



Address the Problem: Develop an Emergency Operations Plan for Extreme Events

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ADDRESS THE PROBLEM: DEVELOP AN EMERGENCY OPERATIONS PLAN FOR EXTREME EVENTS

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16. Abstract <p>Railroads operate in an open environment that is subject to weather-related impacts on its rolling stock, right-of-way, and control systems. Planning in advance for these impacts enables the organization to build from a threat analysis to an organized response. In recent years, weather has created notable extreme events impacting railroad property, such as Hurricane Sandy, Hurricane Helene, and numerous wildland fires. As these extreme events become more common, the railroads can benefit from advanced emergency planning that allows railroad leaders to prepare personnel, facilities, and relationships with local governments and neighboring property owners to respond to and recover from these events and minimize downtime for the rail system. Emergency plans organized around the Incident Command System and checklists enable staff working under the stress of emergency conditions to save lives, while protecting the environment and protecting property, thus speeding system recovery to normal operations.</p>			
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INTRODUCTION

Most railroad organizations have emergency operations plans that address routine emergencies, such as derailments, vehicle collisions, and hazardous materials accidents. The passage of the Rail Safety Improvement Act of 2008 required the implementation of positive train control (PTC) on Class 1 railroads' main lines (Federal Railroad Administration, 2023), representing 57,536 track miles (Federal Railroad Administration, 2023), lessening some types of accidents. The system is designed to prevent "train-to-train collisions, derailments caused by excessive speed, accidents caused by trains being routed down the wrong track, and unauthorized movements in tracks undergoing maintenance" (Edwards and Goodrich, 2024a, p. 234). It is hoped that PTC will lead to a decline in accidents from these causes.

Extreme events, mostly weather-related, are a new hazard class for railroads. While sun kinks, flooding, and snowstorms have long challenged railroad emergency planning, new events such as enhanced hurricane-force winds and new hurricane locations, higher storm surge, sea level rise and wildfires driven by hurricane-force winds are occurring more frequently. For example, in 2024 Hurricane Helene tracked farther inland, impacting the Blue Ridge Mountains in western North Carolina and Tennessee (Petras, Loehrke and Zarracina, 2024). The 2025 wildland urban interface fires in Los Angeles had winds with gusts up to 99 mph driving the flames (Jarvie and Toohey, 2025). California's coastal rail line, referred to as the LOSSAN corridor, has experienced repeated damage from storm surge exacerbated by sea level rise, causing "erosion and ... [extreme events] (that) have jeopardized the track's security and stability," according to State Senator Catherine Blakespear (2023, n.p.). During Hurricane Sandy, the railroad tracks in New York City's Rockaways neighborhood were undermined by storm surge, leaving the track hanging in mid-air (Alan, 2022).



Figure 1. Railroad tracks under water. Source: Adobe Stock

Critical infrastructure related to railroad operations will also be impacted by extreme events, such as the electric grid and diesel fuel supplies. Researchers have found that “infrastructure systems are interdependent, requiring a multi-agency response to ... [extreme events]” (Palin, et al., 2021, n.p.). Supply chain disruptions can impact the ability to operate systems and repair damage. In addition to railroad resources, the extreme event will impact unrelated infrastructure, including easement holders and adjacent property owners. These impacts must be considered at both the strategic level of corporate emergency planning and at the tactical level in division emergency plans.

Finally, the railroad’s customers and their property must be considered. Companies entrust their property to the railroad for safe delivery to a desired location. Loss or damage to the property or late delivery can result in damage to the company’s reputation, processes, and production. Insurance companies define “acts of God” as “event caused without human intervention that couldn’t have been prevented by reasonable foresight or care” (Kin, 2025), and generally cover the damages. But what is “reasonable foresight and care” ? In some states, events that are reasonably known to occur are not acts of God. For example, the California *Acorn Building* case saw the building owners held liable for the deaths of two women killed when the earthquake collapsed a brick wall that crushed them. The court said that the owner was negligent for not retrofitting the building as soon as they knew it was potentially dangerous in an earthquake (Lin, II, Xia and Smith, 2014). Therefore, a shipper could use this doctrine to claim that the railroad should have provided adaptations to its property to protect the customer’s property that it was shipping.



Figure 2. Destroyed bridge and cargo. Source: Adobe Stock.

This guide is designed to help railroad employees in risk management and emergency management roles to update their existing emergency plans to anticipate the extreme events being created by evolving conditions and plan for a response. This is intended as a supplement to existing emergency management guidance like FEMA's Community Preparedness Guide 101 (FEMA, 2010) and its supporting checklists (FEMA, 2021). [Ready.gov](https://www.ready.gov) offers some general business emergency planning guidance ([ready.gov](https://www.ready.gov), 2023). This guide is focused on adding extreme events to the list of threats and hazards already addressed by the railroad's emergency plan, such as plans for handling hazardous materials-related accidents.

PHASE ONE: PLANNING TO PLAN

The US Department of Transportation (DOT) has a set of guiding principles for adaptation¹ and resilience. “These include using the best available Science (sic), prioritizing the most vulnerable, preserving ecosystems, and building community relationships” (Federal Transit Administration², 2024). These can be helpful as railroads design their planning strategies. The “best available science” can be found in federal resources like the Climate Resilience Guidebook (Federal Transit Administration, 2024), *Selecting Climate Information to Use in Climate Risk and Impact Assessments* (White House, 2023), federal and state environmental agencies, and university research centers. The *Federal Flood Risk Management Standard Climate-Informed Science Approach (CISA) State of the Science Report* (March 2023) “offers insights in coastal and riverine flooding” (Federal Transit Administration, 2024, p. 12).

Scale is a consideration for applying the best available science. For a corporate planning perspective, national evaluations and projections would be needed. Since railroads usually run through multiple climate zones, these nationwide approaches will be more useful. In-house system design engineers should evaluate the useful life of the capital improvements likely to be impacted by extreme events and develop the risk assessment at the appropriate scale. For example, a bridge might have a useful life of 80 years, while a culvert’s useful life might be 50 years. Climate predictions for the lifespan of the item should be used in estimating risk, and evaluating the cost/benefit of possible adaptation measures (Federal Transit Administration, 2024).

Plan Design: Organizational Level

Emergency operations plans exist at two levels in an organization. One level addresses the strategic concerns of the whole organization. It looks at managing financial risk, capital investments, external impacts, and human capital management. The risk management section of the organization generally drives this process. The plan may be called a business continuity plan, as it is focused on maintaining the business as a profitable venture during and beyond the triggering event. It may be called an emergency operations plan, as it is focused on the period of time when there is a threat to the organization that must be resolved.

At the strategic level, the cause of the business disruption does not generally change the planning or response to the event, as the investment of capital to respond and recover will be governed by cost/benefit and ROI considerations. Those managing the plan will generally not be in the immediate impact area, so their systems and resources would be available to staff members. Information technology resources are especially critical as the emergency managers draw on existing maps, as-built drawings, engineering information, and corporate information about the impact area. In the event that the headquarters facility is impacted, there should be redundant resources to support the organization.

1. When discussing climate, “adaptation” means changing practices or the built environment to survive extreme event impacts with minimal damage. “Mitigation” means steps to reduce the release of greenhouse gasses.

2. Although this guide is intended for use by heavy rail organizations the information in the Federal Transit Administration’s guide may still be useful. Many transit agencies operate light rail and heavy rail systems, so the FTA guidance may also apply to them, and to freight heavy rail emergency planning strategies.

