



**Tank Car Derailment Damage
FACTUAL REPORT**

**June 24, 2023, Derailment of Montana Rail Link Freight Train
M-LAUMIS1-23A and Subsequent Hazardous Materials Release**

Reed Point, Montana

HMD23LR002

Report Date: March 15, 2024

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1. **Identification**

Carrier: Montana Rail Link (MRL)
Train No.: M-LAUMIS1-23A
Location: Reed Point, Montana
Date/Time: June 24, 2023, 6:14 a.m. MST
NTSB No.: HMD23LR002

2. **Summary**

On June 24, 2023, at approximately 6:14 AM local time, a Montana Rail Link (MRL) key train M-LAUMIS1-23A had 17 cars (No. 36-52) derail from a bridge (MP51.6), near Reed Point, Stillwater County, Montana. Sixteen of the 17 derailed cars were loaded with hazardous materials, carrying UN2922, Corrosive Liquid, toxic n.o.s. (sodium hydrosulfide), class 8 (6.1), packing group II, UN3257, Elevated Temperature Liquid N.O.S. (asphalt petroleum liquid), class 9, packing group III and NA2448, Molten Sulfur, class 9, packing group III. Ten of the derailed cars fell into the Yellowstone River, nine of which were loaded with Class 9 hazardous materials. The nine hazardous materials tank cars (6 - UN3257, 3 - NA2448) had breached and released its lading into the Yellowstone River. Several water treatment plants temporarily stopped drawing water from the Yellowstone River.

There was no evacuation, and no injuries were reported. Weather at the time of the accident was sunny and 53 degrees Fahrenheit, with a 17-mph wind. The bridge was destroyed.

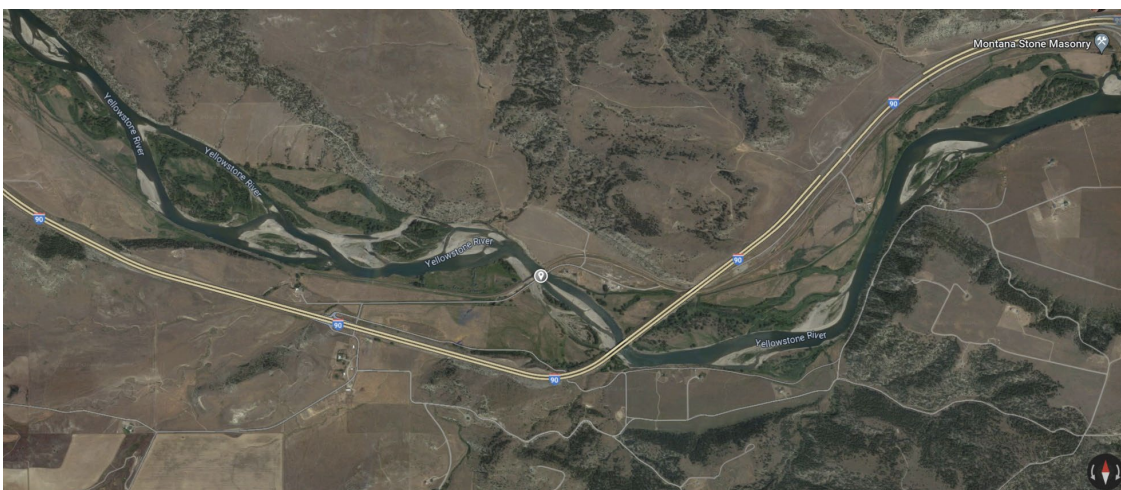


Figure 1. Accident location map. (source: Google Maps)

The National Transportation Safety Board (NTSB) conducted a limited investigation into the accident performance of the DOT-111 and AAR-211 tank cars and collected information relative to the tank car damages from the Federal Railroad Administration (FRA). There were no parties to this investigation due to the limited scope and the NTSB did not taking a lead role.

3. MRL Train M-LAUMIS1-23A

Train No. M-LEUMIS1-23A did not meet the definition of a high-hazard flammable train as defined in 49 CFR 171.8¹, but was listed on the train's consist as a "Key" train, as defined by AAR publication OT-55R. This train was subject to the safety and security planning requirements of 49 CFR Part 172, Subpart I and speed restricted to 45 mph. Train No. MLEUMIS123A contained 47 loaded cars and 8 empty. The train was 3,132 feet long and weighed approximately 6,235 tons. There were 35 loaded hazardous materials cars throughout the train.

