatest public safety consequences. The staff has identified significant risks associated with rail industry. In order to approach risks systematically, the CPUC Office of Rail Safety launched a database system to enable the risk assessment team to identify the areas with the greatest vulnerability. In addition, it has identified significant safety risks associated with rail and public safety, including:

- The dearth of information and lack of regulatory oversight regarding the structural integrity of California's railroad bridges;
- The proliferation of transporting hazardous materials through high-population areas, local safety hazard sites, and across bridges;
- Derailments associated with track-train dynamics; and,
- The need for a near-miss reporting threshold.

These risks can multiply when identified at a local safety hazard site location.

## III. ADOPTION OF LOCAL SAFETY HAZARD SITES

In October 1993, the CPUC opened a rulemaking to consider mitigations for local rail safety hazards within California.[5] In September 1997, the CPUC issued D.97-09-045 (75 CPUC2d 1), adopting safety regulations to eliminate or reduce local safety hazards. The decision identified 19 local safety hazard sites and adopted regulations governing operations at 13 of these sites. The regulations required that the railroads comply with their own train make-up rules at those 13 locations.[6] The Stipulated Final Judgment was approved by the U.S. District Court for the Northern District of California on May 10, 2004.[7]

The local safety hazard sites were identified through two methods. One method used statistical analyses of accident locations to identify the locations where derailments had occurred in clusters not due to random chance, but due to local characteristics. The results were significantly and meaningfully correlated with steep grades and tight curves. Of the existing 19 sites, those statistically confirmed as locations of frequent derailments included sites 1, 3, 4, 9, 12, 16, 22, 23, 26, 28, 29, and 31. The other method used was identifying those areas in California where the operating rules used by railroads were stricter in specific areas believed by the railroad to be more difficult to traverse or that rendered greater consequences as a result of derailment. Those sites identified with severe operating conditions forced the railroad to impose unique operating restrictions included sites 6, 7, 10, 19, 25, 27, and 30.

The risk identified in the Decision (D.97-09-045) is better stated as, "Given any train, what is the likelihood that it will derail here versus elsewhere on this line." It was focused more on location, **where** accidents are likely to occur, than total risk. The total risk to that specific location was captured by both: (1) the probability that any given train would derail at this site; and, (2) the total number of trains passing through the site.

In the Decision, the CPUC stated it took "great pains to ensure that this Commission has done nothing to weaken or conflict with the rightful and valuable exercise of federal jurisdiction" and it "carefully and thoroughly considered every safety measure to ensure that these measures do not `unduly' or `unreasonably' burden interstate commerce."[8] The CPUC regulations were intended to complement the Federal Railroad Administration's efforts, with the hope of reducing or eliminating derailments and toxic spills in California.

[5] R.93-10-002.
[6] The July 1, 2012 Local Safety Hazard Site Report provide greater detail on the history of D.97-09-145.
[7] Case No. C 97-03660-TEH.
[8] 75 CPUC2d 1 at 10.

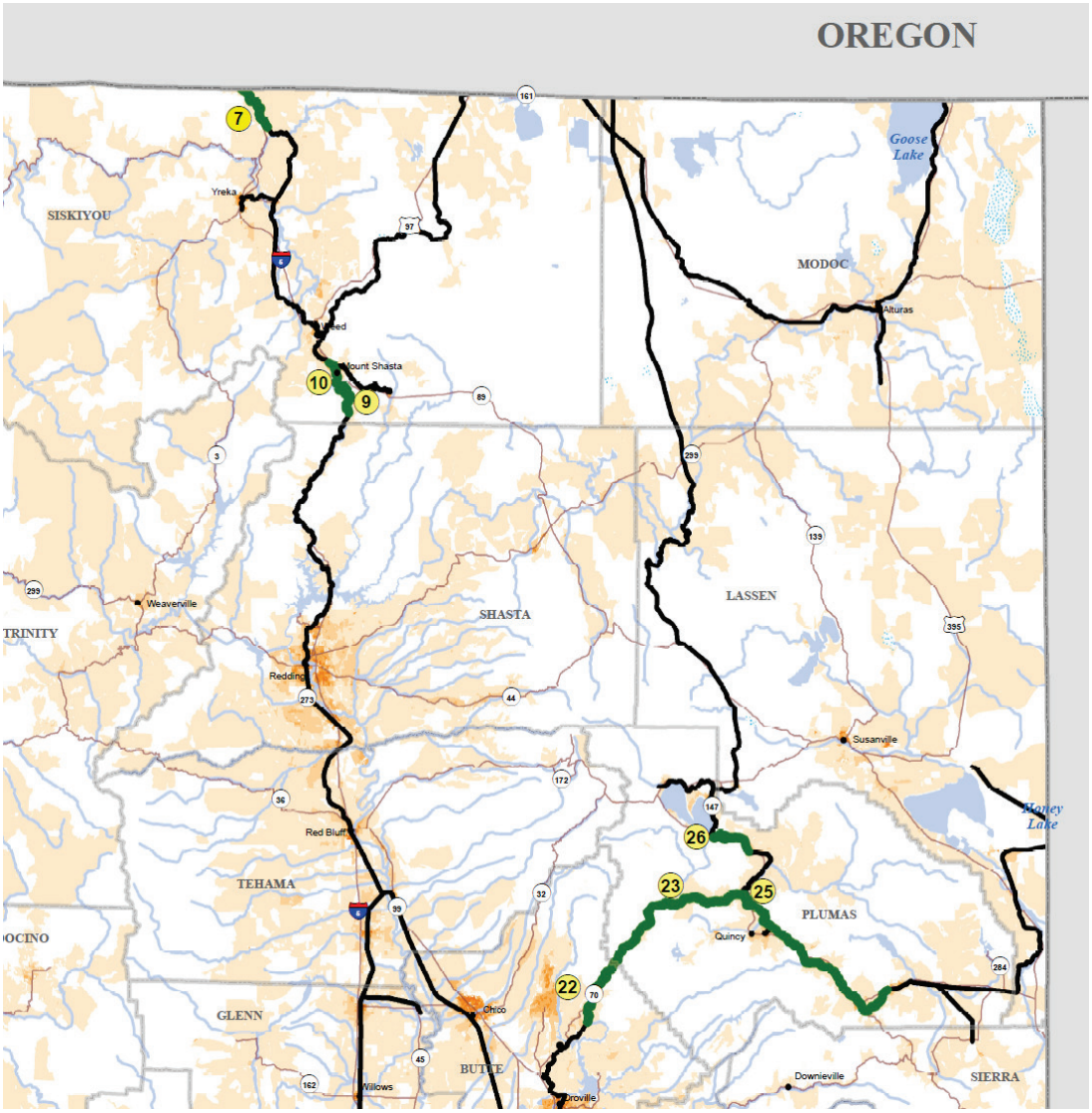
The sites are listed in the order of the most derailments over the past five years. The sites are numbered for identification purposes only. The UPRR Yuma subdivision at a specific milepost range experienced significantly more derailments than the other hazard sites. This could be due to the significant number of number of trains and cars that pass through the site.