Planning for this kind of event requires a different approach with different guidelines, not addressed in this document.³

Generally, a business continuity plan or emergency operations plan includes a risk assessment, an evaluation of essential services, and plans for recovering those essential services quickly (Business Contingency Group, 2024). The state where a railroad's headquarters is located may also provide free guidance documents for its businesses.

At the tactical level, plans have to be developed for specific divisions. Issues like geography, weather conditions, first responder availability, and other resources' locations are key to developing a plan to respond to a specific type of event. Generally, division plans are written with the worst-case scenario in mind, and annexes are created for each additional major extreme event that is likely to occur in that division. Thus, a rail line that runs across the southern part of the US would have to plan for hurricanes in its eastern area, for tornadoes in the middle division, for extreme heat in the desert areas, for ice and snow in the mountains, and for wildland fires in forested portions of the line. Any one division might not experience all of the potential events.



Figure 3. Train traveling in snow. Source: Adobe Stock.

³. Existing business continuity plans should already address catastrophic loss of the headquarters. Extreme events may not require augmentation of that plan.

The availability of resources in each division is also critical. What emergency response assets does the railroad own? Does it have fire trains to support suppression of wildfires in forested divisions (TRA Newswire, 2024; Franz, 2023) or snow sheds in strategic mountain areas (BNSF, 2021)? What level of public safety response is available in its divisions? Are there professional firefighting organizations along most of its trackage, or is it dependent on federal or state forestry departments or volunteer fire departments for wildfire suppression? How well are these departments equipped and trained to manage railroad property impacts? Has the railroad provided orientation to its equipment for the public safety personnel in the division?

Plan Design: Threat and Hazard Inventory and Risk Assessment (THIRA)

Once the organizational level is determined, a threat and hazard inventory and risk assessment (THIRA) must be conducted. In this step, the organizational level collects reliable scientific data on the weather, topography, and density of development in the area being planned for. Once the hazards have been identified, an analysis is performed on them to determine the likelihood that the extreme events would occur within a given time frame. Are these events seasonal, annual, cyclical, or random? Does the scientific data provide information on likely intervals? For example, hurricanes are seasonal and annual, but the exact location of a landfall is unknown until it occurs. Conversely, sea level rise is occurring slowly but will only impact specific coastal areas when large storms exacerbate the water levels at the coasts.

The next step is to assess the vulnerability of railroad property to these hazards. Do the tracks run close to the water, in which case winter storm surge, wind-driven water, or high tides with full moons might lead to flooding the tracks or undermining the track bed? Such conditions exist on the LOSSAN in California (Blakespear, 2023) and along portions of the Amtrak Northeast Corridor in Rhode Island and Connecticut (Federal Railroad Administration, 2015). Does the train run through forests that are fire-prone or through mountains with 11 months of snow (Harmon, 2025)? Tools for assessing organizational and division vulnerability can be found in the Federal Transit Administration's *Climate Resilience Guidebook* (2024).

Finally, the last step is to evaluate the consequences of the extreme event on the railroad. Will the damage be minimal, or will the line be closed for weeks or longer? For example, Hurricane Helene's flooding destroyed 60 miles of track in a key CSX track subdivision between Tennessee and North Carolina that required months to repair (Whetstone, 2024). How critical are the facilities that will be impacted? What will the cost of repairs be? How much revenue would be lost? How much customer inconvenience would result from rerouting trains? Are there redundant routes that could be used while repairs are completed? Will repairs even be possible given the damage to the terrain? Table 1 demonstrates a technique for evaluating the consequences of extreme events. Additional rail-specific examples are found in the Edwards and Goodrich (2024) guide to THIRA that is part of this project. Once the table is made, the issue of facility criticality can be applied to help establish priorities for investment.

Table 1. Summary of Key Current and Projected Climate Hazard Impacts and Exposures

Area of Impact or Exposure	Identified Climate Hazard	Description
National transportation system infrastructure	Wildfires	Directly damages roadways, railways, and pipelines and leads to landslides during subsequent rain events that threaten lives, and property and cause more extensive infrastructure damage; Causes road closures, health impacts, and reduced visibility for drivers and pilots over large regions during active events; Induces the release of toxic chemicals from plastic pipeline infrastructure; Smoke impacts the health of employees operating and maintaining National Airspace System (NAS) infrastructure or working outdoors.
National transportation system infrastructure	Extreme precipitation	Causes erosion and saturated soil that damage roadways, airport runways, railways, waterways, and pipelines; Increases risk of landslides that may impact infrastructure viability; Damages culvert and drainage infrastructure which may increase current and future flooding; Results in pipeline shift or fracture.
National transportation system infrastructure	Extreme heat	Causes railways, roadways, sidewalks, and runways to buckle, crack, and rut; Reduces service life of infrastructure; Induces permafrost melt that destroys infrastructure; Creates unsafe working conditions; Necessitates that trains operate at lower speeds; Induces catenary line sag thus impacting train operability; Reduces NAS capacity via impacts on required lift for larger aircraft.
National transportation system infrastructure	SLR, storm surge	Leads to more frequent/severe flooding of underground tunnels and low-lying infrastructure, requiring improved drainage and pumping, repair, or replacement; Causes coastal airport water intrusion.

Source: US DOT, 2024, p. 11.

After these steps are completed, the organization can determine how to manage the level of risk that has been revealed. Insurance policies may financially protect buildings in fire-prone areas. Engineering and reinforcement of infrastructure may lessen damage from extreme events. In each case, a return on investment (ROI) will have to be calculated to determine the best approach for the railroad's overall operations. The Volpe Center of the US Department of Transportation (US DOT) has created the Resilience and Disaster Recovery (RDR) Tool Suite to assist organizations to "assess transportation resilience return on investment (ROI) for specific transportation assets over a range of potential future conditions and hazard scenarios" (Volpe Center, 2024).

The Federal Railroad Administration's Climate Change and Extreme Events project has published a guide for railroads in applying THIRA to their emergency planning. *Identify The Problems: Threat And Hazard Inventory and Risk Assessment (THIRA)* by Edwards and Goodrich (2024b) contains detailed guidance on how to develop each stage of the THIRA process. It is available for free download (<https://transweb.sjsu.edu/research/2415.1-Emergencies-Hazards-Risk-Disasters>).

Another valuable resource is the Federal Transit Administration's *Transit Resilience Guidebook* (2024). It includes strategies for enhanced investigation of vulnerabilities and consequences, such as "evaluating exposures, sensitivity and adaptive capacity." It also has guidance on a "qualitative approach to assessing vulnerability" and "indicator-based assessment" (Federal Transit Administration, 2024, p. vi). An additional useful resource is the US DOT Climate Adaptation Plan 2024-2027 (US DOT, 2024), which includes the "Climate Hazard Exposure and Resilience (CHER) Tool: An internal tool that uses climate projection data and vulnerability assessments to create risk scores for ... facilities, aiding in climate risk management" (Global Railway Review, 2024).

PHASE TWO: PLANNING

Planning is an exercise in imagining what might happen and how an organization would respond to that event. Most emergency events are unexpected, so the plans that were made for the expected—seasonal, cyclical—events will become the platform for responding to the unexpected event. Thus, the plan itself may not be used, but the planning activity that created it lays the groundwork for on-the-spot emergency management.

