

**Group Chairman Factual Report**

**NATIONAL TRANSPORTATION SAFETY BOARD**

**Office of Railroad, Pipeline and Hazardous Materials Investigations  
Washington, DC**

**TRACK AND ENGINEERING GROUP CHAIRMAN  
PRELIMINARY FACTUAL REPORT**

**RRD20FR002**

**Derailment of CSX Ethanol Unit Train K42911  
Driffin, KY**

**February 13, 2020**

Report Prepared by:  
R. A. Hipskind,  
Track and Engineering Group Chairman

Date: April 13, 2020

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### Synopsis

For an official summary of the accident, refer to the *Accident Summary* report in the docket for this investigation.

### Aerial View of Accident Site:



Figure 1. Aerial photo of the resting wreckage position of locomotives, buffer car and tank cars of train K42911 at the point of collision site. (source: CSX drone still image)

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### View of mud slide<sup>1</sup>:



Figure 2. Aerial photo of the point of collision site taken on February 14<sup>th</sup>. View looking at scar created by the extensive mud slide—arrow shows train direction (source: CSX drone still image)

### Circumstances Prior to the Accident:

#### Train K42911:

On Thursday, February 13, 2020, at 6.54 a.m. EST, a CSX Transportation (CSX) train K42911 was operating southbound on CSX's Kingsport Subdivision on a single main track when it derailed at milepost CMG 123.8. The two-man crew consisted of an engineer and conductor, who went on duty at 00:50 a.m. EST in Kingsport, TN and deadheaded<sup>2</sup> to Shelby, KY. The train consisted of three lead locomotives followed by a single buffer car (an open top hopper) and 96 loaded tank cars and another buffer at the rear of the train. The train originated in Marcus, IA, and was transferred to CSX at Chicago, IL and was destined for Charlotte, NC.

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1 The mud slide included soil, vegetation, rocks and trees with their root ball.

2 Deadheading is a railroad term that means the crew was on duty and transported to the place where they boarded the train to begin operating, thus the crew was "deadheading" and not operating while in transit.

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CSX reported they had accessed the Trip Optimizer<sup>3</sup> data from the locomotive and determined the train was moving at 24.8 mph prior to the loss of normal wheel/rail relationship. Investigators inspected the internal cabinets of the locomotives to retrieve the video and event recorder data; however, the extensive fire damage rendered the components into ashes. No headend or event recorder data was examined.

### Track Description:

This portion of CSX's Kingsport Subdivision is single main track territory with multiple sidings for passage of trains. CSX's officials estimated that this portion of the Kingsport, in aggregate, operates an average of five to six through trains daily not including locals. CSX officials estimated the annual gross million tons (GMT) figure at 10 GMT, some portions were calculated at less than 10 MGT.

CSX inspects and maintains their main track on the Kingsport Subdivision to Federal Railroad Administration (FRA) Track Safety Standards (TSS) for Class 2 track in the vicinity of milepost 123.8 for a maximum operating speed of 25 mph for freight train operation. The maximum operating speed is defined in CSX's Timetable is 25 mph. There is no passenger service on this line.

The area of track on the approach to the point of derailment and including the track within the derailment footprint<sup>4</sup> is constructed of 136-pound continuous welded rail (CWR) resting in 8 inch by 14 ¾ inch double shoulder crosstie plates affixed to the rails with two inside and one field side rail holding cut spikes on each rail along with an outside anchor spike on each rail. The rails and crosstie plates are supported by wooden crossties spaced apart nominally at about 19 ½ inches center to center. The longitudinal movement of the rail (CWR) is restrained by channel lock anchors that are box anchored on every other crosstie for tangent track and curves.

The Kingsport Subdivision follows the Russel Fork River and thus the track structure is a series of curves as it mirrors the river's course. The last curve the accident train traversed prior to the colliding with the mud slide was a 2-degree 10-minute (track chart labeled as "left hand") curve with a designated 1-inch superelevation. The train was operating on a slight ascending grade.

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3. A *trip optimizer* is an intelligent automated energy management system installed on locomotives that assists train crews to improve fuel consumption efficiency based on a train's configuration and the route traveled.