**Table 1—List of Local Safety Hazard Sites**

| LSHS # | Current LSHS Track Line | Previous LSHS Track line at time of D.97-09-045[9] | RR Milepost | Number of Derailments 2009-13 |
|---|---|---|---|---|
| 3 | UPRR Yuma Subdivision | SP Yuma Line | 535.0 to 545.0 | 32 (3&6) |
| 16 | UPRR Mojave Subdivision | SP Bakersfield Line | 335.0 to 359.9 | 10 |
| 9 | UPRR Black Butte Subdivision | SP Shasta Line | 322.1 to 332.6 | 4 (9&10) |
| 10 | Incorporated into Site No. 9 | SP Shasta Line | 322.1 to 338.5 | 4 (9&10) |
| 19 | UPRR Mojave Subdivision | SP Bakersfield Line | 463.0 to 486 | 4 |
| 12 | UPRR Roseville Subdivision | SP Roseville District | 150.0 to 160.0 | 3 |
| 6 | UPRR Yuma Subdivision | SP Yuma Line | 542.6 to 589.0 | 2 (3&6, 4&6)) |
| 22 | UPRR Canyon Subdivision | UP Feather River Division | 234.0 to 240.0 | 2 (22&25) |
| 25 | UPRR Canyon Subdivision | UP Feather River Division | 232.1 to 319.2 | 2 (22&25) |
| 4 | UPRR Yuma Subdivision | SP Yuma Line | 586.0 to 592.0 | 1 |
| 26 | BNSF Gateway Subdivision | UP Bieber Line, | 15.0 to 25.0 | 1 |
| 31 | BNSF San Diego Subdivision | ATSF San Diego | 249.0 to 253.0 | 1 |
| 1 | UPRR Coast Subdivision | SP Coast Line | 235.0 to 249.0 | 0 |
| 7 | Central Oregon and Pacific Railroad Siskiyou Subdivision | SP Siskiyou Line | 393.1 to 403.2 | 0 |
| 23 | UPRR Canyon Subdivision | UP Feather River Division | 253.0 to 282.0 | 0 |
| 27 | UPRR L.A. Subdivision, Cima Grade | | 236.5 to 254.6 | 0 |
| 28 | BNSF Cajon Subdivision | ATSF Cajon | 53.0 to 68.0 | 0 |
| 29 | BNSF Cajon Subdivision | ATSF Cajon | 81.0 to 81.5 | 0 |
| 30 | BNSF Cajon Subdivision | ATSF Cajon | 55.9 to 81.5 | 0 |

[9] In 1996, Union Pacific Railroad purchased Southern Pacific Railroad.

# Local Safety Hazard Sites on Railroad Track Routes
# -Northern California-



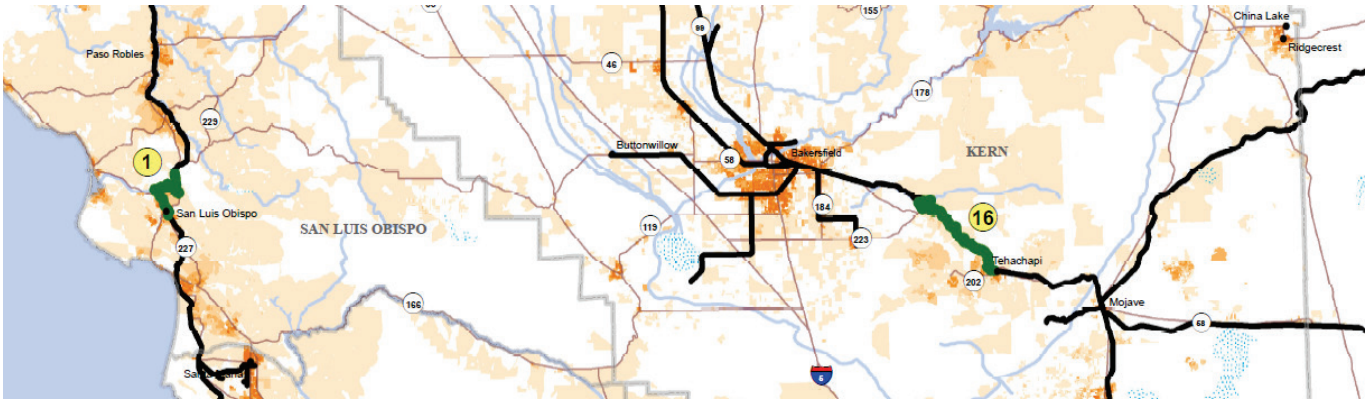

## LEGEND

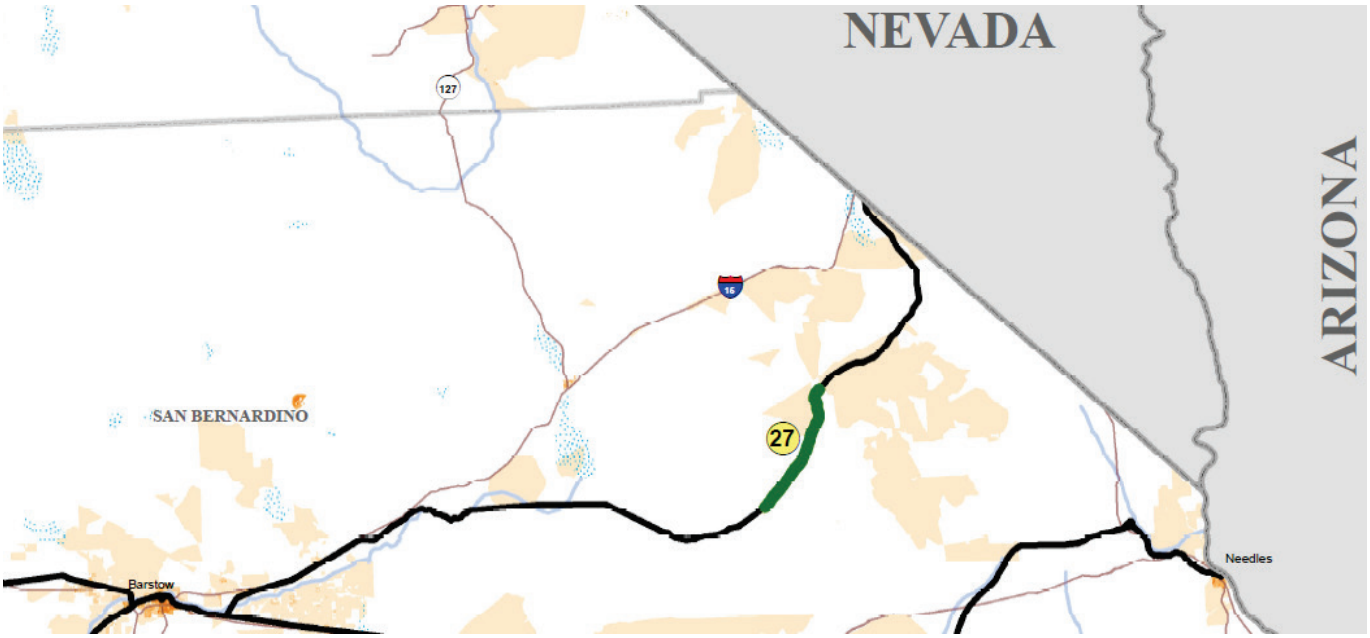
Local Safety Hazard Sites

Rail

| LSHS Site # | LSHS Track Distance (mi.) | LSHS County Location |
|---|---|---|
| 7 | 9.7 | Siskiyou |
| 9 | 10.5 | Siskiyou |
| 10 | 16.4 | Siskiyou |
| 12 | 10.0 | Placer |
| 22 | 6.0 | Butte |
| 23 | 29.0 | Plumas |
| 25 | 87.1 | Butte and Plumas |
| 26 | 10.0 | Plumas |

