NATIONAL TRANSPORTATION SAFETY BOARD
Investigative Hearing
Norfolk Southern Railway general merchandise freight train 32N derailment with subsequent hazardous material release and fires, in East Palestine, Ohio, on February 3, 2023

GROUP	H
EXHIBIT	
10	

Agency / Organization

Norfolk Southern

Title

Job Safety Analysis (JSA) Initial Derailment Response Worksheet

JOB SAFETY ANALYSIS (JSA)
INITIAL DERAILMENT RESPONSE WORKSHEET

Date:	November 25, 2015
Chemical:	TBD
Location:	Emergency Response Site
Prepared By:	Scott Skelton, MS, CIH
Version:	Derailment Initial Assessment_Version1.0

Emergency Procedures	
Muster Point	**Egress cross-wind, then upwind to: Entrance Gate**
Medical Emergency	1) Call 911, 2) Administer First Aid, 3) Contact Site Safety Officer
Emergency Signal	3 long horn blasts, hand signals for entry team
Site Safety Contact	John Doe, Site Safety Officer, Phone: 555-123-5555

Notice: The content included in this JSA has been prepared in advance of its use during an actual event. Workers engaged in response operations associated with a derailment should use this JSA only after completing a site-based hazard assessment to determine the effectiveness and completeness of this JSA's content. This JSA should not be used as the only safety provision for activities during the derailment response. Please refer to the Norfolk Southern Corporate Emergency Response Plan (ERP), Contractor and Employee Safety Rules, and site safety plans as necessary for policies and procedures not identified herein.

Job Steps	Hazards	Hazard Controls
1. Mobilization/Demobilization	1.1 Vehicle Accident	1.1.1 Wear seat belts at all times. 1.1.2 Abide by vehicle safety policies while in route to incident site.
	1.2 Struck by Vehicles	1.2.1 Use spotters where needed for parking/backing. 1.2.2 Wear reflective vests when working on active roadways. 1.2.3 Upon arrival, park in safe locations away from road and railways.
	1.3 Communication	1.3.1 Abide by cell phone safety policies. 1.3.2 Establish radio or cell phone communication with all responders. 1.3.3 Safety briefing conducted prior to initial entry.
2. Initial Entry & Damage Assessment	2.1 Slips/Trips/Falls	2.1.1 Watch footing on loose/shifting rocks. Visualize a safe travel path. 2.2.2 Wear railroad approved work boots with ankle support.
	2.2 Fire/Explosion	2.2.1 Identify all potential flammable liquids & gases using manifest. 2.2.2 Identify ignition sources, locate all active fires. 2.2.3 Wear flash-protective bunker gear/FRC and SCBA. 2.2.4 Conduct LEL monitoring. Action level 10% of LEL for known substances.
	2.3 Chemical Inhalation	2.3.1 Identify all inhalation hazards using manifest. 2.3.2 Wear SCBA for initial entry. 2.3.3 Conduct air monitoring during initial entry to identify sources and airborne levels.
	2.4 Dermal Contact	2.4.1 Use encapsulating suit if potential for toxic dose/irritation via dermal contact with vapor exists. 2.4.2 Use hooded chemical suit with taped gloves and boots if potential for liquid splash only exists. 2.4.3 Chemical resistant fabric must be protective for chemical or class of chemicals.
	2.4 Mechanical Injury	2.4.1 Stay clear of unstable or elevated wreckage. 2.4.2 Avoid reaching/walking between unstable cars/loads.

Job Steps	Hazards	Hazard Controls
3. Fire Mitigation	3.1 Fire and explosion	3.1.1 Identify all potential flammable liquids & gases using manifest. 3.1.2 Identify ignition sources, locate all active fires. 3.1.3 Wear flash-protective bunker gear/FRC and SCBA. 3.1.4 Conduct LEL monitoring. Action level 10% of LEL for known substances.
	3.2 High pressure water	3.2.1 Use NFPA approved pumps, valves, fittings, and hoses. 3.2.2 Ensure all system pressures are within manufacture recommended ranges. 3.2.3 Ensure all connections are tight and secured. 3.2.4 Avoid body contact with high-pressure water streams. 3.2.5 Wear protective clothing capable of protecting from high-pressure water impact.
	3.3 Communication	3.3.1 Abide by cell phone safety policies. 3.3.2 Establish radio or cell phone communication with all responders. 3.3.3 Safety briefing conducted prior to initial entry.
	3.4 Chemical inhalation	3.4.1 Identify all inhalation hazards using manifest. 3.4.2 Wear appropriate respiratory protection based on site air monitoring. 3.4.3 Conduct continuous air monitoring for identified chemical hazards.
	3.5 Dermal contact	3.5.1 Use NFPA bunker gear if suitable for liquid splash protection of chemical hazards if flash or flame hazards exist. 3.5.2 Use encapsulating suit if potential for toxic dose/irritation via dermal contact with vapor exists. 3.5.3 Use hooded chemical suit with taped gloves and boots if potential for liquid splash only exists. 3.5.4 Chemical resistant fabric must be protective for chemical or class of chemicals.
	3.6 Mechanical Injury	3.6.1 Stay clear of unstable or elevated wreckage. 3.6.2 Avoid reaching/walking between unstable cars/loads.
	3.7 Slips/trips/falls	3.7.1 Watch footing on loose/shifting rocks. Visualize a safe travel path. 3.7.2 Wear railroad approved work boots with ankle support.