4 The derailment footprint is a term used to define the limits of track damage, the mud slide obstruction area and the resting positions of the derailed equipment.



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### Point of Collision/Derailment:

Investigators identified the point-of-collision (POC/POD) at a location about midpoint into the expanse of the mud slide footprint<sup>5</sup>. Investigators observed how the depression into the mud slide angled outward away from the bluff area and toward the river side below the track structure. A still image of the area from fire department video taken about one hour after the event confirms the above description. Due to the unsafe conditions of the active mud slide, a consensus was reached by the investigators that the point of derailment was located at milepost 123.8. (See Appendix A to view accident scene graphic).



Figure 3. This is view looking at the mud slide and resting position of the equipment about one hour after the event. Notice the red circle outlining the depression in the slide portion covering the track.

### Damages Estimates:

CSX engineering personnel estimated the total track structural damages at \$60,000. This figure includes costs for the installation of track panels, cross-ties, associated ballast and track materials. The overall cost was estimated by CSX at \$2.4 million.

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<sup>5</sup> The mud slide footprint is defined as the linear distance of the slide that covered the track structure.

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### Post-Accident Inspection/Testing of Track

On February 12, 2020, CSX operated one of its track geometry cars (TGC3) over 151.43 miles of the Kingsport Subdivision that included the area where the derailment occurred on February 13<sup>th</sup>. The data from the testing on the 12<sup>th</sup> did not indicate any track geometry exceptions within the area of the derailment footprint or in the curve on the approach to milepost 123.8. In lieu of taking track field notes measurements and due to the complexity of the hazardous materials concerns and excessive coverage of the track structure by the debris from the mud slide, the track group is accepting the track geometry measurement data (measured under load) from CSX's TGC3 of the previous day before the accident.



Figure 4. View looking at track structure and approach the accident train traverse prior to collision with the obstruction. (source: FRA Inspector—taken on 2/13/20)

### Track Geometry Car (TGC) Tests

CSX reported they operate their TGC to test the Kingsport Subdivision two times annually. CSX provided both foot-by-foot line data measurements from their TGC3 test, as well as, expanded images of the strip chart signature for evaluation by investigators. Investigators focused on the immediate area of track that the accident train traversed going into the mud slide location. In addition, investigators reviewed the curve analysis data produced from the test data for the curves in the area of track. The files associated with the TGC3 test used by investigators can be found in NTSB public docket for this accident.

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A review of CSX's TGC3 data revealed the following measurements for the track the train last traversed prior to the POC/POD:

- The maximum measurement allowed for gauge in FRA Class 2 track, a maximum authorized speed of 25 mph for freight is 57 3/4 inches. Investigators determined that the widest gage prior to and including the POC was 56.695 inches; or about 1 inch under the FRA maximum allowable limit. [see line 344 of the tabular data]
- The maximum allowable difference in crosslevel between any two points less than 62 feet apart (warp) may not be more than 2 1/4 inches for Class 2 track. Investigators determined from the TGC3 measurement data that the maximum warp measurement was 0.556 of an inch; or 1.694 of an inch under the FRA maximum limit. [see line 46 of the tabular data]

The TGC3 measured the degree of curvature and crosslevel (superelevation) of each curve throughout the test. Investigators reviewed the curve analysis data for the curve at the mud slide and found that the curve's maximum operating speed was 62 mph. The curve at the time of the accident was authorized for 25 mph. This is the last segment of track that train K42911 traversed prior to the POC. According to CSX's internal rating of track measurements, there were no critical or priority defects on the curve prior to the mud slide area. CSX critical and priority defect limits are more restrictive than FRA Track Safety Standards (TSS) regulatory geometry measurement limitations.

### **Last Production Maintenance—Ties and Surfacing**

According to a CSX documents, in 2010, CSX tied and surfaced portions of the Kingsport Subdivision, including the area of the derailment.

### **Internal Rail Tests Data:**

On October 15, 2019, an ultrasonic rail test was conducted on CSX's Kingsport Subdivision. Sperry Rail Service, Inc. (car 948) conducted this inspection. No defects were recorded in the vicinity of the mud slide.