# Local Safety Hazard Sites on Railroad-Track Routes
# -California Central Coast/Desert Valley-



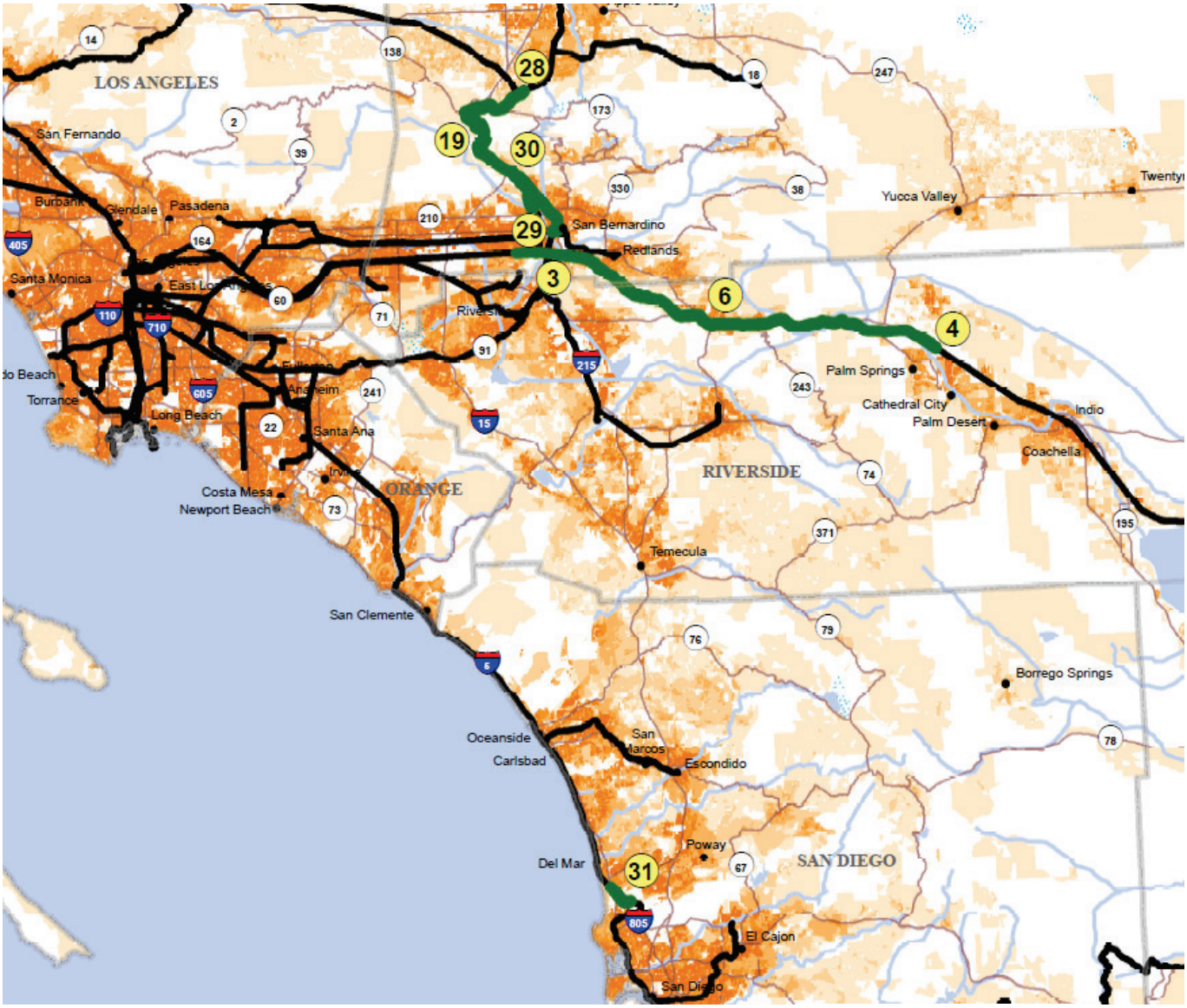

**LEGEND**

Local Safety Hazard Sites

Rail

| LSHS Site # | LSHS Track Distance (mi.) | LSHS County Location |
|---|---|---|
| 1 | 14.0 | San Luis Obispo |
| 16 | 24.9 | Kern |
| 27 | 18.1 | San Bernardino |

# Local Safety Hazard Sites on Railroad-Track Routes -Southern California-

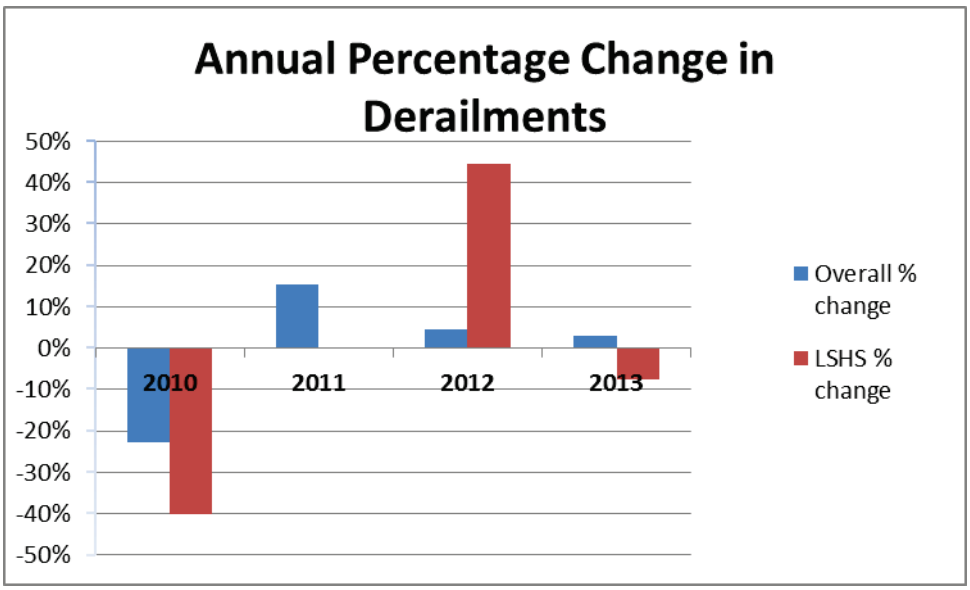



| LSHS Site # | LSHS Track Distance (mi.) | LSHS County Location |
|---|---|---|
| 3 | 10.0 | San Bernardino/ Riverside |
| 4 | 6.0 | Riverside |
| 6 | 46.4 | San Bernardino/ Riverside |
| 19 | 23.0 | San Bernardino |
| 28 | 15.0 | San Bernardino |
| 29 | 0.5 | San Bernardino |
| 30 | 25.6 | San Bernardino |
| 31 | 4.0 | San Diego |