Job Steps	Hazards	Hazard Controls
4. Product containment & recovery	4.1 Fire and explosion	4.1.1 Identify all potential flammable liquids & gases using manifest. 4.1.2 Identify ignition sources, locate all active fires. 4.1.3 Wear flash-protective bunker gear/FRC and SCBA. 4.1.4 Conduct LEL monitoring. Action level 10% of LEL for known substances. 4.1.5 Ensure that all transfer, flaring, venting, and vacuum equipment is properly grounded and bonded. 4.1.6 Ensure that necessary hot work permits are issued and communicated to all affected parties.
	4.2 High/Low pressure transfer	4.2.1 Use chemical compatible, valves, fittings, and hoses. 4.2.2 Ensure all system pressures are within manufacture recommended ranges. 4.2.3 Ensure all connections are tight and secured. 4.2.4 Avoid body contact with high-pressure liquid and gas streams. 4.2.5 Initially and periodically monitor pumps, hoses, valves, and fittings for liquid or gas leaks. 4.2.6 Use hot/cold tap procedures based on the flammability of the material and pressure of containment.
	4.3 Venting and flaring	4.3.1 Use chemical compatible, valves, fittings, and hoses. 4.3.2 Ensure all system pressures are within manufacture recommended ranges. 4.3.3 Ensure all connections are tight and secured. 4.3.4 Avoid body contact with high-pressure liquid and gas streams. 4.3.5 Initially and periodically monitor hoses, valves, and fittings for liquid or gas leaks. 4.3.6 Use hot/cold tap procedures based on the flammability of the material and pressure of containment. 4.3.7 Ensure proper placement of flare to reduce unwanted vapor or smoke impact to work area.
	4.4 Vacuum Operations	4.4.1 Use chemical compatible, valves, fittings, and hoses. 4.4.2 Ensure all system pressures are within manufacture recommended ranges. 4.4.3 Ensure all connections are tight and secured. 4.4.4 Avoid body contact with liquid streams. 4.4.5 Initially and periodically monitor hoses, valves, and fittings for liquid leaks. 4.4.6 Ensure that all vent hoses are positioned to direct vacuum exhaust away from the work area.

		4.4.7 Ensure that vac trucks are parked on secure areas and are properly staged to minimize potential for unwanted equipment movements.
	4.5 Skimming/Boom Operations	4.5.1 Use USCG approved life preservers for all workers working near water bodies. 4.5.2 Ensure all connections are tight and secured. 4.5.3 Use proper boating safety to deploy boom. Secure boom properly 4.5.4 Avoid reaching near moving parts of skimming equipment.
	4.6 Chemical inhalation	4.6.1 Identify all inhalation hazards using manifest. 4.6.2 Wear appropriate respiratory protection based on site air monitoring. 4.6.3 Conduct continuous air monitoring for identified chemical hazards.
	4.7 Dermal contact	4.7.1 Use NFPA bunker gear if suitable for liquid splash protection of chemical hazards if flash hazards exist. 4.7.2 Use encapsulating suit if potential for toxic dose/irritation via dermal contact with vapor exists. 4.7.3 Use hooded chemical suit with taped gloves and boots if potential for liquid splash only exists. 4.7.4 Chemical resistant fabric must be protective for chemical or class of chemicals.
	4.8 Mechanical Injury	4.8.1 Stay clear of unstable or elevated wreckage. 4.8.2 Avoid reaching/walking between unstable cars/loads.
	4.9 Slips/trips/falls	4.9.1 Watch footing on loose/shifting rocks. Visualize a safe travel path. 4.9.2 Wear railroad approved work boots with ankle support. 4.9.3 Ensure that proper fall protection is in place prior to climbing on to elevated work spaces. 4.9.4 Ensure that all walking/working surfaces on equipment are free of liquid materials or slick spots.