### **Track Inspection:**

FRA regulations found in 49 CFR 213 require that a rail carrier's track inspection records be prepared and signed on the day of the inspection for frequency of compliance with the FRA TSS. FRA track inspection records are required to reflect actual field conditions and deviations from the FRA TSS.

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On February 16, 2020, an FRA Track Safety Inspector examined the previous three months of CSX track inspection records for the Kingsport Subdivision from milepost CMG 114.0 to 128.0 including the area of the derailment and took no exceptions to those records—the records met FRA frequency of inspection requirements. The FRA inspector also examined CSX’s “special inspections”<sup>6</sup> records for 2019 and 2020 and noted there were 27 inspections for severe weather, floods and slides.

### Regulatory Track Inspection History

#### FRA Activity on CSX - Kingsport Subdivision

During the 2019 calendar year, an FRA Region 3 track safety inspectors performed five (5) inspections on CSX’s CMG Line (Kingsport Subdivision) in Kentucky. One (1) track inspection was performed in 2019 that encompassed the derailment location at milepost CMG 123.8. The inspection was performed on August 7, 2019 and annotated on FRA Form F 6180.96; report number 73. Several defects were written for 49 CFR 213.033A1; drainage or water-carrying facility not maintained. No violations of federal regulation were written in 2019. CSX repair records show that the drainage facility was repaired on September 12, 2019, by cleaning the culvert out with a backhoe.

Additionally, FRA’s Automated Track Inspection Program (ATIP) car DOTX 219 collected data on CSX’s Kingsport Subdivision including the area at the derailment location at CMG 123.8 on November 1, 2018. The ATIP test started in Pikeville, KY and ended in Johnston City, TN. There were no FRA defects or violations identified on the DOTX 219 test of November 1, 2018.

#### Synopsis of Interviews:

On February 15, 2020, investigators conducted five interviews of CSX engineering personnel. The interviews included the following: the current track inspector for the territory including the derailment site; the Roadmaster, who supervises the track inspector; the Director of

Track for an even larger area of CSX maintenance and engineering safety and who supervises the Roadmaster for the Kingsport Subdivision; the Assistant Regional Engineer, who manages CSX engineering personnel on CSX’s Northeast Region<sup>7</sup>; and CSX’s Chief Engineer--

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<sup>6</sup> FRA Track Safety Standards denotes in their subsection Special Inspections the following regulatory language: *In the event of fire, flood, severe storm, or other occurrence which might have damaged track structure, a special inspection shall be made of the track involved as soon as possible after the occurrence and, if possible, before the operation of any train over that track.*

<sup>7</sup> The ARE that was interviewed was not the ARE for the accident territory but rather was filling in due to a recent vacancy.



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North, who oversees safety and plans and executes system capital programs and policy over the widest area of CSX system. The content of the interviews focused on the track inspection process and procedures, as well as, oversight of environmental risks on CSX's Kingsport Subdivision.

#### **CSX Track Inspector (T/I):**

The T/I stated that he started with the railroad about 17 years ago in 2003 and that he held several positions including that of a supervisor before returning to his present position as a T/I. He indicated that he had been inspecting track for about the last 14 years and that he was very familiar with his assigned territory of inspection on the Kingsport Subdivision.

He described that his normal duties each day was "to go from A to B" and that he covered his assigned main track portion on each Monday. Records show that he last inspected the main track including the area of the derailment on February 10, 2020 (or three days prior to the incident). He added that in addition to meeting FRA track inspection frequency for the main track that he also assigned to inspect switches, sidings and some yard tracks, which he does either when he is going over the main track or on his days that are assigned to other than main track inspection activities.

In total, he stated that he is assigned about 130—140 miles of main track territory. A review of CSX's timetable defined the limits of both the single main track and passing track territory included within the limits of his assignment.

He believed that he has been trained adequately to perform the various inspections and that he felt "comfortable" doing the work and "empowered" to make decisions regarding placing a slow order or taking the track out-of-service if that was warranted.

He said that his training included elements about conducting "special inspections" (i.e. weather-related type reasons to conduct additional inspections). He also defined for investigators that a special inspection would mean that he would continue inspecting the main track until the alert had expired. This meant that if covered the limits of the main track once that he would set-off and proceed to inspect the track going back over the track until the special inspection requirements had been met. He said he would usually get a notification from his supervisor or the dispatcher about when and where to conduct a special inspection.