## IV. TRAIN DERAILMENTS IN CALIFORNIA

### *Overall Derailments*

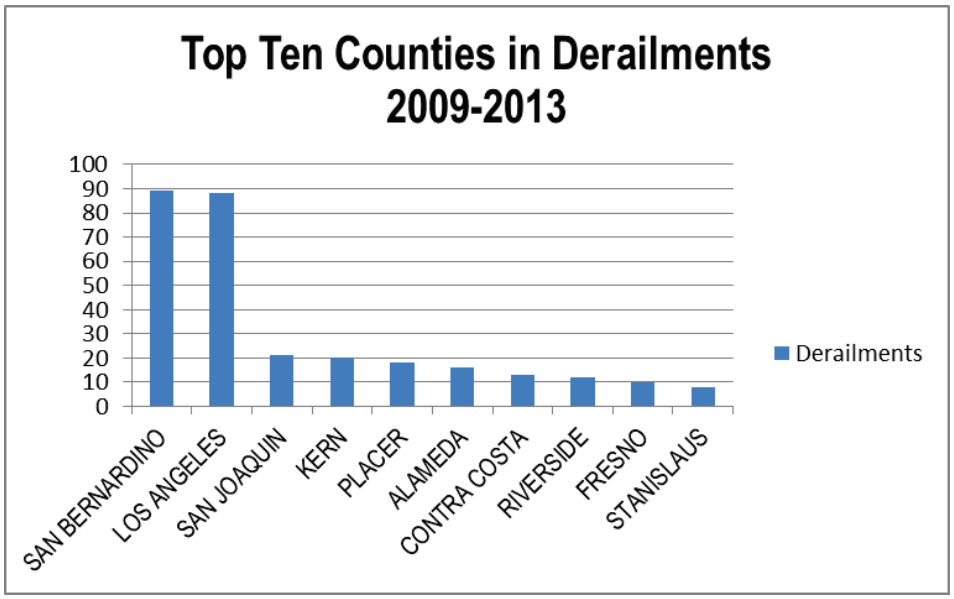
Over the past five calendar years, January 1, 2009 through December 31, 2013, California experienced a total of 342 derailments. Over the five-year period, there was very little average annual change. From a year-to-year basis, the largest increase was from 2010 to 2011—from 58 derailments to 67; a 15.5 percent increase. The most significant decrease was from 2009 to 2010—from 75 to 58; a 23-percent decrease.




There has been a 4-percent decrease between the 2009 figures and the 2013 figures—from 75 derailments in 2009 to 72 derailments in 2013. From 2010 to 2013, California experienced a 24-percent increase—from 58 derailments to 72 derailments in 2013. For those same years, there has also been corresponding increases in reported train derailments that have occurred "at or near" local safety hazard site locations.

*2011 UP derailment at Local Safety Hazard Site No.12, near Gold Run, CA. Cause was due to remote locomotive mechanical failure.*

The greatest number of derailments occurred in San Bernardino County, closely followed by Los Angeles County. This could be due to the large switching yards in these counties and may reflect a large number of very low-consequence derailments. The following graph ranks the counties based on the number of derailments.



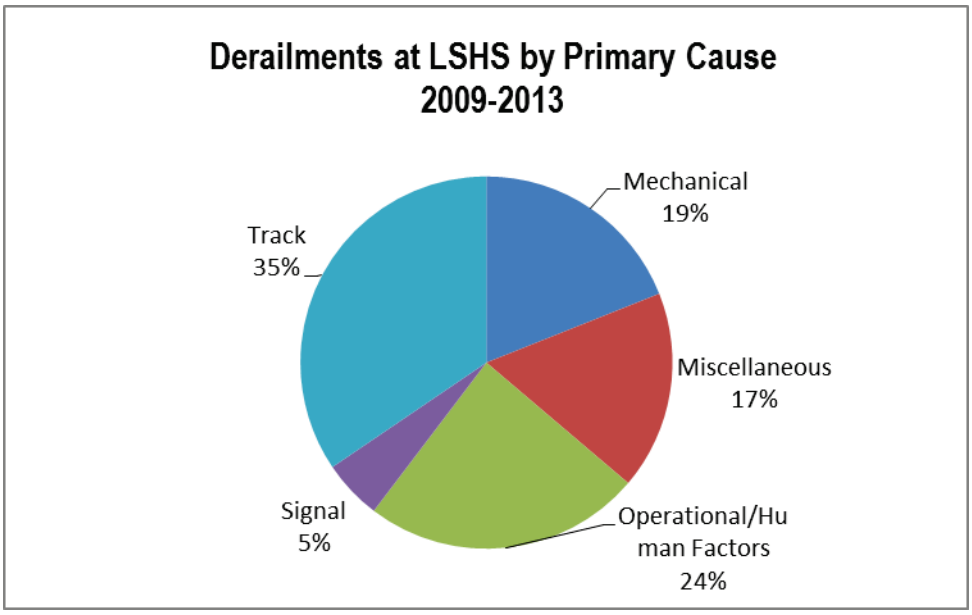

## *Derailments at or Near Local Safety Hazard Sites*

Over the past five years, California experienced a total of 58 derailments at or near local safety hazard sites. There was an average annual decrease of 1 percent. From a year-to-year basis, the largest increase was from 2011 to 2012 – from 9 derailments to 13, a 44-percent increase. The most significant decrease was from 2009 to 2010 – from 15 to 9, a 40-percent decrease.

The primary causes for the derailments at the sites noted by the inspectors were attributed to problems with the track. Track problems can include gage widening due to worn rail, or defective or missing crossties, spikes, or fasteners. The second most common cause of derailments is operational factors, including train make-up or placement. When heavy and light, and short and long, cars are not strategically placed in the train in relation to each other and in relation to in-train forces,[10] the train can incur excessive lateral derailing forces on curves.

[10] For example, for an uphill movement, the greatest pulling force is on the first car in the train behind the locomotive, with the least pulling force on the last car.

*An example of inadequate rail repair which lead to a December 2013 derailment at Local Safety Hazard site No. 16 near Tehachapi CA.*




Two notable derailments in 2013 include the following:[11]

- On December 10, 2013, a BNSF freight train derailed 12 cars near Tehachapi, Kern County, approximately 43 miles southeast of Bakersfield. (Local Safety Hazard Site #16.)

- On June 13, 2013, a Union Pacific Railroad (UPRR) freight train derailed at milepost 328.05 of the Black Butte subdivision in Siskiyou County. This derailment occurred on the Cantara Loop at the same location as the 1991 Dunsmuir train tank car derailment. (Local Safety Hazard Site #9.)

[11] The CPUC Internet site contains a complete list of all railroad derailments in the California in the last five years including derailments at or near local safety hazard sites. The CPUC Internet site also contains the USDOT Accident Cause Code list.

*BNSF December derailment near Tehachapi CA.*


*UPRR June Derailment Dunsmuir, Siskiyou County.*[12]

The CPUC rail safety inspector determined that the cause of the December 2013 BNSF train derailment accident at local safety hazard site #16 in Tehachapi was a result of an inappropriate and unacceptable repair of a broken rail. The rail had been identified by the railroad to be in need of repair. It was temporarily and expeditiously repaired using an inappropriate and unsafe technique. The CPUC rail safety inspector cited the unsafe fix and recommended that a penalty be assessed.

The CPUC rail safety inspector determined the June 2013 UPRR train derailment accident at local safety hazard site #9 was a result of a "locomotive power surge." A surge could cause a derailment when there exist contributing factors, such as long light cars on the head end, or if the railroads' train make-up rules did not have a sufficient margin of safety to prevent excessive lateral forces. Lateral forces could negatively affect the ability to operate the train and keep the train on the tracks. Local safety hazard site #9 is the same location as the July 1991 train derailment accident that prompted this annual report. The cause of the derailment is also similar to the July 1991 derailment. Due to the steep incline and tight switchbacks, this section of track is still prone to derailments. Due to the proximity to the Sacramento River, the state's drinking water and agricultural life-blood, the consequences of a hazardous materials spill could be environmentally and economically tragic.

*Derailment barrier on the Cantara Loop bridge.*[13]

[12] Local safety hazard site #9 is the same location where in 1991 a railroad train derailed and spilled concentrated metam sodium, a herbicide that became toxic when it made contact with the Sacramento River and Lake Shasta, prompting action which resulted in the Public Utilities Code 7711 and the mandated annual local safety hazard site report.