Train No. MLEUMIS123 had originated from Laurel, MT and was destined for Missoula, MT. The track speed limit was 45 mph prior to the curve on the bridge approach, then reduced to 40 mph on the curve. The train was travelling at 38 mph across the bridge at the time of the derailment.

The hazmat cars involved in the derailment were contained in DOT specification 111A100W1 tank cars and one AAR 21160W (See section 8, Table 2).

The derailment sequence began with the tank car at line 36 through line 52.

4. Derailment Location

Train No. M-LAUMIS1-23A was traveling on Montana Rail Link's Subdivision 2 in a westerly direction, derailling on the MRL at a bridge (MP 51.6) near Reed Point, Stillwater County, Montana. (See Figure 1)

The derailment location is remote with Interstate 90 to the south and the town of Reed Point west-northwest.

¹ [https://www.ecfr.gov/current/title-49/part-171/subpart-A#p-171.8\(High-hazard%20flammable%20train%20\(HHFT\)\)](https://www.ecfr.gov/current/title-49/part-171/subpart-A#p-171.8(High-hazard%20flammable%20train%20(HHFT)))



Figure 2. Accident scene, Courtesy Federal Railroad Administration.

Published 2020 demographic data indicated that about 247 people lived in the area with the town of Reed Point approximately 6 miles from the accident location.²

5. Hazardous Materials Shipper

CHS Inc. operates a refinery in Laurel Montana that produces refined petroleum hydrocarbon products. CHS Inc. was the shipper of the hazardous materials released as a result of the derailment, which includes 6 tank cars with a proper shipping name³ of UN3257, Elevated Temperature Liquid N.O.S. (Asphalt Petroleum Liquid), class 9, packing group III, 3 tank cars of NA2448, Molten Sulfur, class 9, packing group III and 2 tank cars of UN2922, Corrosive Liquid, Toxic N.O.S. (Sodium Hydrosulfide), Class 8 (6.1), packing group II.

6. Hazardous Materials Information

The hazardous materials transported in MRL train M-LAUMIS1-23A contained several different hazard classes of materials. Involved in the derailment were UN2922, Corrosive Liquid, Toxic N.O.S. (Sodium Hydrosulfide), class 8 (6.1), packing group II, UN3257, Elevated Temperature Liquid N.O.S. (Asphalt

²<https://datausa.io/profile/geo/reed-point-mt> accessed August 24, 2023.

³[https://www.ecfr.gov/current/title-49/part-172/subpart-C#p-172.200\(a\)](https://www.ecfr.gov/current/title-49/part-172/subpart-C#p-172.200(a))

Petroleum Liquid), class 9, packing group III and NA2448, Molten Sulfur, class 9, packing group III.

Class 9 materials (miscellaneous) were the only tank cars that were breached in the derailment, all of which were in the Yellowstone River. Six of the class 9 tank cars in the river were shipped as UN3257, Elevated Temperature Liquid, N.O.S. (Asphalt Petroleum Liquid). This material is intended to be shipped at or above 212 degrees F. ERG Guide 171 recommends an isolation distance of at least 150 feet for liquids and 75 feet for solids.⁴ The cold water of the river would have caused this material to harden.

Three of the class 9 tank cars also in the river were shipped as NA2448, Sulfur, Molten. This material is at an elevated temperature and is at approximately 290 degrees F to be in a molten state. At temperatures below its molten state, it becomes a crystalline solid and has a pale-yellow color. ERG guide 133 recommends an isolation distance of at least 330 feet for a large spill. The recovered molted sulfur was in a crystalline state.

7. Shipper's Tank Car Inspections and Loading

7.1. *Pre-trip Inspections*

On June 20, 2023, CHS, Inc. conducted a pre-load inspection of the 3 tank cars loaded with NA2448, Molten Sulfur that were involved in the derailment. CHS, Inc. conducted a pre-loading inspection of each tank car.