General Dwight D. Eisenhower, arguably the greatest general in World War II, said, “Plans are worthless, but planning is everything. There is a very great distinction because when you are planning for an emergency, you must start with this one thing: the very definition of ‘emergency’ is that it is unexpected, therefore it is not going to happen the way you are planning.” This means, “The details of a plan which was designed years in advance are often incorrect, but the planning process demands the thorough exploration of options and contingences. The knowledge gained during this probing is crucial to the selection of appropriate actions as future events unfold” (UC Santa Barbara, 1957).

The Organizational Planning Committee

Planning requires a broad base of knowledge and a variety of points of view. This is why the creation of the planning committee is crucial to the success of the plan in the long run. When writing the emergency operations plan for a railroad enterprise, the leader needs to select staff members with specific knowledge that applies to the activities needed to manage and resolve the event. At the enterprise level most of these considerations are based on money, so the committee should include departments that represent financial and capital investments: finance, risk management, operations and maintenance, railroad planning, facilities, sustainability/resilience, human capital, public information (reputation protection), governmental relations and logistics, which includes information technology (IT), communications, utilities, and transportation of goods and people.



Figure 4. Typical enterprise level emergency planning committee membership.

People should be selected from the upper management levels of the organization to ensure that the representative of each interest group has both the knowledge and the authority to engage in planning for the use of the organization's resources. Typically, a deputy department head or a very senior manager in the department is selected to represent the department's interest in the planning process. The representatives should have significant experience in the railroad enterprise and within that organization. The convener should be the emergency manager for the organization, who is usually a department head or a senior member of the executive team.

Once the committee is organized, they should meet regularly to construct the revised emergency plan document. Each person brings specialized knowledge to the planning effort. They should be encouraged to review the existing emergency plan and consider what information they need to update it for extreme events in the future. In the early stages, outside experts might be invited to provide supportive information. For example, the local National Weather Service (NWS) staff might be invited to discuss the evolving changes to weather in the areas of the nation where the railroad operates, and US Geological Survey (USGS) staff might be invited to address topography and special hazard zones along the railroad's right-of-way.

Inventory the Assets at Risk

Inventory of the potentially impacted real estate and capital projects should be undertaken as the second step in developing the plan. Once the types of extreme events that could impact railroad property are known through the THIRA process, the railroad should develop a spreadsheet showing each piece of real estate, each building and each asset, and the extreme event that might impact that item. This step is important in helping the railroad to understand the scope of the concern and the potential financial impact that an extreme event might have on the organization. Topics should include at a minimum sea level rise, storm surge, extreme heat, wildland fires, lightning storms, tornadoes, hurricanes, snow and ice storms, and any other hazard that might be exacerbated by extreme events. For example, USGS researchers suggest that the occurrence of earthquakes might be impacted by extreme heat (USGS, 2024). If the spreadsheet is organized by division, it will be easier to pass this information along to the division planning committees for their use in updating their local plans.



Figure 5. Railroad bridge with flood damage. Source: Adobe Stock

With the existing plan as a starting point, planning committee members should construct an outline for the revised plan, noting which elements have to change because of the addition of extreme events. The roles of all the critical elements of the railroad's organization should be clearly described, and a basic response checklist should be provided for each person who will be part of a response. If the existing plan is written addressing an ongoing major event, such as hazardous materials events, the extreme events could be addressed in individual hazard-specific annexes (CPG 101, 2010).

An example railroad extreme events emergency plan annex is provided as Attachment 3 of this document.

Identify State Emergency Notification Points

The next step for the organization-wide plan is to determine which states along the railroad's route are likely to experience the various extreme events, using the spreadsheet as a guide. This activity can build on an existing analysis of potential locations for hazardous materials events, or on a derailment response plan. Railroad staff should then contact each state's Office of Emergency Services, which may be in the Governor's Office or within the National Guard structure, to get the 24-hour emergency contact number for an emergency response center. This may already have been done for hazardous materials accidents, but the numbers should be confirmed, and a chart should be created listing all the states in which the railroad has property and the emergency number for each state.



Figure 6. Public safety answering point. Source: Adobe Stock.

Having the information readily available will save time when a notice of an event that has impacted the railroad has to be made. For example, the railroad would want to notify the state when a wildland fire impacts the tracks so that a wildland fire response can be implemented, since the state might have to organize mutual aid into the area.

Risk Management: Insurance

Another critical activity is risk management, which has two elements: insurance and adaptation. The insurance element can be handled by the organization's risk management staff. Once they understand the scope of the extreme event potential, they can discuss insurance coverage with their carriers. Liberty Mutual Insurance Company (2021) states,

“While companies don’t have the power to eradicate impacts of ... [extreme events] single-handedly, they can understand the data and take a big-picture look at how severe weather will affect their risk in years to come. By establishing thoughtful [emergency] plans that consider the many risk areas related to severe weather, leaders can work toward a safer future for their communities ... —and the clients they serve.”

Some types of facilities may already have commercial insurance policies for fires, wind, hurricanes, and other perils. Flood Insurance may also be needed for stations and offices in areas with high potential for flooding, sea level rise and storm surge. Using the previously developed extreme events spreadsheet, the risk management staff and their insurance carriers can determine where there is the need for added coverage and when the return-on-investment is not justified.

Railroads already have comprehensive coverage for accidents involving their rolling stock and facilities. Collisions with vehicles, derailments and their impacts, and hazardous materials are typically thoroughly covered by insurance. Liability coverage is also carried through Railroad Protective Liability Insurance. Railroads can also get insurance coverage against natural disasters. For example, Amtrak obtained \$275 million in natural disaster coverage in 2015 for its Northeast Corridor to secure its assets against the kind of damage it experienced from Hurricane Sandy in 2012 (Sheet Metal Air Rail Transportation, 2015). “Sandy created a storm surge that inundated both of Amtrak’s Hudson River rail tunnels and two of the four tubes of the East River tunnel with corrosive salt water.” They used a catastrophe bond to secure the coverage (Progressive Railroad, 2015).

Liberty Mutual Insurance Company has created a matrix that demonstrates the impact of extreme events on corporate risk. They point out that “failing infrastructure” is one consequence of extreme weather events. “The public’s health and safety as well as the economy depend on functioning infrastructure, from telecommunication networks and power grids to water supply systems and transportation. Extreme temperatures, flooding and other weather could disrupt these networks and have severe consequences” for the infrastructure owners (Liberty Mutual, 2021, n.p.).

For example, CSX was sued for \$450 million after a culvert under its Trace Creek bridge carrying the rail line became clogged with debris in 2021 during an unusually heavy rainstorm. The culvert acted as a dam. When the debris dam broke, the water inundated homes in Waverly, Tennessee, sweeping 20 people away to drown. Their families blamed the railroad for poor maintenance practices (Timms and Gadd, 2022). CSX says the blame should be placed on the record-setting 17” rainfall, and that they have no duty to protect the community against flooding (Sutton, 2022). However, CSX has had to pay for legal services and suffer reputational impacts, as well as repair the damage to its property, and the outcome of the lawsuit is still undecided.