When asked about the limits of his visibility of the bluff side of the property while h-railing the main track, he stated that he could easily see the first 100 feet of the hillside as he moved over the track, but that normally, he would not see much above that point on the hillside (he specifically answered "no" when asked about the 250', 300' and higher portions of the hillside). He did not think that "slides are a normal problem on his territory."

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Towards the end of his interview, the T/I said that he was very familiar with environmental challenges throughout the geographic area he patrols and the areas in which he lives and travels (highway and public roads) when not working his job. He described that abandoned mines often fill with water and eventually cause or are the source of water that contribute adversely to what he called “a blowout.” A blowout is how he described what occurred at the mud slide location. He stated that he had never seen anything like that in all the years he had been inspecting track.

Investigators asked the T/I if there are “slide fence” locations on the areas that he inspected, he said there were not any (for the territory he covers). CSX provided investigators with a list of 15 slide fence locations and the list confirmed there were no slide fence locations where the T/I patrolled track. [see Post-accident Actions section for a list of slide fence locations]

### **CSX Roadmaster (RDM):**

The RDM said that CSX hired him in 2008 and initially he worked five years as a management employee. He indicated that he worked in various positions and territories until he was promoted to his current position in May of 2019.

The RDM stated that he was very familiar with the terrain and issues within the region (rain, abandoned mines, mud slides and blowouts).

As part of his duties and responsibilities, he reviews and approves the track inspection records. He stated that he often rides with his T/I's to assess their competency and to fulfill the railroad's expectation of going over his territory once a week.

He described that his territory includes about 128 miles of main track and that he has three T/I's who work for him. In addition, he has two section gangs to address maintenance items that he wants repaired or improved. He thought that he had enough manpower for his assigned territory.

He informed investigators that a “contracting” company alerts the dispatcher (operations center) about weather related events and that operations then informs him of the information. He indicated that the operations desk gives him the milepost to milepost location for severe weather alerts. He then contacts the appropriate T/I to conduct the special inspection. He said there had been several “flash flood warnings” in the general area recently, but not near the derailment site. He stated that he is “comfortable” with the current system.

About the weather, he said that over the last couple of months, the precipitation has been “elevated” on the northern side of the territory, opposite the derailment site. He said he was surprised to see a slide in the area of the derailment and that it was the biggest he had ever seen.

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He informed investigators that he knew the track was last inspected on Monday (the 10<sup>th</sup>) and that he rode on the TGC3 over his portion of the Kingsport Subdivision on Wednesday, the 12<sup>th</sup>.

He added that the ethanol train movements were recent to the line.

### **Director of Track (DOT)**

The DT said he was hired as a trackman in 2006 and that after holding several positions of increasing responsibilities, he was promoted to management in 2016 and then in 2019 as Director of Track. He described that his territory includes about 1,150 miles of main line track with about 200-300 miles of yard track.

He oversees five Roadmasters and said his workload is “manageable.” One of his expectations from CSX is that he rides trains over the passenger route territory, which is about 107 miles every quarter, as well as, all his main track territory. He is also responsible to review, plan and submit capital improvements projects for the territory. He believes that he spends an adequate amount of time “mentoring and educating” employees that he interacts with and that he must identify any educational needs or training they may require.

About the weather alerts, he said that he does not get them and depends upon the Roadmasters and T/T’s to handle those duties. When asked about the mud slide, he commented that he has never seen anything of that magnitude ever. He added that his whole territory is river grade, a bluff or mountain or one side of the track and downward slope to water or a river on the opposite side of the track.

### **Assistant Regional Engineer (ARE):**

The ARE recalled that CSX hired him in 2007 as a management trainee and that he worked through “every position” on the ladder up to his current position as ARE. He said he has two DOT’s who work for him and one general Roadmaster. He described that his territory includes 2,000 miles of main track of which 80% are Amtrak routes.