After the tank cars had been loaded, a final inspection was conducted to verify the tank car had been closed properly and showed no signs of leaking, vapor or spillage.

The loader found no exceptions during the pre-load and post-load condition of the tank cars involved in the derailment. This information is recorded on the "Tank Rail Car Loading Form (RC-1)".

On June 21, 2023, CHS, Inc. conducted a pre-loading inspection of the 6 tank cars loaded with UN3257, Elevated Temperature Liquid, N.O.S. (Asphalt

⁴ Emergency Response Guidebook: a Guidebook for First Responders during the Initial Phase of a Dangerous Goods/Hazardous Materials Transportation Incident. (Washington, DC.: U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration, 2020).

Petroleum Liquid) that were involved in the derailment. CHS, Inc. conducted a pre-loading inspection of each tank car.

After the tank cars had been loaded, a final inspection was conducted to verify the tank car had been closed properly and showed no signs of leaking, vapor or spillage.

The loader found no exceptions during the pre-load and post-load inspections of the tank cars involved in the derailment.

7.2. Loading

MRL waybills identified the loading weight for each tank car. No loadings exceeded applicable load limits (by weight or by volume) for the derailed tank cars. CHS, Inc. loading records provided the preset volume of molten sulfur and asphalt loaded into each tank car (Table 1). The 10 derailed tank cars carried a total of 168,965 gallons, or 1,663,606 pounds.

Table 1. Loaded tank car volumes and weights.

Line #	Car Mark	Car Number	Tank Capacity (gal)	Loaded Volume ⁵ (gal)	Load Limit (lb.)	Lading Weight ⁶ (lb.)
38	UTLX	665072	23590	21708	190800	178554
39	UTLX	644827	23450	21579	190700	178554
40	UTLX	664879	23505	21629	190800	178554
41	TILX	136042	13920	13181	203200	197104
42	UTLX	641341	23508	21631	190500	178554
43	UTLX	661234	23382	21518	191000	178554
44	UTLX	644859	23405	21539	191200	178554
45	GATX	69298	13856	12968	203000	196910
46	CGTX	13864	13960	13212	204400	198268
		Total		168,965		1,663,606

8. Tank Car Information

Eight derailed tank cars that were breached were originally constructed to specification DOT-111A100W1. One tank car was constructed to specification

⁵ Loaded volumes were provided by a CHS, Inc, dated June 20 & 21, 2023.

⁶ Lading weights were provided by BNSF tank car waybills.

AAR-21160W which is similar to the DOT-111 with few exceptions. These requirements are found in the AAR Manual of Standards and Recommended Practices (M-1002) in Chapter 3⁷.

Title 49 of the Code of Federal Regulations (CFR) Part 179 outlines the following specification requirements for DOT-111 tank cars: (1) Subpart B of Part 179 - general design requirements; (2) Subpart D - specifications for non-pressure tank car tanks. Additional tank car industry standards incorporated in the HMR by reference are: The Association currently applicable Section C-Part III, Specifications for Tank Cars, Specification M-1002.

Tank car heads must be normalized after forming, unless approval is granted by the AAR Executive Director of Tank Car Safety on the basis that a facility has demonstrated that its equipment and controls provide an equivalent level of safety. For tanks constructed on normalized TC128 Grade B steel, non-jacketed tanks must be at least 1/2-in. thick and jacketed cars must be at least 7/16-in. thick. For tanks constructed of normalized A516-70 steel, non-jacketed cars must be at least 5/8-in. thick and jacketed cars must be at least 1/2-in. thick. In all cases the cars must be equipped with at least 1/2-in. half-head shields.⁸

Federal regulations at 49 CFR 173.241⁹ provide specification requirements for tank cars used to carry certain low hazard liquid and solid materials.

Table 2: Summary of breached derailed tank cars.