Risk Management: Adaptation

Adaptation refers to changes in operations or creation of railroad infrastructure that will enhance sustainability and resilience to extreme events. Transportation experts have developed guidance for transit agencies’ railroad adaptations that may provide useful

ideas for railroads, as well (FTA Research, 2011). At the organizational level, this may include changes to the size of culverts purchased for replacement during maintenance. It may change the construction of an asset to raise it above an expected level of flooding, storm surge, or sea level rise. More modest expenses might include raising the height of support buildings, creation of snow sheds in more track areas, and the development of fire trains that could be stationed along rail lines in fire-prone areas.



Figure 7. Train track and seawall. Source: Adobe Stock.

Adaptation may also impact how existing assets are managed. Vegetation may be stripped from the railroad's right-of-way to limit wildland fire fuel near the tracks. Utilities might be buried to prevent wildland fire from destroying electrical service and fiber optic cable that serve the railroad.

Some adaptation can be accomplished with a slight increase in budget, such as clearing extra acres of brush along routes. Other adaptations may be very costly, such as rerouting coastal lines inland to avoid coastal flooding from all sources, as the LOSSAN and Amtrak Northeast Corridor are doing. Activities demanding a large budget will have to be part of long-term planning and budgeting at the corporate level. Cost benefit and ROI will have to be calculated, and investment decisions will also be made based on criticality of the route or asset.

The Division Planning Committee

Each division of the railroad should also have a planning committee that will review the existing emergency operations plan for that specific division and determine the need to amend it to address extreme events. There is probably already a plan for responding to a derailment or hazardous materials accident, which can form the basis for the extreme events planning.

A member of the operations and maintenance staff is probably already designated as the emergency coordinator for the division. If not, someone should be appointed to that role. The local plan will be focused on providing field-level management of an event, or support to a local event. Therefore, the committee's composition should focus on personnel safety, environmental protection and property protection, including a senior staff member from the division's operation and maintenance, human capital, safety, communications (IT, radio, PTC, signals) and any other critical function. Someone who will act as liaison to a local Incident Command should also be designated and be part of the planning committee.



Figure 8. Typical division/subdivision level emergency planning committee membership.

When possible, a representative fire chief and sheriff from the mutual aid organizations covering the jurisdictions where the railroad operates should either be included on the planning committee, or at least be invited to a meeting to discuss their resources for responding to an event on the railroad and their level of confidence in being able to operate

on or near rail assets. As was discovered in the East Palestine, Ohio, derailment small volunteer fire departments may have no plan for responding to an extreme event on the railroad (Mission Critical Partners, 2024), and may have no knowledge of how rail rolling stock operates. This might reveal a need to offer training to first responders along the railroad's route. The Federal Railroad Administration has training videos and materials for first responders (Federal Railroad Administration, 2024) on a variety of routine emergency events. These might help to familiarize first responders with railroad operations.



Figure 9. Fire fighters practice evacuating a train. Source: Edwards.

Inventory the Assets at Risk

Using the THIRA spreadsheet created by the railroad organization, as described earlier, the planning committee should determine which hazards and risks exist in their division, relying on the information provided by the division's NWS, USGS, and public safety representatives. The committee should evaluate the division to determine the criticality of various subdivisions and assets, and set priorities for the development of response plans.

Considering the communities along the route subdivisions in this division, the committee should evaluate the current emergency plan for its effectiveness in responding to derailments, hazardous materials events, and any other events already specified in the existing plan. These subdivisions should be reviewed and updated based on the new THIRA.

New annexes to the plan should be created for each significant extreme event that has been identified to impact this division. The division should be divided into subdivisions as appropriate, and the specific hazards and risks should be individually addressed. The committee could choose to make a base plan for an extreme event, and then provide annexes to the plan for each subdivision. For example, several portions of the division might be subject to wildland fires, so a common base plan could be created. Then specialized instructions might be added for one subdivision that is in a remote mountainous area and for another subdivision that is in a wildland urban interface fire zone with structures nearby and a professional fire department in the community. Each annex should consider the level of threat, the criticality of the subdivision, and the railroad resources available to manage the hazard in that subdivision. The plan should be written for the existing circumstances, not for an enhanced resource base that might be desirable.



Figure 10. Buckled rail (sun kink) from extreme heat. Source: NOAA, 2017.

The annex must include collaboration with first responders and other available assets. For example, there might be national or state forestry assets in the division to help fight a fire, or mutual aid resources to help fight flooding. These collaboration plans must be agreed upon by all the parties, and the railroad must understand its priority in their use of resources. Rail assets will be allowed to burn if evacuation of the population is underway, for example.

Identify Emergency Notification Points

An important activity is the collection of information from every first responder agency along the railroad in that division. The rail right-of-way likely passes through several states and

counties, and each will have unique emergency notification methods. Each Public Safety Answering Point will have access to 9-1-1 but also have a telephone number. During a disaster, the 9-1-1 system might become overloaded, so having an alternative emergency number is important. This number will give the railroad emergency manager direct access to a first responder agency during an extreme emergency.

In some cases, a division may rely on volunteer fire service, and their chief officers might be reached through personal phone numbers. Some divisions will have law enforcement provided by sheriff's deputies who may be spread over a large territory. Knowing how to reach the sheriff directly could be an important asset. Sometimes the deputies are augmented by ranchers or other community members who have been sworn, and the sheriff would be the best point of contact for getting this augmented assistance.

Risk Management: Insurance

The railroad company will already have a risk management system for the entire enterprise. The division committee should get information from the organization-wide committee about how any insurance coverage should be accessed. Having 24-hour direct phone contact for whoever manages insurance reports is important when specialized resources have to be ordered. This information might already be provided for the hazardous materials aspect of emergency response, but other resources like signal repair might also be needed urgently.

The emergency manager for the division should get a spreadsheet of all assets that are covered by insurance and what perils are covered. This information will assist in managing an event, as information would have to be collected on insured property to give to the risk manager at the corporate level. It may also include access to specialized responders for specific events in addition to hazardous materials. Damage to property and rolling stock should be mitigated as soon as possible, and accessing insurance company assets may speed response.

Risk Management: Adaptation

The division committee has the most thorough knowledge of the characteristics and assets of the various subdivisions in the division. While the headquarters may just have a map of the division's routes, the members of the division planning committee will have visited the areas and understand the specialized concerns of each subdivision. Issues like elevation, topography, and road access will all impact what kind of emergency response can be planned for.

These same members will also have a concept of what kind of adaptations might improve the safety of the rail operations in the subdivision. Experience operating in the area will guide them in suggesting locations where utility undergrounding might be beneficial, or where retaining walls are needed to protect the tracks from landslides. Sometimes the hazard itself can benefit from adaptation, such as changing the slope and characteristics of railroad property near the tracks. In other cases, the hazardous land is owned by others, and the railroad can only take steps to protect itself.



Figure 11. Railroad track inundated by storm surge. Source: Adobe Stock.

Local planning committee members will also be aware of evolving issues in their subdivision. For example, a wildland fire scorches the dirt and turns it into a glassy surface that will not absorb water. Areas that once readily absorbed rain will now create only runoff that could swamp a rail line or overwhelm a culvert. Such knowledge would allow the local committee to recommend remediation measures to protect the rail subdivision to the organizational committee and get budgetary support for diversions or new facilities like enlarged culverts.

PHASE THREE: AMENDING THE EXISTING EMERGENCY PLAN

At the planning phase, the group members should work as a team of equals, contributing from their expertise to the development of the plan's details. The THIRA is the basis for creating a plan that addresses appropriate hazards and threats to the organization. While a field response to an earthquake and a wildfire would be different, from the organizational perspective the response is similar.