[13] Notably, following the 1991 derailment, the railroad built a massive barrier railing on the bridge over the Sacramento at this site, which should provide some protection against cars derailing to the inside of the curve off the bridge and into the river.

## VI. LOCAL SAFETY HAZARD SITES AND POSITIVE TRAIN CONTROL

The Federal Rail Safety Improvement Act of 2008 requires Class I railroads[14] to install PTC equipment on main lines that carry passengers, freight, and specified hazardous materials, by December 31, 2015. Most of the original local safety hazard sites are on main line track that have or will have PTC equipment installed. CPUC rail safety inspectors have been monitoring progress for PTC design and installation, noting that the first installation in the nation was in the Los Angeles Basin, and covers the Metrolink system's tracks.

## VII. CRUDE OIL TRAIN SHIPMENTS OVER LOCAL SAFETY HAZARD SITES

*"The movement of this product is a game changer. We have to rethink everything we've done and known in the past about safety."* [15]

*"Shortcomings in tank car design… create an unacceptable public risk"*[16]

According to the U.S. Energy Information Administration, domestic crude oil production is increasing dramatically in the United States; in 2012 the United Stated produced a total of 2.4 billion barrels of crude oil and 2.7 billion barrels in 2013—a 14-percent increase. For the first three months of 2014, each month averaged a 14-percent increase over the same month in 2013 trending toward an annual production in 2014 of over 3 billion barrels.

The U.S. Energy Information Administration forecasts oil production to rise to between 9.1 and 13 million barrels per day over the next few years to 2040.[17] The different forecasts of the growth potential and sustainability of domestic crude oil production are based on uncertainties in key assumptions, such as well production decline, lifespan, drainage areas, geologic extent, and technological improvement—both in areas currently being drilled and in those yet to be drilled.

The California Energy Commission reported that barrels of crude oil shipped by rail in California increased by 158 percent from September to December, 2013. In early 2013, the primary source of the crude oil was imported from North Dakota. Toward the end of the year, imports from Canada dramatically increased. All domestic imports, as well as Canadian imports that enter California via railroad, will traverse local safety hazard sites.

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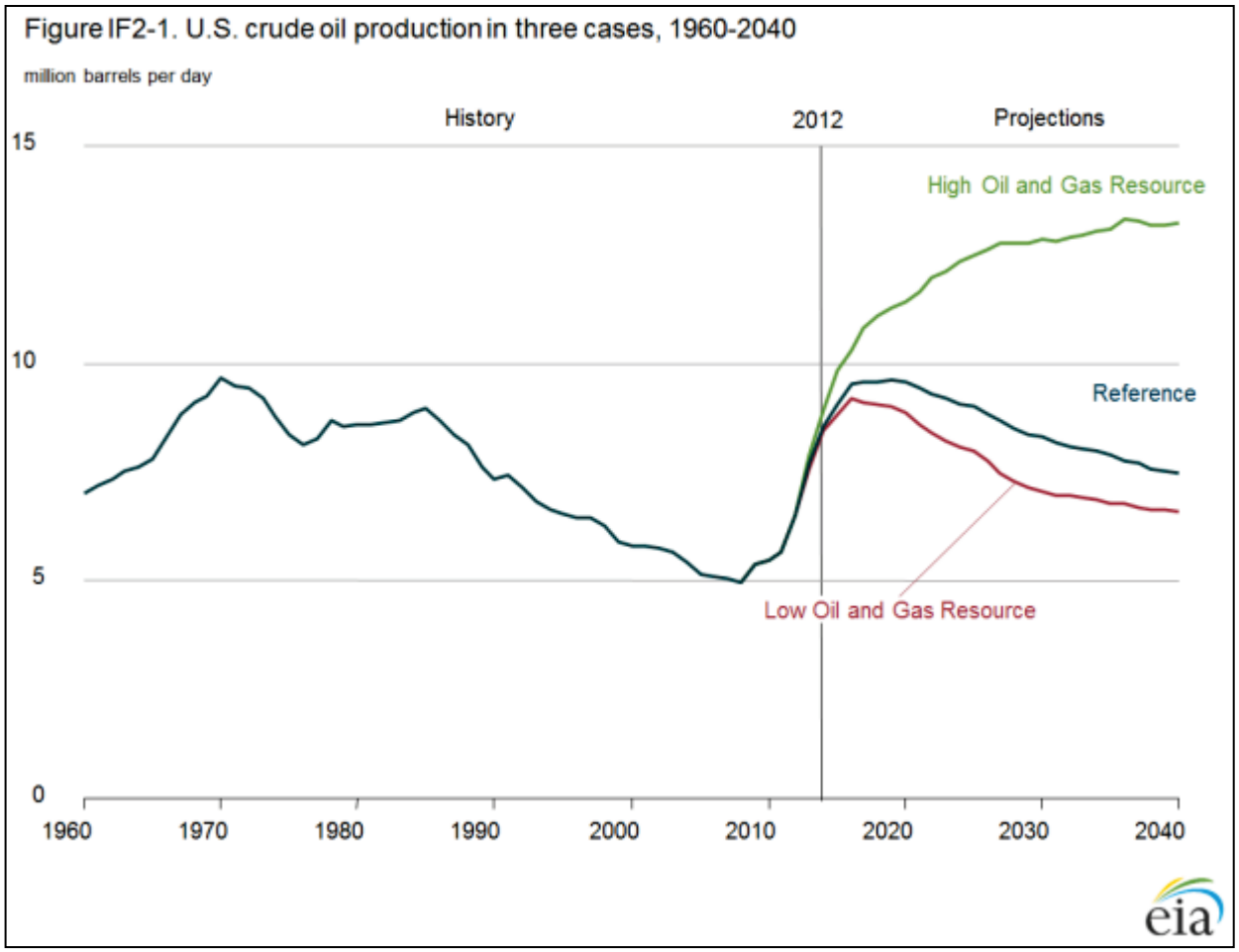
[14] The Surface Transportation Board defines a Class I railroad in the United States as "having annual carrier operating revenues of $250 million or more" after adjusting for inflation using a Railroad Freight Price Index developed by the Bureau of Labor Statistics. (49 CFR Part 1201) Two Class I railroads operate in California, the Union Pacific Railroad Company (UPRR) and the Burlington Northern Santa Fe Railway (BNSF).