Line #	Car Number	Type	Commodity	Tank Car Specification	UN ID	Hazard Class/Packing Group
38	UTLX 665072	Tank Car	Elevated Temperature Liquid N.O.S. (asphalt petroleum liquid)	DOT111A100W1	UN3257	Class 9/ PG III
39	UTLX 644827	Tank Car	Elevated Temperature Liquid N.O.S. (asphalt petroleum liquid)	DOT111A100W1	UN3257	Class 9/ PG III
40	UTLX 664879	Tank Car	Elevated Temperature Liquid N.O.S. (asphalt petroleum liquid)	DOT111A100W1	UN3257	Class 9/ PG III

⁷ *Manual of Standards and Recommended Practices, Section C-III, Specifications for Tank Cars, M-1002*, paragraph (Washington, DC: Association of American Railroads, 2014).

⁸ *Manual of Standards and Recommended Practices, Section C-III, Specifications for Tank Cars, M-1002*, paragraph 2.5.2. (Washington, DC: Association of American Railroads, 2014).

⁹ <https://www.ecfr.gov/current/title-49/subtitle-B/chapter-I/subchapter-C/part-173/subpart-F/section-173.241>

41	TILX 136042	Tank Car	Sulfur, Molten	DOT111A100W1	NA2448	Class 9/ PG III
42	UTLX 641341	Tank Car	Elevated Temperature Liquid N.O.S. (asphalt petroleum liquid)	DOT111A100W1	UN3257	Class 9/ PG III
43	UTLX 661234	Tank Car	Elevated Temperature Liquid N.O.S. (asphalt petroleum liquid)	DOT111A100W1	UN3257	Class 9/ PG III
44	UTLX 644859	Tank Car	Elevated Temperature Liquid N.O.S. (asphalt petroleum liquid)	DOT111A100W1	UN3257	Class 9/ PG III
45	GATX 69298	Tank Car	Sulfur, Molten	AAR21160W	NA2448	Class 9/ PG III
46	CGTX 13864	Tank Car	Sulfur, Molten	DOT111A100W1	NA2448	Class 9/ PG III

9. Derailment Damage Summary

Local Federal Railroad Administration collected detailed tank car damage assessment data provided in Appendix A of this report.

The resting locations of all the breached tank cars was not able to be determined due to the depth of the river. (See Figure 3)

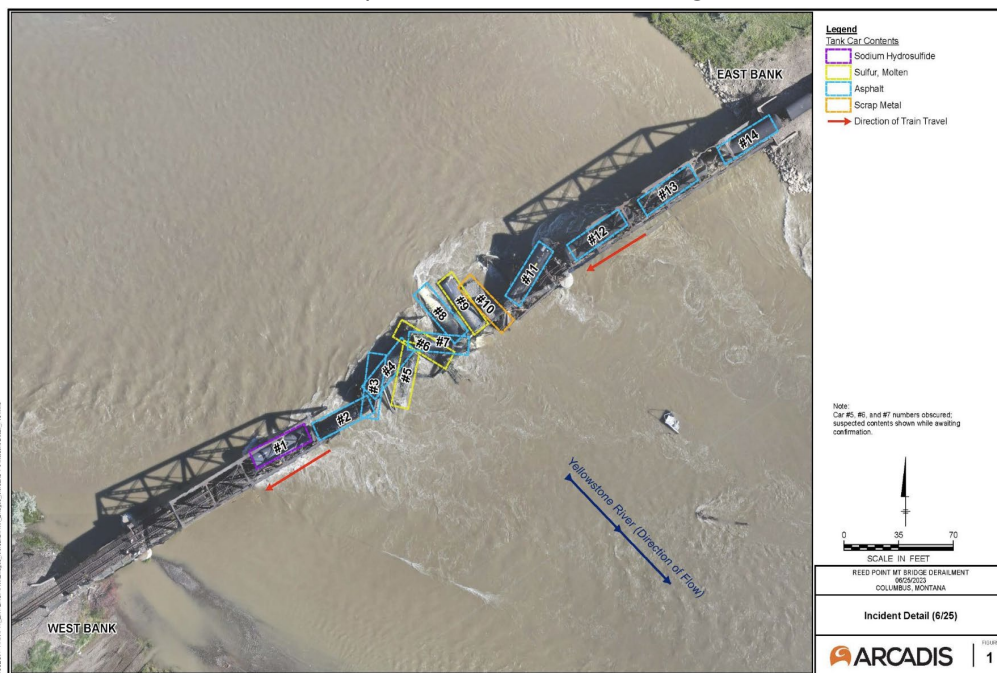


Figure 3. Derailment showing tank car locations. Submerged tank cars are #2-#10. Tank cars and contents are approximate. Drone photo credit: Rapid Response Systems on behalf of Montana Rail Link¹⁰

¹⁰ <https://experience.arcgis.com/experience/719ee8d6c1d743e89b95ee946d1d4d45/page/Drone-Imagery-and-Maps/>

9.1. Breaching Damage

All the cars involved in the derailment that fell into the river were breached. The catastrophic failure of the bridge during the crossing caused the tank cars to drop into the river with multiple contacts with other tank cars and bridge material.