The Organizational Planning Committee

The use of the scenario-drive planning approach will work best when amending an existing plan to address specific newly identified extreme events (CPG 101, 2010). The safety of personnel, the condition of the environment and the exact nature of the damage to the railroad's property all must be determined, along with identification of a responsible party if appropriate (for example, automobile versus train collision). Once this information is known, the insurance company should be notified and the emergency manager in the division should provide a list of needed support: debris removal, expert on-scene services (for example, hazardous materials remediation), equipment replacement, and damage correction. Rescheduling of the rail service system wide will be required, and this includes notification of any entities that share the track. For example, the LOSSAN between San Luis Obispo and San Diego in California is used by Union Pacific and BNSF for freight, and by Amtrak, The Coaster, Sprinter and Metrolink for passengers (Caltrans and US DOT, 2003).

A critical part of the enterprise emergency management planning is the understanding of governmental and community relationships within the enterprise service areas. It is likely that the emergency that impacted the railroad also impacted the adjacent communities, private property, and local and state government resources. In some areas these could include federal and tribal lands and jurisdictions. The railroad's emergency plan must address a structure for coordinating with the other impacted entities to ensure that their activities do not compromise railroad interests, and that railroad activities do not negatively impact other stakeholders.

For example, in 2024 Hurricane Helene veered far inland, creating severe flooding in the Blue Ridge Mountains of North Carolina and Tennessee. CSX has a "main artery" rail line in that area that runs along the Nolichucky River. Sixty miles of the rail line and the bridge across the river gorge were washed out by the storm, taking roadbed and track into the swollen river (Wadhwani, 2024). When CSX started to restore the track, it mined rocks and sediment from the river to make the repairs because the storm had destroyed the access road to the nearest quarry. CSX "coordinated" with federal agencies on September 30, three days after the storm, and asked for emergency permission to repair the critical rail line. However, the Nolichucky River is an important white-water rafting site that draws tourists and created economic benefit for the nearby town that has little other enterprise. Local environmentalists are suing CSX to force them to stop mining rocks from an eight-mile stretch of the river that locals say will damage the white-water environment and cause downstream flooding in the future. Even though CSX coordinated with the federal agencies, they did not wait for formal permission, and they did not coordinate with the local economic interests (Whetstone, 2024). By December 10, 2024 state regulators and the US Army

Corps of Engineers (US ACE) ordered the railroad to stop excavating or dredging material from the river. The state called previous federal permissions illegal (Wadhwani, 2024). Even though CSX discussed its plan with federal regulators, the failure to collaborate with local interests has led to the extra cost and reputational damage of a lawsuit.

Lessons learned from the 2023 derailment in East Palestine, Ohio, make clear that railroad asset management decisions must be coordinated with other stakeholders and community partners (Mission Critical Partners, 2024). FEMA has established a requirement for public safety agencies to use the Incident Command System (ICS) in all multi-profession emergencies, such as this train derailment. The East Palestine derailment after-action report makes clear that the failure to establish Incident Command at the outset of the event impeded organization and communication (Mission Critical Partners, 2024). This suggests that railroad emergency management staff should become familiar with the ICS through training before an event, so that the railroad's on-scene liaison understands their position, and can effectively gather intelligence for the railroad's central organization.

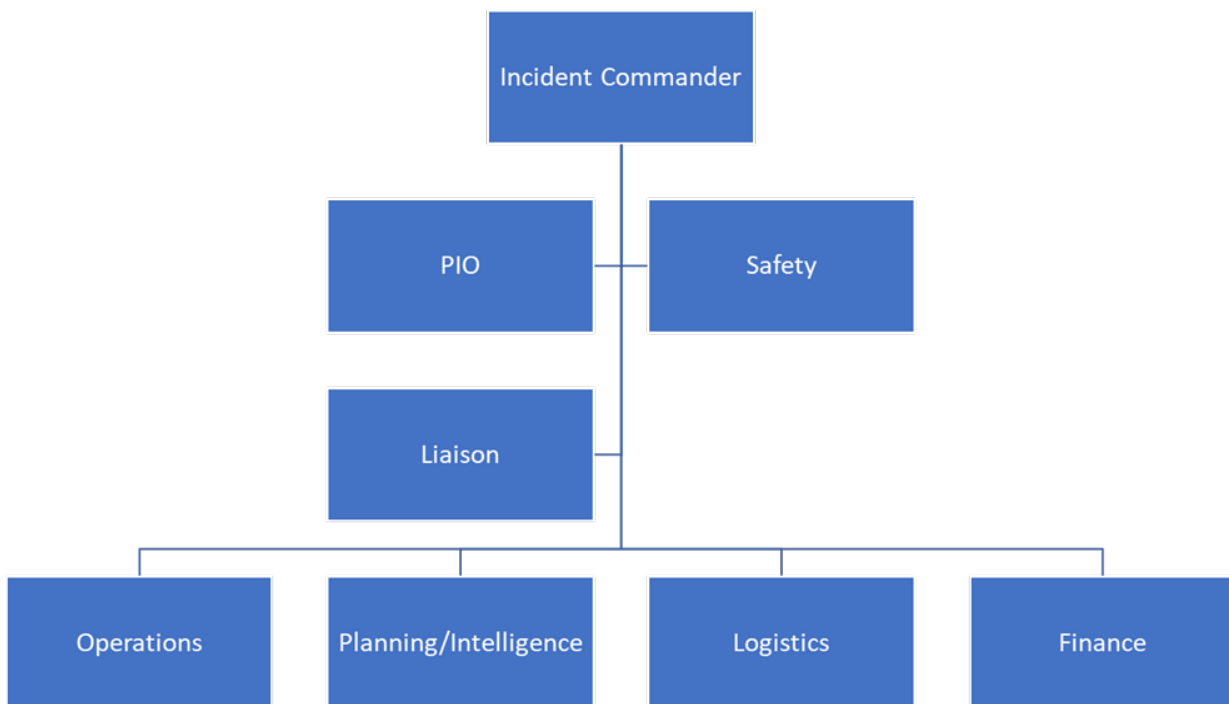


Figure 12. Incident command system structure.

Those in the railroad's central organization need to understand the railroad's role in an emergency where rail assets are the cause or victim. Thus, the emergency plan for the strategic response needs to have both internal roles and responsibilities clearly identified, and the linkage to the community where the event occurred and their public safety infrastructure mapped out. This process can start with a simple table that lists extreme events and shows their immediate and longer-term consequences and where the impact is felt. Table 2 is an example of this approach.

Table 2. Weather Hazards and Impact on Infrastructure

Hazard	Impact	Direct Consequence	Indirect Consequence	Breadth
Heat	Short circuit	Signal failure	Train delays	Railroad only
		Crossing failure	Maintenance work	
		Switch failure	Accidents	
	Buckled rail	Installation failure	Train delays	Railroad only
		Track failure	Maintenance work Accidents	
Hurricane	Track under water	Track failure	Train delays	Community
		Substructure failure	Maintenance work Accidents	
	Power failure	Signal failure	Train delays	Community
		Crossing failure	Maintenance work	
		Switch failure	Accidents	
		PTC compromised		
	Wind	Debris on track	Track failure	Community
			Derailment	
		Signal failure	Train delays	
Wildland fire	Buckled rail	Installation failure	Train delays	Railroad only
		Track failure	Maintenance work Accidents	
	Burned ties	Installation failure	Train delays	Railroad only
		Track failure	Maintenance work Accidents	
	Embankment failure	Installation failure	Train delays	Railroad only
		Track failure	Maintenance work Accidents	
	Power failure	Signal failure	Train delays	Community
		Crossing failure	Maintenance work	
		Switch failure	Accidents	
		PTC compromised		

While the division plan will address immediate field response issues, the strategic organizational plan must make clear how issues like insurance, specialized contractors (such as hazardous materials management and clean up companies) and other railroad resources (rolling stock, information technology technical capability and repair capabilities) can be accessed by injured parties and communities.