Job Steps	Hazards	Hazard Controls

5. Wrecking Operations	5.1 Fire and explosion/ Hot work	5.1.1 Identify all potential flammable liquids & gases using manifest. 5.1.2 Identify ignition sources, locate all active fires. 5.1.3 Wear flash-protective bunker gear/FRC and SCBA. 5.1.4 Conduct LEL monitoring. Action level 10% of LEL for known substances. 5.1.5 Ensure that all transfer, flaring, venting, and vacuum equipment is properly grounded and bonded. 5.1.6 Ensure that necessary hot work permits are issued and communicated to all affected parties.
	5.2 Load rigging & wreckage movement	5.2.1 Inspect all cables, hooks, straps or chains prior to installation. 5.2.2 Ensure all loads are properly secured and rigged prior to movement of equipment. 5.2.3 Equipment used to move wreckage must have audible alarms. 5.2.4 Avoid positioning workers between or underneath suspended loads unless trained to do so. 5.2.5 Movement of wreckage should be slow and continuously monitored by trained ground crew. 5.2.6 Loads must remain secured until arriving at designated staging location. 5.2.7 All wreckage must be cribbed with appropriate materials or soil construction. 5.2.8 Avoid positioning work crews near loaded cables or rigging unless trained to operate in the vicinity. 5.2.9 Stay outside of the operating range of all equipment unless trained to do so. Eye contact and hand-based or radio communication must be maintained with equipment operators at all times. 5.2.10 All crane operations must be supervised and conducted by qualified crane operators and grounds crew. 5.2.11 All lifting equipment must be staged on a secured earthen or constructed platform with necessary outriggers secured.
	5.3 Chemical inhalation	5.3.1 Identify all inhalation hazards using manifest. 5.3.2 Wear appropriate respiratory protection based on site air monitoring. 5.3.3 Conduct continuous air monitoring for identified chemical hazards.
	5.4 Dermal contact	5.4.1 Use NFPA bunker gear if suitable for liquid splash protection of chemical hazards if flash hazards exist. 5.4.2 Use encapsulating suit if potential for toxic dose/irritation via dermal contact with vapor exists.

		5.4.3 Use hooded chemical suit with taped gloves and boots if potential for liquid splash only exists. 5.4.4 Chemical resistant fabric must be protective for chemical or class of chemicals.
	5.5 Mechanical Injury	5.5.1 Stay clear of unstable or elevated wreckage. 5.5.2 Avoid reaching/walking between unstable cars/loads.
	5.6 Slips/trips/falls	5.6.1 Watch footing on loose/shifting rocks. Visualize a safe travel path. 5.6.2 Wear railroad approved work boots with ankle support.

Job Steps	Hazards	Hazard Controls
6. Removal of residual	6.1 Fire and explosion/ Hot	6.1.1 Identify all potential flammable liquids & gases using manifest.

materials and impacted soil	work	6.1.2 Identify ignition sources, locate all active fires. 6.1.3 Wear flash-protective bunker gear/FRC and SCBA. 6.1.4 Conduct LEL monitoring. Action level 10% of LEL for known substances. 6.1.5 Ensure that all transfer, flaring, venting, and vacuum equipment is properly grounded and bonded. 6.1.6 Ensure that necessary hot work permits are issued and communicated to all affected parties.
	6.2 Vac operations	6.2.1 Use chemical compatible, valves, fittings, and hoses. 6.2.2 Ensure all system pressures are within manufacture recommended ranges. 6.2.3 Ensure all connections are tight and secured. 6.2.4 Avoid body contact with liquid streams. 6.2.5 Initially and periodically monitor hoses, valves, and fittings for liquid leaks. 6.2.6 Ensure that all vent hoses are positioned to direct vacuum exhaust away from the work area. 6.2.7 Ensure that vac trucks are parked on secure areas and are properly staged to minimize potential for unwanted equipment movements.
	6.3 Excavation operations	6.3.1 Ensure that all machinery is equipped with properly functioning audible alarms for movement. 6.3.2 Avoid unnecessary foot traffic within the operating distances of the machinery. 6.3.3 Workers within the operating distance of the machine must remain within the line-of-sight of the operator at all times. Use hand signals to signal movement once within the operating distance of the machine. 6.3.4 Keep all workers from working beneath suspended loads. 6.4.4 All receiving containers must be properly staged on a suitable foundation and secured before loading. 6.4.5 All machinery must be operated from secure locations. 6.4.6 Open trenches must be maintained within the requirements of applicable trenching/shoring standards. Workers should not enter an un-secured trench at any time. Use barricades to prevent workers from working closely to trench or pit openings.
	6.4 Chemical inhalation	6.4.1 Identify all inhalation hazards using manifest. 6.4.2 Wear appropriate respiratory protection based on site air monitoring. 6.4.3 Conduct continuous air monitoring for identified chemical hazards.