He estimated that there were about five to six times there was an “impact” type event with slides on one of the Amtrak routes. He stated that speeds vary on the Amtrak routes but range from 60 to 79 mph. However, he said that he had never seen anything of the magnitude like the mud slide at 123.8, the accident site, on an Amtrak route.

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He indicated that it is not uncommon on the Amtrak route (double main track) to have other trains observe and report encroachment (trees, mud or rock falls short of the operating window of the equipment) or even “fouling” type events through the dispatcher. He stated that many of the encroachments or fouling conditions near the main are found by track inspectors, as well. He added that the Amtrak routes are equipped with slide fencing where they are warranted. He was aware that a freight train had hit a rock about two months ago located on an Amtrak route.

He also stated that he was aware that over the years, contractors have been commissioned to conduct slope analysis [on Amtrak routes].

### **CSX Chief Engineer (CE):**

The CE stated that he began his railroad career 42 years ago in 1978. He said he started on another railroad but that after coming to CSX he was promoted through management positions and became their CE five years ago. He spoke to the investigators that his primary role is focused first on safety and derailment prevention. He believes that if analyzed correctly, derailments can be prevented but that it takes looking beyond the immediate circumstances of the event.

The CE was asked where this particular slide event ranked for the forty plus years of experience and he remarked that “it is the worst I have ever seen.” He commented that he thought the site would be studied and that it was a “potential” candidate for a slide fence, but wanted to dig into the hillside to create a “reservoir” type basin to capture and contain potential loose material as part of the clean-up. He was aware that water seem to be emptying toward the track and that it did not lessen over the several days after the initial blowout.

He commented that like the others, he was surprised about where the event happened since there had been no prior indications.

The CE said he was aware that the weather contractor system for notifications provided to the railroad had been in effect “for a long time.” However, he intends to review the “accu-weather process” to consider improvements. He agreed to keep the investigation informed about how the process may change (improve).

He stated that the Southwest Zone of the Northeast Region and its Amtrak lines are an area of the most concern. He stated that track inspections are conducted three times a week on Amtrak lines.

Although he was not aware of special technologies to address special inspections, he said it was his intent to reach out to his counterparts on the other Class 1 railroads for their input and experience with detection and mitigation of slides and rock falls with new technologies.

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The CE informed investigators about the idea that CSX likely would develop and place into service two additional autonomous “state-of-the-art” TGC. He believes that measuring the track and gathering data has dramatically helped reduce slow orders and improves the management of track defects.

In closing, the CE was proud to announce that CSX has “the best derailment rate of class 1’s for FRA reportable main track derailments” (meaning the fewest number). And he stated that CSX is the “safest of all Class 1’s” in 2019.

### Post-Accident Investigation

#### Slide Fences on Kingsport Subdivision:

The following is a list of the slide fences on the Kingsport. If a slide fence is struck with a force that causes a broken wire (discontinuity of the system), or in other words, “activates”, the discontinuity will cause a display of a track occupancy light on the dispatcher’s board. In addition, the wayside signals at the outside block limits of where the indication occurs (nearest signals in both directions) will be set to “red” or STOP and thus alert a train crew before entering that block of track. Please notice the length of the fencing, for example, the location listed below as Z71.5 to Z72.9 is not a single slide fence 1.4 miles in length, but rather several shorter (in terms of length) slide fence installations located within the broader milepost limits. Since the accident, CSX added a slide fence installation at the accident location, that location is not listed here.

Table 1. Slide Fence Locations on CSX’s Kingsport Subdivision

Asset	Prefix	Milepost	Block	City	State
Haysi Slide Fence	Z	9.5	4248		VA
SLIDE FENCE AT NE REX	Z	10.1	4251/4248		VA
SLIDE FENCE AT MP Z 71.5 TO Z 72.9	Z	71.5	4274/4275		VA
SLIDE FENCE	Z	71.6	4274	CLINCHPORT	VA
SLIDE FENCE AT MP Z 72.9 TO Z 73.5	Z	72.9	4274/4275		VA
SLIDE FENCE AT MP Z 73.6 TO Z 77.0	Z	73.6	4274/4275		VA
SLIDE FENCE	Z	73.7	4274	CLINCHPORT	VA
SLIDE FENCE STARNE to KERMIT MP Z 74.9	Z	74.9	4275		VA
SLIDE FENCE STARNE to KERMIT MP Z 75.8	Z	75.8	4274		VA
SLIDE FENCE STARNE to KERMIT MP Z 76.7	Z	76.7	4275		VA
SLIDE FENCE AT MP Z 77.0 TO Z 78.8	Z	77	4274/4275		VA
SLIDE FENCE AT MP Z 80.2 TO Z 80.3	Z	80.2	4274/4275		VA
SLIDE FENCE AT MP Z 84.9 TO Z 85.1	Z	84.9	4274/4275		VA
SLIDE FENCE MP Z 85.0	Z	85	4277		TN
SLIDE FENCE AT MP Z 85.2 TO 85.4	Z	85.2	4274/4275		VA