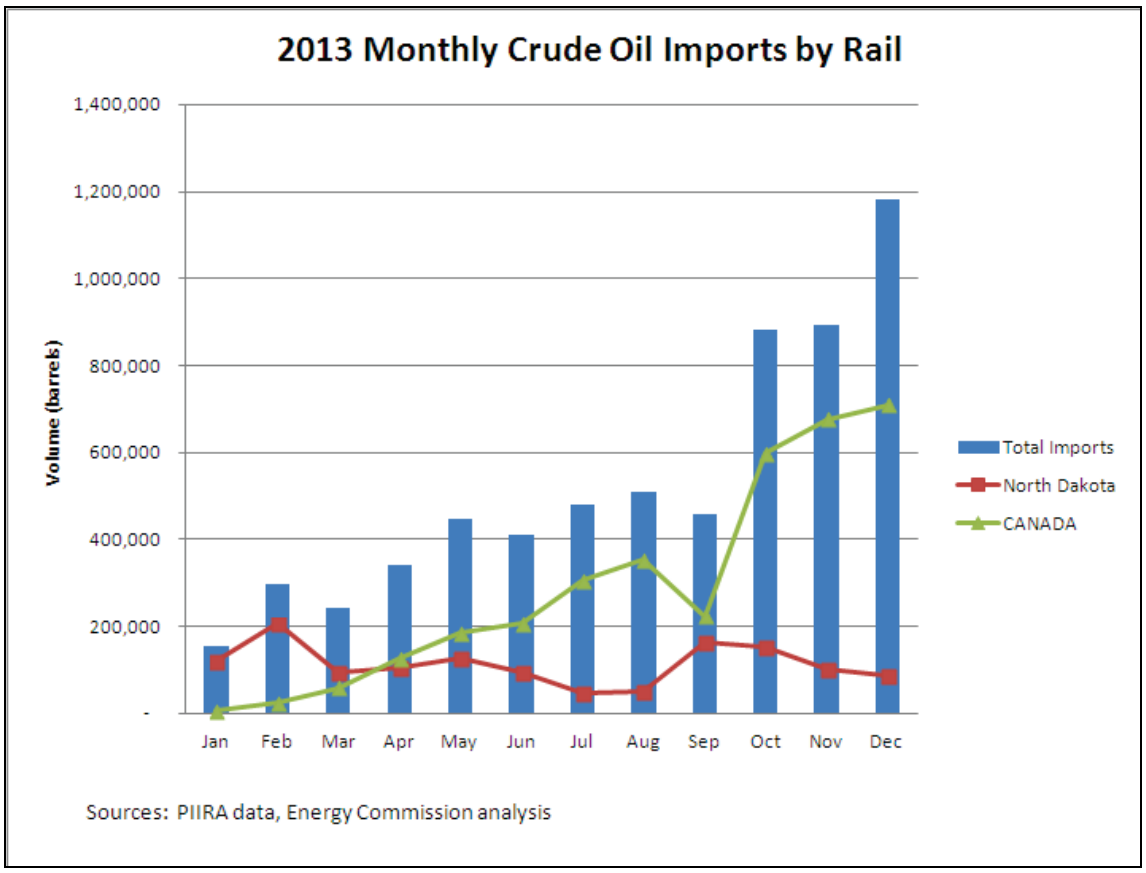
[15] Federal Railroad Administrator Joseph Szabo, quoted by the Times of Northwest Indiana, June 6, 2014. *Federal rail chief outlines oil train safety strategy*, by Keith Benman. http://www.nwitimes.com/business/local/federal-rail-chief-outlines-oil-train-safety-strategy/article_b4fc1fde-b3d2-59d1-8ee5-792e5d22bffb.html

[16] NTSB Chairman Deborah Hersman, April 9, 2014, https://www.ntsb.gov/news/speeches/hersman/daph140409.html

[17] The U.S. Energy Information Administration (USEIA) uses three scenarios: High, Low, and Reference cases. The USEIA forecasts increases in domestic crude oil production to nearly 13 million barrels per day (MMbbl/d) before 2035 in the High Oil and Gas Resource case, with net U.S. oil imports declining through 2036 and remaining at or near zero from 2037 through 2040. The Low Oil and Gas Resource case addresses uncertainty about tight oil and shale crude oil and natural gas resources, which leads to lower domestic production projections than in the Reference case. In the "Low" case, production reaches 9.1 MMbbl/d in 2017 before falling to 6.6 MMbbl/d in 2040, leading to higher projected dependence on net imports of petroleum and other liquids than in the Reference case.

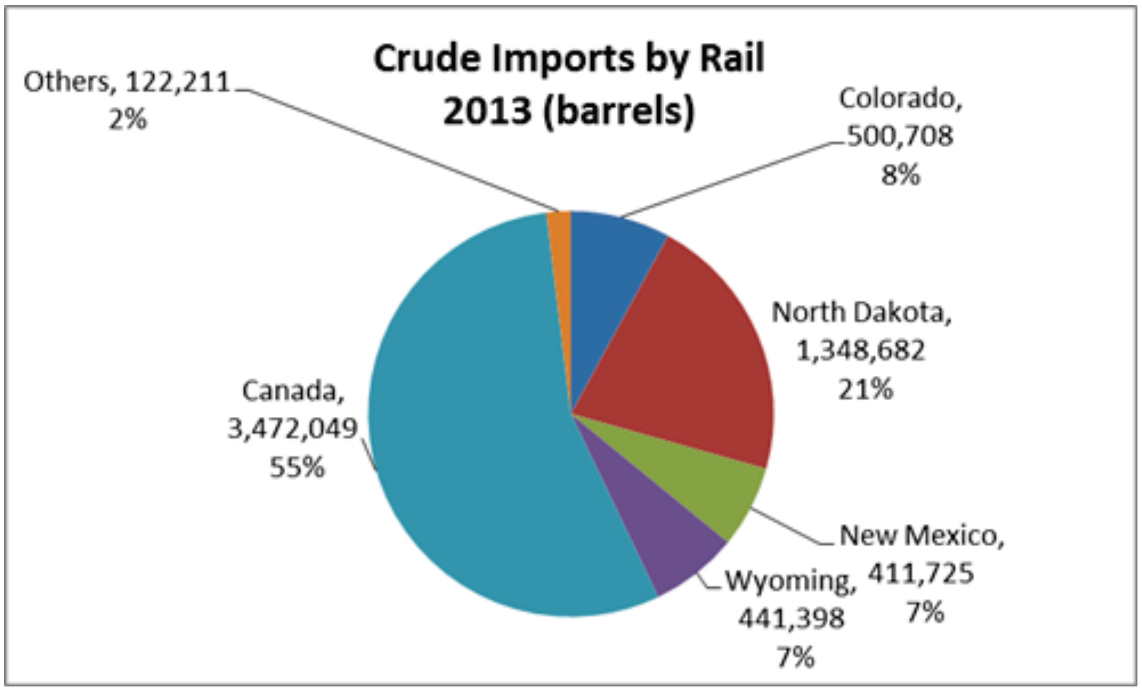



*Source: U.S. Energy Information Administration. Annual Energy Outlook – 2014.*




All rail routes into California and destined for oil refineries traverse locations of known local safety hazard sites. As such, these increases have heightened the CPUC's awareness of the volumes and potential risks of crude oil being transported by way of railroad into and through California.

*January 2013 derailment, Grass Valley Road at-grade public highway crossing, near Local Safety Hazard Site No.12 in Colfax, CA. Cause was due to equipment failure: tread build up on flange wheel.*