	6.5 Dermal contact	6.5.1 Use NFPA bunker gear if suitable for liquid splash protection of chemical hazards if flash hazards exist. 6.5.2 Use encapsulating suit if potential for toxic dose/irritation via dermal contact with vapor exists. 6.5.3 Use hooded chemical suit with taped gloves and boots if potential for liquid splash only exists. 6.5.4 Chemical resistant fabric must be protective for chemical or class of chemicals.
	6.6 Mechanical Injury	6.6.1 Stay clear of unstable or elevated wreckage. 6.6.2 Avoid reaching/walking between unstable cars/loads.
	6.7 Slips/trips/falls	6.7.1 Watch footing on loose/shifting rocks. Visualize a safe travel path. 6.7.2 Wear railroad approved work boots with ankle support.
	6.8 Railway hazards	6.8.1 All workers must be briefed on track protection 6.8.2 All workers must abide by railroad track safety rules as covered by contractor orientation.

Additional Site Hazards	Actions to Eliminate Hazards
1.	1.
2.	2.
3.	3.
4.	4.
5.	5.
6.	6.
7.	7.
8.	8.
9.	9.
10.	10.

HEAT STRESS: AWARENESS AND PREVENTION

Work / Rest and Fluid Intake Schedule for Acclimatized, Self Paced Workers

Temp.	Work/Rest*	Fluid intake per hour
< 90°F	Not Restricted	As needed
90 to 94°F	Rest about 10 minutes every hour	About 12-24 ounces
95 to 99°F	Rest about 10 minutes every hour for light work and about 20 minutes for heavy work	About 24-36 ounces
100 to 104°F	Rest at least 20 minutes every hour.	About 36-48 ounces
105 to 110°F	Rest 40 minutes every hour.	About 36-48 ounces
> 110° F	Do not work without consulting H&S	

Note*: Rest periods can be decreased by implementing other heat stress controls such as cool vests, but must be doubled if Chemical Protective suits are worn.

Recognizing Symptoms of Heat Illness

NOTICE

Prickly Heat - Also referred to as heat rash, appears on the skin as tiny red vesicles (bumps) in areas continuously wet with un-evaporated sweat. Treated by replacing wet clothing.

CAUTION

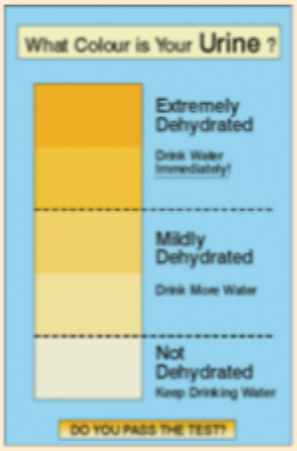
Heat Cramps- Muscle spasms caused by salt loss and dilution of tissue fluid. Cramps usually occur during or shortly after work that involves profuse sweating. Treatment involves movement into cool environment and drinking fluids.

DANGER

Heat Exhaustion- Generally a mild form of heat disorder resulting from dehydration. Symptoms may include clammy skin, pale complexion, fatigue, nausea, and headache. Treatment involves movement into a cool environment and drinking fluids.

Heat Stroke- **Considered a medical emergency.** It is the result of the failure of the body's cooling mechanism and can result in death if not immediately treated. Symptoms include hot, dry skin, confusion, loss of consciousness and convulsions. Treatment involves the rapid cooling of the body and immediate medical attention **(Call 911 for help)**.

Drink Plenty of Water and Check Your Hydration



- Drink 12 ounces of water before entering the hot work area and at least once per hour during the work.
- If you are well hydrated, your urine will be light in color and have sufficient volume.
- Do a self check in the restroom.

Personal Responsibilities

Keep hydrated before, during, and after work.	Minimize or avoid caffeinated beverages on hot days.	Check hydration with the color chart provided.
Recognize your limitations and take rest breaks before excessive fatigue develops.	Stay in good shape and exercise regularly.	Get plenty of sleep.
Eat healthy.	Minimize personal risk factors to the extent feasible.	Seek and follow appropriate medical advice about your personal risk factors and how to work safely in hot environments.

Name	Signature	Date Signed