Tank car breaching damage is summarized in Table 3.

Table 3. Tank car breach summary.

Position	Tank Car	Damage Related to Product Release
38	UTLX 665072	Breach locations on both heads with B-end (leading) head having deep dent and rip 17"x7". A-end has a puncture 23"x2" and 12"x12". Right center of the tank has a puncture 7"x7".
39	UTLX 644827	Puncture on left side of B-end (leading). B head has a deep dent. Top valve sheared off.
40	UTLX 664879	A end of tank car crushed and buckled downward. Bottom outlet valve sheared off. Tank punctured on bottom, B-end of tank car. Top valves sheared off.
41	TILX 136042	Puncture on the bottom of B-end is 11" x 7". Manway lid torn off.
42	UTLX 641341	Bottom outlet valve sheared off. A-head breach is 71" x 70".
43	UTLX 661234	PRD sheared off and leaking product. Both heads show signs of severe impact with 14" to 23" dents.
44	UTLX 644859	Bottom outlet valve sheared off. Tank rip left side, B-end at 58" x 45".
45	GATX 69298	A-head puncture is 54" x 15". Manway cover missing which released hazmat into the environment. Bottom outlet valve handle securement structure was missing, and valve was partway open. The bottom outlet valve was intact.
46	CGTX 13864	Manway and PRD missing. A-head punctures are 54" x 28" and 10" x 2". Top of the A-end has a puncture that is 13" x 9"

10. Hazardous Materials Release Estimate

EPA reported MRL estimates the mass balance, or total volume, for the asphalt material that entered the river has been calculated at 419,442 pounds of material. As of October 10, 2023 235,813 pounds of asphalt had been recovered.¹¹

Submitted by:

*Bob Clatterbuck
Branch Chief, Hazmat Accident Investigator*

¹¹ <https://www.stillwatercountymt.gov/DocumentCenter/View/708/Press-Release-10102023>

Appendix A: Tank Car Examinations

Tables A-1 through A-9 summarize field observations collected for the derailed tank cars.

Key to abbreviations used in this Appendix

B-end: the end of the car with the handbrake wheel

A-end: the end of the car opposite the B-end

A-L: A-end, left side

A-R: A-end, right side

B-L: B-end, left side

B-R: B-end, right side

BOV: bottom outlet valve

PRD: pressure relief device

Top: 4-feet to the right and left of the top longitudinal centerline

Bottom: 4-feet to the right and left of the bottom longitudinal centerline

All observations and orientations provided are from the perspective of facing the B-end of the tank car.

Table A-1: Tank Car UTLX 665072, 111A100W1

Consist order	38
Orientation in the consist	A-end leading.
Derailed resting position	The car came to rest partially submerged in the river.
Heads	The A-end and B-end heads had extensive damage. A-end stub sill fractured and separated at the head brace.
Shell	Multiple areas of damage. A-end buckled at inboard end of the stub sill, creased and folded under.
Bottom outlet valve	No damage.
Top fittings, PRD and Manway	Unable to view.



1(a) A-end head with two punctures.



1(b) A-end, bottom buckled at inboard end of the stub sill.



1(c) B-end trailing head with multiple breaches.



1(d) Bottom outlet valve is in-tact.

Table A-2: Tank Car UTLX 644827, 111A100W1

Consist order	39
Orientation in the consist	B-end leading.
Derailed resting position	The car came to rest partially submerged in the river.
Heads	Rounded dent to upper A-end head, B-end with a deep crease.
Shell	Multiple areas of damage with a breach on the B-end.
Bottom outlet valve	Not able to view.
Top fittings, PRD and Manway	Protective housing was missing. No leak from top fittings or manway noted. Valves sheared off.