At each level, the plans should look at the extreme event impacts from a broad perspective. They should include impacts on system design, non-operating assets (stations, parking lots) and human capital (operations, maintenance, station, administration). Strategies for meeting the extreme events might include avoiding the event through protective measures, relocating assets out of harm's way before a predicted event, focusing ongoing

maintenance to ensure that property is preserved, and design of retrofit infrastructure to cope with changing conditions (Federal Transit Administration, 2024), such as installing larger culverts to handle greater storm run-off. Enhancing redundancy when financially feasible provides the possibility of continuing service more quickly after an extreme emergency. This is a strategy being adopted by Amtrak in their Northeast Corridor Future plan (Federal Railroad Administration, 2015).

The Division Planning Committee

Supporting the organization's plan would be the division plan for the impact area. This plan is created by a local emergency planning committee that includes the emergency manager, operations and maintenance, safety, information technology, communications, facilities, human capital, liaison to ICS structure, public safety liaisons and utilities liaison. At the division level, the concerns are saving lives and preventing injury, preserving the environment and protecting property, both the railroad's and that of adjacent property owners.

The division planning committee should start by reviewing the existing emergency plan and determining how it needs to be amended to include effective direction for responding to extreme events. The NWS office for the division should be invited to give an overview of anticipated weather-related changes in the near future. USGS should be contacted for information about extreme events related to the division. For example, the Pacific Northwest might have volcano eruption plans while the southeast might have hurricane response plans. The public safety representative should be asked for any specialized information, such as a wildland fire intensity map for the division. This information will provide a basis for the development of hazard-related annexes for the added extreme events emergency plan.

The focus of this plan is how the railroad's staff will respond to an emergency in the field. Since all public safety first-responders will use the federally mandated Incident Command System (ICS) (Homeland Security Presidential Directive-5, 2003, section 15), it would benefit the railroad staff to become familiar with the vocabulary and roles of that system to better integrate with community resources in an emergency.

Table 3. Critical Terminology- Incident Command

Incident Commander (IC)	In overall charge, makes the Incident Action Plan
Command Staff Supports the Incident Commander	
Safety Officer	Responsible for upholding all safety rules at the site of the extreme event
Public Information Officer (PIO)	Communicates with media and community about all aspects of the event, coordinated media releases and conferences
Liaison Officer	Coordinates with representatives from outside agencies who contribute to the response—the railroad would send a representative to work with this officer.
General Staff Carries Out the Incident Action Plan	
Operations	Operations— responsible to resolve the event
Planning/Intelligence	Runs the Incident Command Post, check-in/check-out function and completes all ICS forms

Logistics	Provides everything needed to support Operations
Finance	Accounts for all costs and coordinates with responsible party and insurance companies; oversees risk management
Locations and Actions	
Incident Command Post (ICP)	Place where coordination is conducted, check-in/check-out occurs, incident planning meetings are held
Incident Action Plan (IAP)	Actions of all entities working within the ICS, approved by the IC
Incident Action Period	Period to carry out the IAP, usually 24 hours
After Action Report	Documents what occurred and ends with an improvement matrix to improve future responses

Detailed information about the ICS for railroads has been created as part of this project. It can be found at <https://transweb.sjsu.edu/research/2415.2-ICS-Extreme-Events> for free downloads of a guidance document and training materials.

Notably, the person appointed as the liaison to the local Incident Command should be familiar with that role and what kinds of information they will be expected to provide on behalf of the railroad organization. This might include railroad operations schedules, ability to stop rail traffic and resources that the railroad might be able to provide to the extreme emergency. For example, in Washington State, Burlington Northern Santa Fe (BNSF) has provided a fire train to transport fire personnel to the scene of a wildfire and provide 30,000 gallons of water for fighting fire along the tracks (Rail Talk, 2019).

The updated emergency plan will incorporate appropriate lessons learned from recent events in the division. Committee members might want to review the National Transportation Safety Board (NTSB) reports from any accidents or events in the division to see whether any recommendations might be incorporated into the revised emergency plan. If the event included a fire department, there might be an after-action report describing the event and recommending improvements (Mission Critical Partners, 2024). For example, the NTSB report for the Norfolk Southern derailment and hazardous materials release at East Palestine, Ohio's is available (<https://www.nts.gov/investigations/AccidentReports/Reports/RIR2405%20CORRECTED.pdf>).

CONCLUSION

Railroads are subject to extreme events along their routes. The rails travel through a variety of climates, topographies, and social conditions. The emergency plan at the corporate level should consider all the threats and hazards and evaluate the risks of each occurring, then determine how to respond. The division-level plan is focused on field response and adaptation to limit damage. Railroad corporations have over 150 years of experience dealing with routine weather events. The changing environment is creating new extreme events that have the power to damage railroad property and rolling stock, as well as customers' property. Planning to respond to extreme events in advance will allow for using insurance and adaptation to minimize the impact on the railroad's property and reputation, and on its customers' business.

ACRONYMS AND GLOSSARY

AAR	Association of American Railroads
ACE	Army Corps of Engineers
ACE Train	Altamont Corridor Express
Adaptation	Changes to capital goods, systems or procedures to provide resilience to extreme events
Amtrak	The American heavy rail passenger service railroad
BNSF	Burlington Northern Santa Fe Railroad, a class 1 railroad
Class 1 Railroad	One of seven heavy rail companies that hauls freight in the US and Canada
CSX	A Class 1 railroad
Critical Infrastructure	Those assets, systems, and networks that provide functions necessary for our way of life; the 16 sectors are part of a complex, interconnected ecosystem and any threat to these sectors could have potentially debilitating national security, economic, and public health or safety consequences; transportation is one sector.
DOT	Department of Transportation
EOC	Emergency Operations Center
EOP	Emergency Operations Plans
FEMA	Federal Emergency Management Agency
FTA	Federal Transit Administration
HSPD	Homeland Security Presidential Directive
ICS	Incident Command System
IT	Information technology
LOSSAN	San Luis Obispo to San Diego coastal rail line in California
Mitigation	Actions to lessen the emission of greenhouse gasses
mph	Miles per hour
NS	Norfolk Southern, a Class 1 railroad
NTSB	National Transportation Safety Board
NWS	National Weather Service
PTC	Positive Train Control
ROI	Return on investment
THIRA	Threat and Hazard Inventory and Risk Assessment
UP	Union Pacific, a class 1 railroad
US	United States of America
USGS	United States Geological Survey

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INCIDENT BRIEFING (ICS 201)