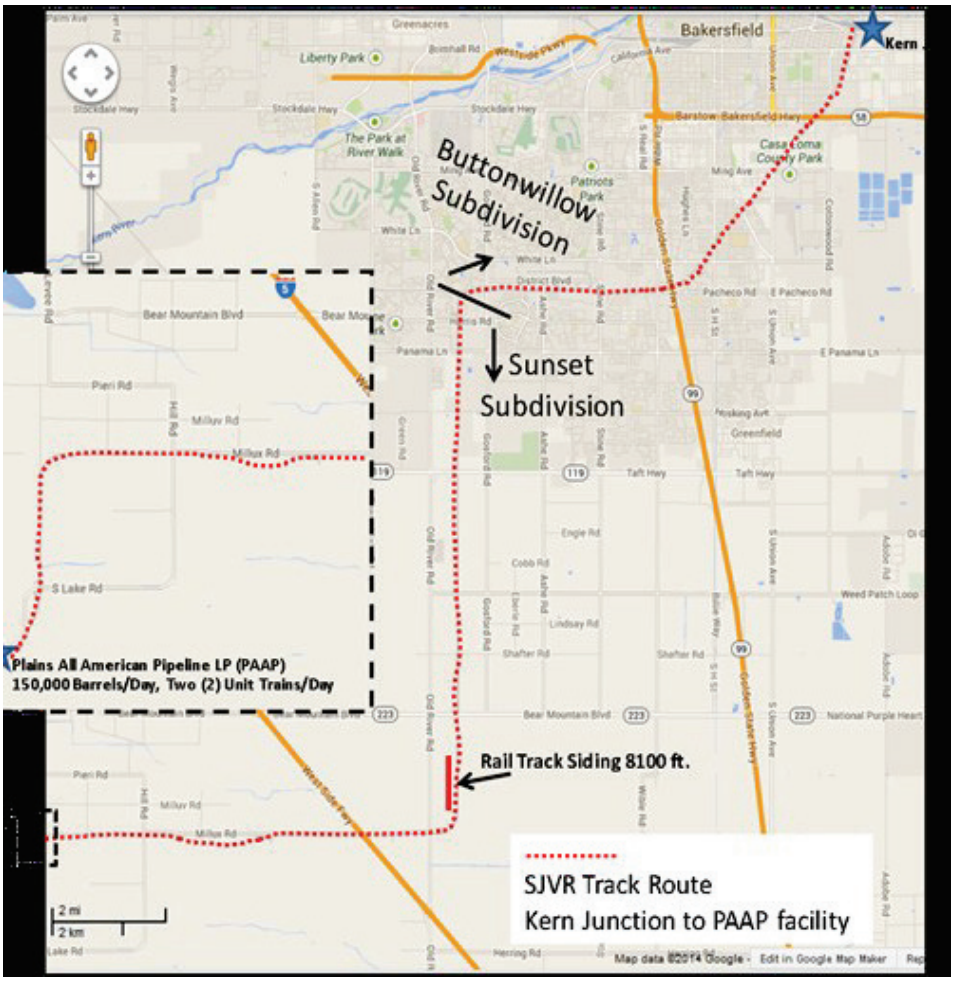



*Source: California Energy Commission*

With increased domestic production, a significant volume of crude oil is forecasted to be transported into California by railroad, destined for California terminals and refineries in areas such as Contra Costa County, Santa Barbra County, Los Angeles County, and Kern County. Communities, wildlife, and the natural environment at or near refineries in cities such as Bakersfield, Santa Maria, and Richmond, or anywhere along the train route traversed by these trains, will be at risk of train derailment accidents with the potential of crude oil release as well as other more toxic hazardous materials. In all cases, imported crude oil coming into California's refineries by railroad will traverse local safety hazard site locations along the way because railroad routes are fixed via these limited points of entry into the state.

## Crude Oil Reconnaissance Team (CORT)

Last year, Railroad Operations Safety Branch staff witnessed a significant amount of construction of new crude-oil related railroad transfer facilities in the Bakersfield area. These developments are likely in response to and in anticipation of crude oil being transported by rail. Upon further investigation, the branch program manager formed an interdisciplinary team of federally certified CPUC railroad safety inspectors, naming it the Crude Oil Reconnaissance Team (CORT). The individual specialties include: track, signal, hazardous materials / security, and operating practices and railroad equipment (railroad cars and locomotives).




*Planned increases in crude oil transportation through Bakersfield, CA.*

The team's purpose is to:

- Assess and mitigate risks and potential risks to public safety associated with crude oil railroad transportation in California;
- Identify and to resolve relevant areas of general safety and regulatory compliance by the railroads; and,
- Provide guidance to the UPRR, BNSF, contractors, and maintenance staff to improve the safety of crude oil transportation.

The CORT team's initial focus is on the pending opening of the Plains American / Bakersfield Crude Oil Unloading Facility, located 30 miles southwest of Bakersfield, and the related necessary upgrades planned for the railroads' routes to this area. During field observations beginning in November 2013, the team identified a number of potential risks regarding the condition of 29 miles of track and 35 grade crossings. In the subsequent months, the team has conducted numerous surveillance activities, inspections and investigations, culminating in mitigation efforts with railroads and their associated contractors to improve and maintain competencies.

The CORT team monitors the effectiveness of inspections, investigations, communications, regulation, rules and enforcement for areas found to be most vulnerable to the consequences of crude oil being released from a train transporting it. In order to prevent releases of chemicals carried by California's railroads, the team continually considers the impacts of the latest hazardous material safety risks encountered in the railroad industry in general and on California's railroad system, as well as on the specific local safety hazard sites.

The crude oil destined for refineries in Bakersfield or any other existing refinery in California will traverse local safety hazard sites, whether it is brought in through points of railroad route entries into California from the north, south, or east.

*All American crude oil terminal in Bakersfield. The January, 14, 2014 photo, left, shows preliminary site stakes in the ground just to the right of the overgrown bush. Within just three months, the March, 27, 2014, photo, right, shows train tracks placed – quickly constructed to make the facility ready for receiving crude oil transported by rail.*

The two companies, Plains All American Pipeline LP and Alon USA Energy Inc., are planning and developing separate crude oil rail terminal sites to offload a combined 220,000 barrels per day.[18] There are also similar developments and efforts already completed, underway, or being planned by other companies in preparing in anticipation for the influx of significant volumes of crude oil to be imported into California by railroad.

The Plains All American Pipeline is forecasted to transfer approximately 65,000 to 70,000 barrels per day from railroads, although the facility is designed for 140,000 barrels per day. The Dallas-based Alon proposes to build a 150,000-barrel-a-day, double-loop rail terminal at its Rosedale Highway plant that would handle an average of two "unit trains" per day, each more than a mile long and so named because they can be offloaded from a single point. Similar crude oil by rail developments are happening in areas such as Santa Maria with Phillips 66, as well as in Richmond with Kinder Morgan.

Increases in crude oil shipped by railroad into California increases risks generally, and additionally increases risks where these shipments pass through local safety hazard sites. With each DOT-111 rail tank car used to carry the crude oil, holding up to just over 30,000 gallons, and a unit train consisting of anywhere from 50 to 100 or more DOT-111 rail tank cars, a significant volume of crude oil can pass through these sites with risks of derailment and release of crude oil.

California imported crude oil consumption for the year of 2012 was 619 million barrels, which is an approximate average of 1.7 million barrels per day.[19] To place this in perspective, the anticipated 220,000 barrels of oil per day into Bakersfield would be, in volume comparison, nearly 13 percent of California's 2012 total daily consumption of crude oil. The anticipated 220,000 barrels per day into Bakersfield by railroad

[18] Source: Bakersfield Californian, Sat. Nov. 9, 2013.
[19] Source: U.S. Department of Energy, Energy Information Administration.

translates to an average of three unit-trains, consisting of about 90 to 100 rail tank cars of crude oil, to be delivered per day to Bakersfield.