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## Pike County Assessor's Office:

On February 14<sup>th</sup>, investigators requested topographical and property plot data from the Pike County Assessor's office. Pike County officials provided the image of the contour map of the surrounding landscape.



Figure 5. Contour map of the ridge line above the incident site.

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### **State of Kentucky Division of Abandoned Mines and Land (DAML)**

NTSB made an open records request from DAML on February 27, 2020. The DAML responded on March 9, 2020. In their letter dated February 19, 2020, the DAML stated the following about their findings into the accident: [relative to the source of water]

Our [DAML] investigations resulted in the following findings regarding the causes and/or the degree of hazard for the problem(s) you reported:

- Our February 17, 2020 investigation observed a large landslide that had occurred on a steep slope above a CSX rail line and the Russell Fork River. During our investigation the effort to remove the derailed train cars and engines from the river was still ongoing. A significant amount of mud and debris still blocked the tracks. No benches, portals, or other mining related features were observed while traversing the slope from the river to above the top of the slide.
- Mine history research failed to identify any AML-eligible mining operations in the immediate area that could be directly linked to the problem area.
- Water sampled at the site failed to show the chemical characteristics of drainage being produced by a mining related source.
- When reviewing the rainfall data for the immediate area, the National Weather Service (weather.gov) observed precipitation totals between 4.5 inches to 6.0 inches for the week leading up to the slide event.

In addition to the excerpt from DAML's letter, NTSB has placed a 20-page report from DAML and a 12-page field report by a DAML investigator in the public docket.

#### **Weather:**

NTSB has reached out to the Weather Channel to request two graphics produced by them for a broadcast aired on February 16, 2020. The graphics displayed "record-breaking" rainfall amount for a large portion of the southeastern United States. A second graph displayed the divergence of the actual accumulative rainfall (precipitation) in the same region of the country. The actual amount as of February 16, 2020 was expressed as "8—9 weeks" ahead of normal rainfall amounts.

An NTSB meteorological investigator has prepared a factual weather report that can be accessed via the public docket for this accident.

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### Photos:



Figure 8. A track level view of the mud slide.  
View looking at the approach into the mud slide.  
(source: FRA Inspector)



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### Photos (continued):



Figure 9. View of the top end of the mud slide.



Figure 10. Close-up view of previous photo—notice the “black” line of sedimentary rock or possible coal vein near the top.

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### Parties to the Investigation - Acknowledgment Signatures

The undersigned designated *Party to the Investigation* representatives attest that the information contained in this factual report for NTSB's accident investigation RRD20FR002 for the CSX's head-on train collision with a mud slide and derailment of hazardous materials with fire investigation conducted in Draffin, KY at milepost CMG 123.8 is a factually accurate representation of the information collected during the investigation, to the extent of their best knowledge and contribution in this investigation. Note: As part of NTSB's on-going investigative review process, this report will undergo a Technical Review with the Parties at a later date, wherein some minor word changes may occur. Substantive changes to this report will be documented with a subsequent Addendum report, if necessary.