1. Incident Name:	2. Incident Number:	3. Date/Time Initiated: Date: _____ Time: _____
4. Map/Sketch (include sketch, showing the total area of operations, the incident site/area, impacted and threatened areas, overflight results, trajectories, impacted shorelines, or other graphics depicting situational status and resource assignment):		
5. Situation Summary and Health and Safety Briefing (for briefings or transfer of command): Recognize potential incident Health and Safety Hazards and develop necessary measures (remove hazard, provide personal protective equipment, warn people of the hazard) to protect responders from those hazards.		
6. Prepared by: Name: _____ Position/Title: _____ Signature: _____		
ICS 201, Page 1	Date/Time: _____	

INCIDENT BRIEFING (ICS 201)

[illegible]

INCIDENT BRIEFING (ICS 201)

1. Incident Name:	2. Incident Number:	3. Date/Time Initiated: Date: _____ Time: _____
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9. Current Organization (fill in additional organization as appropriate):

Incident Commander(s)

Operations Section Chief

Planning Section Chief

Logistics Section Chief

Finance/Admin Section Chief

Liaison Officer

Safety Officer

Public Information Officer

6. Prepared by: Name: _____ Position/Title: _____ Signature: _____

ICS 201, Page 3

Date/Time: _____

INCIDENT BRIEFING (ICS 201)

1. Incident Name:		2. Incident Number:		3. Date/Time Initiated: Date: _____ Time: _____	
10. Resource Summary:					
Resource	Resource Identifier	Date/Time Ordered	ETA	Arrived	Notes (location/assignment/status)
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6. Prepared by: Name: _____ Position/Title: _____ Signature: _____					
ICS 201, Page 4		Date/Time: _____			

ICS 201

Incident Briefing

Purpose. The Incident Briefing (ICS 201) provides the Incident Commander (and the Command and General Staffs) with basic information regarding the incident situation and the resources allocated to the incident. In addition to a briefing document, the ICS 201 also serves as an initial action worksheet. It serves as a permanent record of the initial response to the incident.

Preparation. The briefing form is prepared by the Incident Commander for presentation to the incoming Incident Commander along with a more detailed oral briefing.

Distribution. Ideally, the ICS 201 is duplicated and distributed before the initial briefing of the Command and General Staffs or other responders as appropriate. The "Map/Sketch" and "Current and Planned Actions, Strategies, and Tactics" sections (pages 1–2) of the briefing form are given to the Situation Unit, while the "Current Organization" and "Resource Summary" sections (pages 3–4) are given to the Resources Unit.

Notes:

- The ICS 201 can serve as part of the initial Incident Action Plan (IAP).
- If additional pages are needed for any form page, use a blank ICS 201 and repaginate as needed.

Block Number	Block Title	Instructions
1	Incident Name	Enter the name assigned to the incident.
2	Incident Number	Enter the number assigned to the incident.
3	Date/Time Initiated <ul style="list-style-type: none">• Date, Time	Enter date initiated (month/day/year) and time initiated (using the 24-hour clock).
4	Map/Sketch (include sketch, showing the total area of operations, the incident site/area, impacted and threatened areas, overflight results, trajectories, impacted shorelines, or other graphics depicting situational status and resource assignment)	Show perimeter and other graphics depicting situational status, resource assignments, incident facilities, and other special information on a map/sketch or with attached maps. Utilize commonly accepted ICS map symbology. If specific geospatial reference points are needed about the incident's location or area outside the ICS organization at the incident, that information should be submitted on the Incident Status Summary (ICS 209). North should be at the top of page unless noted otherwise.
5	Situation Summary and Health and Safety Briefing (for briefings or transfer of command): Recognize potential incident Health and Safety Hazards and develop necessary measures (remove hazard, provide personal protective equipment, warn people of the hazard) to protect responders from those hazards.	Self-explanatory.
6	Prepared by <ul style="list-style-type: none">• Name• Position/Title• Signature• Date/Time	Enter the name, ICS position/title, and signature of the person preparing the form. Enter date (month/day/year) and time prepared (24-hour clock).
7	Current and Planned Objectives	Enter the objectives used on the incident and note any specific problem areas.

Block Number	Block Title	Instructions
8	Current and Planned Actions, Strategies, and Tactics <ul style="list-style-type: none"> Time Actions 	Enter the current and planned actions, strategies, and tactics and time they may or did occur to attain the objectives. If additional pages are needed, use a blank sheet or another ICS 201 (Page 2), and adjust page numbers accordingly.
9	Current Organization (fill in additional organization as appropriate) <ul style="list-style-type: none"> Incident Commander(s) Liaison Officer Safety Officer Public Information Officer Planning Section Chief Operations Section Chief Finance/Administration Section Chief Logistics Section Chief 	<ul style="list-style-type: none"> Enter on the organization chart the names of the individuals assigned to each position. Modify the chart as necessary, and add any lines/spaces needed for Command Staff Assistants, Agency Representatives, and the organization of each of the General Staff Sections. If Unified Command is being used, split the Incident Commander box. Indicate agency for each of the Incident Commanders listed if Unified Command is being used.
10	Resource Summary	Enter the following information about the resources allocated to the incident. If additional pages are needed, use a blank sheet or another ICS 201 (Page 4), and adjust page numbers accordingly.
	<ul style="list-style-type: none"> Resource 	Enter the number and appropriate category, kind, or type of resource ordered.
	<ul style="list-style-type: none"> Resource Identifier 	Enter the relevant agency designator and/or resource designator (if any).
	<ul style="list-style-type: none"> Date/Time Ordered 	Enter the date (month/day/year) and time (24-hour clock) the resource was ordered.
	<ul style="list-style-type: none"> ETA 	Enter the estimated time of arrival (ETA) to the incident (use 24-hour clock).
	<ul style="list-style-type: none"> Arrived 	Enter an "X" or a checkmark upon arrival to the incident.
	<ul style="list-style-type: none"> Notes (location/assignment/status) 	Enter notes such as the assigned location of the resource and/or the actual assignment and status.

ATTACHMENT 2: RAILROAD EXTREME EVENT ANNEX TEMPLATE

Background

Describe the event and the likely impact on railroad property in the division

Goals

What are the railroad's goals for this event? Protect against it, prevent it, minimize its impact on railroad property and personnel, limit losses of capital investments, assist the surrounding jurisdictions, protect the railroad's reputation?

Scope

Describe the division's boundaries and any areas of special concern for this type of event.

Organizational Structure

How would the division organize to cope with this event? Which positions would fill the ICS format officers' and chiefs' roles?

What is the overall plan for managing this event?

Pre-event preparation, event response, immediate recovery, long-term recovery/adaptation?

External resource list

Counties in the division, 24-hour contacts for law enforcement and firefighting for each county, other contact information for major jurisdictions and private property owners.

Railroad facilities at risk of this event

These include buildings, yards, rolling stock, signals, switches, crossing gates, wheel-bearing defect detectors (hot box detectors), and other equipment.

Railroad resources that could be used to mitigate the event

Yards for staging, potable water and sanitation equipment, trains or maintenance trucks to move firefighters to the fire area, especially if it is in a remote area; open purchase orders or mutual assistance agreements with other railroads.

Railroad public information officer assistance

Assist the Incident Command's PIO, write media releases, provide a list of media contacts, represent the railroad in a Joint Information Center (JIC) when established.