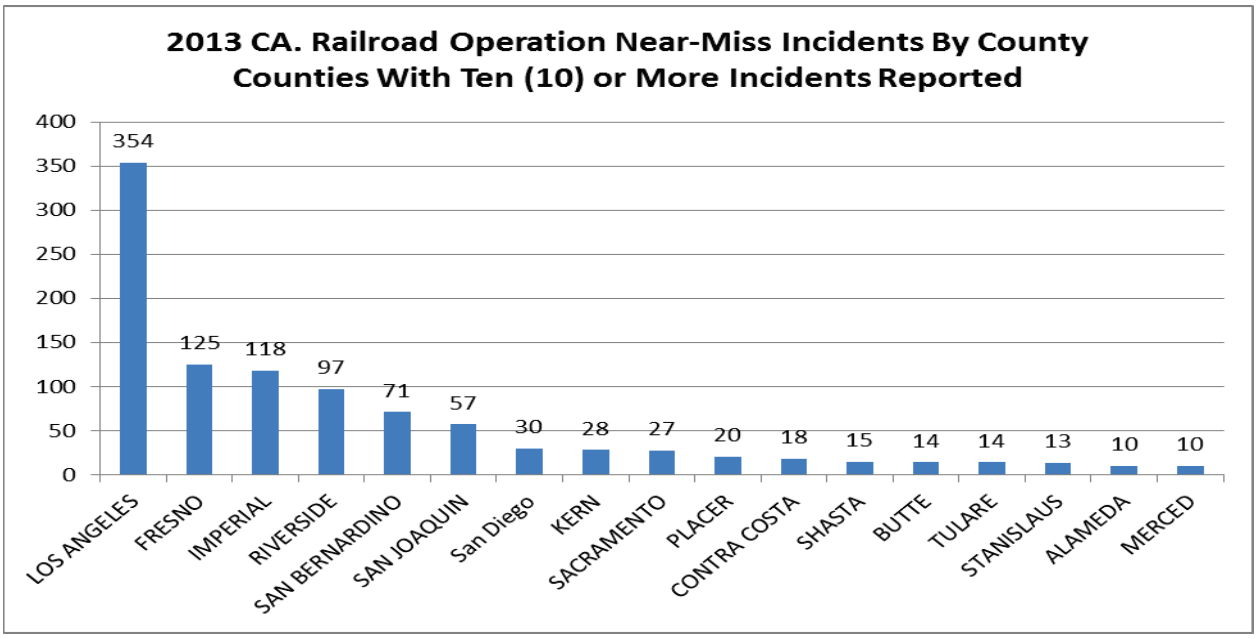
## VIII. NEAR-MISS REPORTING AND ANALYSIS

Public Utilities Code Section 7711.1 requires the CPUC to collect and analyze near-miss data for incidents in California occurring at railroad crossings or along the railroad right-of-way. "Near-miss" is further defined as a runaway train or any other uncontrolled train movement that threatens public health and safety. In support of this requirement the CPUC has developed a process for managing the risks discovered through the collection and analyzing of such near-miss data.

To proactively mitigate risks, the CPUC has more broadly interpreted the term "near-miss" is an incident that does not result in the occurrence of an accident but presents an unintended condition or exposure to a hazard that may have caused an accident. Accidents may be preceded by one or more near-miss incidents, making near-miss incident data useful information for identifying potential threats to public health and safety.

The CPUC railroad risk assessment team has collected near-miss data reported in the year 2013 and analyzed it for Class 1 railroads for counties in which they operate. The team graphed those counties in California with ten or more occurrences of near-miss incidents reported. Through this effort, areas being observed with a high frequency of occurrences of near-miss incidents can be further explored to determine if there are safety issues or existing hazards that can be addressed by taking additional action.

Reporting of most near-miss incidents is voluntary and all railroad corporations operating trains in California do not equally report near-miss information in a standardized format and do not use a uniform threshold for determining what conditions qualify as near-miss incidents. As such, the reported near-miss data may not be useful for comparisons. Nevertheless, because the data may describe conditions that may be leading indicators of accidents and thus describe characteristics that can be addressed, the near-miss data still has considerable accident prevention usefulness.




*Source: Union Pacific Railroad and BNSF Railway*

The county-wide data from near-miss incidents can be further broken down to a city level, and further still to a particular crossing. For example, a railroad crossing in El Centro, Imperial County, was identified through the risk assessment team's analysis to have a significant amount of near-miss incidents. Further analysis determined that a particular highway-railroad crossing had a much higher than average frequency of near miss-incidents. Analysis revealed that the railroad crossing configuration, located in El Centro at Clark Rd. and North 8th St., presents a blind spot hindering motorists from clearly seeing oncoming trains. Train operators have a similar hindrance for seeing oncoming motorists (see photos below). Using near-miss data to identify locations where there are conditions which may pose a greater likelihood of accidents, and/or have greater consequences in the event of an accident, enables the railroad risk assessment team to improve railroad safety.


*North 8th St. /Clark Rd. railroad crossing, view from North 8th St. side of crossing. The railroad crossing blind spot is located on the right*

*North 8th St. / Clark Rd. railroad crossing. Photo view is from Clark Rd. side of crossing. A train emerging out of the motorist blind spot created by trees and building structures, can be seen to the left.*

## IX. CONCLUSION

The CPUC has identified railroad lines in the state it finds to be hazardous. In addition, the CPUC has included a list of all railroad derailment accident sites in the state on which accidents have occurred within at least the previous five years, described the nature and probable causes of the accidents, and indicated whether the accidents occurred at or near sites that the commission has determined to be hazardous.

The Railroad Operations Safety Branch of the CPUC determined that the local safety hazard sites that experienced the most derailments were sites #3 and #16. Site #3 experienced 32 derailments in 2013, and site #16 experienced 10 derailments. Both sites are located in Southern California along track with steep grade as a factor.[20]

Over the past five years, California experienced a total of 58 derailments at or near local safety hazard sites. This rate has not significantly changed over the five-year period.

The primary causes of derailments were track-related. This is understandable because of the nature of the track. The track consists of two steel rails that are supported by crossties, resting on rock ballast, which rests on the subgrade foundation. This track structure must support the loads generated by a modern heavy-haul freight train, which can weigh 14,000 tons or more with each wheel exerting 36,000 pounds or 18 tons of force. Every component of the track has to be designed and maintained to withstand heavy loads, heavy traffic density, and severe weather conditions that can range from extreme cold and snow to severe heat and rain.

The second most common cause of derailments is operational factors, including train make-up or placement. Although it is possible to formally study and simulate train-track dynamics, every train is unique. When considering the significant length and weight of trains, steep grades, tight curves, and the compression experienced when starting, stopping, accelerating, and decelerating, each train may react differently depending on how the heavy and light cars are placed within the train. Eliminating derailing forces can become complex.

[20] See D.97-09-045, pp. 124, 129 – 130.

With the significant increases in crude oil being transported by railroad, the Railroad Operations Safety Branch formed the Crude Oil Recon Team (CORT), a team of multi-disciplinary specialists, to monitor and ensure the construction and operations of the crude oil facilities is done in compliance with federal laws, state laws, and CPUC general orders. In addition, the CORT team, as well as all CPUC railroad safety inspectors, possesses the authority to look beyond the regulations and note safety risks even though there may not be a specific violation. This is particularly necessary when the crude oil trains are running through local safety hazard sites.

The Railroad Operations Safety Branch advises the commission on all matters relating to rail safety, and proposes to the commission rules, regulations, orders, and other measures necessary to reduce the dangers caused by unsafe conditions on the railroads of the state. The CPUC proposes to:

- Continue working with the Administration and the Legislature to ensure the Railroad Operations Safety Branch has the resources necessary to enforce state and federal laws, regulations, orders, and directives relating to transportation of persons and/or commodities by rail.
- Consider an evaluation of new sites that may not be identified as local safety hazard sites, but are a risk to the public, railroad employees, and/or the environment.
- Reduce the dangers caused by unsafe conditions at all rail facilities.
- Continue to look "beyond the regulations" to mitigate risks at all railroad sites, in particular local safety hazard sites.