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\_\_\_\_\_/s//\_\_\_\_\_  
Richard A. Hipskind, NTSB

Date 4-22-20

\_\_\_\_\_/s//\_\_\_\_\_  
Daniel G. Wilson, FRA

Date 4-15-20

\_\_\_\_\_/s//\_\_\_\_\_  
Greg Mellish, CSX

Date 4-22-20

\_\_\_\_\_/s//\_\_\_\_\_  
Benjamin Crossman, CSX

Date 4-16-20



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**Appendix A**  
Derailment scene graphic

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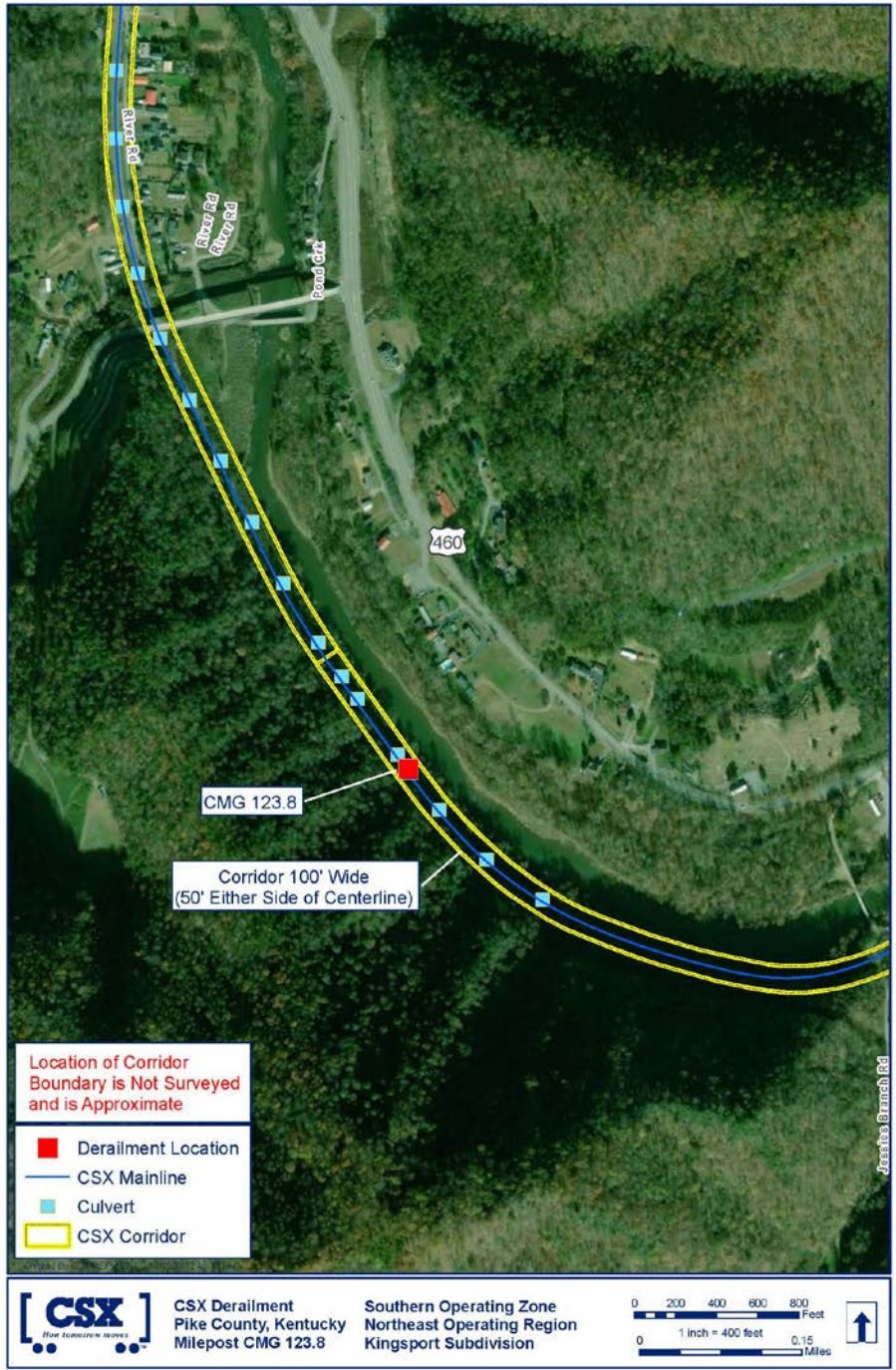


Figure 11. Derailment scene graphic.