2(a) A-end, UTLX 664879 imprinted on head.



2(b) B-end leading. Shell was intact while in river.



2(c) A-end and top showing valve sheared off.



2(d) B-end left side breach.

Table A-3: Tank Car UTLX 664879, 111A100W1

Consist order	40
Orientation in the consist	A-end leading.
Derailed resting position	The car came to rest partially submerged in the river.
Heads	Heads were crushed.
Shell	Tank was punctured on bottom of B-end on tank car and crushed.
Bottom outlet valve	Sheared off.
Top fittings, PRD and Manway	Valves were sheared off and manway opened during derailment. PRD was good.



3(a) A-end leading, UTLX 644827 imprinted on head. Head is crushed from the top.



3(b) B-end



3(c) A-end is to the left.



3(d) Breach on bottom of B-end.

Table A-4: Tank Car TILX 136042, 111A100W1

Consist order	41
Orientation in the consist	Unknown
Derailed resting position	The car came to rest partially submerged in the river.
Heads	Dent to center of A-end head is 54" x 63".
Shell	Shell puncture near the bottom centerline of the B-end is 11" x 7".
Bottom outlet valve	Valve was intact.
Top fittings, PRD and Manway	Manway had lid torn off. No PRD.



4(a) A-end



4(b) B-end



4(c) Open Manway



4(d) Puncture on B-end bottom.

Table A-5: Tank Car UTLX 641341, 111A100W3

Consist order	42
Orientation in the consist	Unknown
Derailed resting position	The tank car came to rest upright on top of partially submerged tank cars and bridge wreckage.
Heads	A-end head breach is 71" x 70".
Shell	The bottom was crushed and dented from one end to the other. Top of A-end breached.
Bottom outlet valve	The BOV nozzle was sheared off. The valve remained closed.
Top fittings and Manway	Remained closed.



5(a) A-end breach



5(b) B-end



5(c) A-end breached area.



5(d) Bottom valve closed.

Table A-6: Tank Car UTLX 661234, 111A100W1

Consist order	43
Orientation in the consist	A-end leading.
Derailed resting position	The car came to rest partially submerged in the river.
Heads	Both heads were dented.
Shell	Shell had extensive damage and breached on top center and B-end.
Bottom outlet valve	Intact
Top fittings, PRD and Manway	Manway was intact. PRD was sheared off.



6(a) A-end leading



6(b) B-end



6(c) Top PRD sheared off



6(d) Bottom outlet valve

Table A-7: Tank Car UTLX 644859, 111A100W1

Consist order	44
Orientation in the consist	A-end leading.
Derailed resting position	The car came to rest partially submerged in the river.
Heads	A-end dented, B-end has considerable jacket damage and a rip on left side.
Shell	Large amount of shell damage believed to have occurred during recovery. Rip on B-end of shell.
Bottom outlet valve	Sheared off.
Top fittings, PRD and Manway	Top fittings/manway intact.



7(a) A-end



7(b) B-end



7(c) Manway intact



7(d) Left side B-end tank rip location

Table A-8: Tank Car GATX 69298, AAR21160W

Consist order	45
Orientation in the consist	Unknown
Derailed resting position	The car came to rest partially submerged in the river.
Heads	Puncture in A-end head. B-end head dented.
Shell	Jacket was torn off from the middle to the B-end head.
Bottom outlet valve	Appeared intact.
Top fittings, PRD and Manway	Manway cover missing.



8(a) A-end head with jacket tear and head puncture.



8(b) B-end.



8(c) Puncture in top of A-end head.



8(d) Manway cover missing.

Table A-9: Tank Car CGTX 13864, 111A100W1

Consist order	46
Orientation in the consist	A-end leading.
Derailed resting position	The car came to rest partially submerged in the river.
Heads	A-end head with breach, B-end head dented.
Shell	Damaged with sleeve tears.
Bottom outlet valve	Intact
Top fittings, PRD and Manway	Manway cover missing, no PRD.



9(a) A-end with head breach



9(b) B-end



9(c) Manway with missing cover



9(d) Bottom outlet valve