ATTACHMENT 3: RAILROAD WILDLAND FIRE ANNEX (EXAMPLE)

Part One Overview

Background

The ABC Railroad's Southern Division includes a number of wildland zones along its route. In recent years the incidence of drought has increased, killing many of the trees in the forests adjacent to ABC Railroad's right-of-way. During wet seasons the underbrush is replenished, and then dries out seasonally, creating forest-floor-level fuel for fires. Recent weather conditions have included strong winds that carry large embers in the fire zone, spreading the burning beyond the reach of flames alone. These combined conditions can lead to fire leaving the forest floor, where it can be effectively fought with shovels, and into the forest canopy where aerial firefighting is required to surround the fire until it burns out. Aerial firefighting resources have to come from FEMA and other states with mutual aid agreements.

Some of the forested areas are in national forests and national park lands, while some are in state park land. There are also active timber operations in areas along the right-of-way. Therefore, the railroad is both a landowner and a neighbor to other entities in the wildland fire zone. Since trains have been identified by the State of Minnesota as a major source of sparks that ignite wildland fires, it is important for the railroad to be proactive in fire prevention and a collaborating partner in fire response.

Organized firefighting in wildland zones is generally conducted by the National Forest Service and the State Parks Department that each have both full-time and part-time firefighters. Their resources include wheeled equipment and aerial capability. There are fire roads cut into the forests in some areas, but some of the wildland is inaccessible by existing roads. State highway departments will work with the state fire departments to create expedient roads from existing highways into the wildlands. However, this work is time consuming, and may become impossible when the fire begins to travel on strong wind currents.

ABC Railroad has a regular vegetation management program along its right-of-way, which is conducted in association with the utility companies in many areas. ABC Railroad and local utility companies clear vegetation at the same time to benefit from cooperative clearance work, and the railroad removes the vegetation debris for safe disposal outside of the wildland. This program helps to ensure that sparks from train wheels do not find tinder along the tracks to start a fire.

ABC Railroad's Southern Division also includes urbanized areas that have volunteer fire departments to protect urban property. These units do not generally fight wildland fires. However, recent fire events in California have demonstrated that wildland fire can burn into rural residential areas (often called the interface) and into urbanized areas. The recent fires burned over a thousand homes and killed dozens of residents. Therefore, plans for wildland fires have to include the possibility that the wildland urban interface might become involved, threatening ABC Railroad's property in rural, suburban and even urban areas.

Goals

ABC Railroad's goals for wildland fire planning are to develop knowledge and practices that will allow the railroad to prevent and protect against wildfire, minimize its impact on railroad property and personnel, limit losses of capital investments, assist the surrounding jurisdictions, and protect the railroad's reputation.

Scope

The Southern Division encompasses coastal, mountain, and desert land in State A, desert and mountains in States B and C, and desert and grasslands in State D. A map of the division's boundaries is included as Attachment A.

Organizational Structure

ABC Railroad has organized its emergency response using the Incident Command System (ICS). Since all public safety personnel are required by federal regulations to follow the ICS organizational structure, using the same system eases collaboration between the railroad and first responders along its right-of-way. ICS is required for hazardous materials response, so using one consistent system makes emergency planning seamless across types of events.

The Southern Division has an organization chart that matches ICS positions with railroad positions, and is used regardless of the cause of the emergency.

ABC Railroad, Southern Division ICS Position Assignments

Incident Commander	Division Director
Operations Section Chief	Operations and Maintenance Director
Planning/Intelligence Section Chief	Railroad Planning Director
Logistics Section Chief	General Services Director
Finance Section Chief	Finance Director
Safety Officer	Senior Safety Officer
Public Information Officer	Senior Public Information Officer
Liaison to the Incident Command	Division Deputy Director

What is the overall plan for managing a wildland fire adjacent to/near the railroad property?

Pre-event

Pre-event preparation includes education of all Southern Division staff about fire safety on the railroad, debris management, hot tool use and electricity management safety. The goal is to prevent any spark from escaping a work or operational space to ignite a fire.

The Southern Division has an ongoing vegetation management plan, as discussed above. It also has regular maintenance activities designed to prevent sparks and heated materials from entering the wildland areas.

Event Response

When a fire starts, the Southern Division of ABC Railroad provides support and services to the federal and state firefighting efforts. This may include the use of ABC Railroad's right-of-way for the movement of firefighters and firefighting equipment, use of personnel support equipment such as potable water and sanitation, and support from the railroad's public information officer at the Incident Command Post or at the Joint Information Center (JIC) if it is established. ABC Railroad provides open access to its lands and right-of-way for all public safety personnel engaged in the firefighting effort.

Immediate Recovery

ABC Railroad's engineers and support staff will participate in the development of the lead jurisdiction's damage assessment report by providing information about losses and damage to railroad property and capital goods. The Southern Division will contact the ABC Railroad headquarters with information to open claims with its insurance carriers for any covered property losses. Workers' Compensation Claims will be filed for injured ABC Railroad employees involved in fighting the fires or protecting railroad property during the fires.

Long Term Recovery

ABC Railroad will collaborate with the lead wildland fire agency to develop an after-action report and an improvement matrix, with the goal of future prevention and protection of railroad property from the impact of a wildland fire. The Southern Division will work with the ABC Railroad's headquarters to consider investments in additional insurance, in fire-resistant equipment and in fire response resources like fire trains (currently operated by BNSF and UP) for long-term protection, prevention, and adaptation. ABC Railroad will review fire resistant construction techniques for its buildings and facilities to adapt to more frequent extreme events.

External resource list (examples)

Jurisdiction	Official	Direct Emergency Line
County A	Fire chief	000-000-0000
County A	Sheriff	000-000-0000
City 1	Fire Chief	000-000-0000
City 1	Police Chief	000-000-0000
County B	Fire Chief	000-000-0000
County B	Sheriff	000-000-0000
County C	Fire Chief	000-000-0000
County C	Sheriff	000-000-0000
First Tribal Organization	Chairman	000-000-0000
Second Tribal Organization	Chairman	000-000-0000
XYZ Electric Utility	On-duty Operator	000-000-0000
MNO Electric Utility	On-duty Operator	000-000-0000
County A Water Utility	On-duty Operator	000-000-0000
County B Water Utility	On-duty Operator	000-000-0000
County C Water Utility	On-duty Operator	000-000-0000
Big Woods Timber Company	Executive Director	000-000-0000
Famous Brand Tool Company	On-duty Manager	000-000-0000
Big Hat Cattle Ranch	Ranch Owner	000-000-0000

Railroad facilities at risk of wildland fire

Access the spreadsheet of ABC Railroad property in proximity to wildland fire prone areas.
 Access the GIS map of ABC Railroad property in proximity to wildland fire prone areas.
 Ensure that the following elements are evaluated for preventive or protective actions in advance of a fire: buildings, yards, rolling stock, signals, switches, crossing gates, wheel bearing defect detectors (hot box detectors), cameras, other equipment.

Railroad resources that could be used to mitigate the event

Make a spreadsheet of ABC Railroad resources that could be used by railroad personnel or local first responders to mitigate the wildland fire event. These might include yards for staging, potable water and sanitation equipment, trains or maintenance trucks to move firefighters to the fire area, especially if it is in a remote area; open purchase orders or mutual assistance agreements with other railroads.

Railroad public information officer assistance

Create a Go-Kit for the Public Information Officer (PIO) to use during an emergency. It should include a list of media contacts and 24/7 contact information for senior PIO personnel at ABC Railroad headquarters and essential equipment like a laptop, charger, portable printer, note pads, and pens. Make sure the laptop is loaded with pre-made templates for media releases, the railroad's logo to include on joint media releases, and script formats for radio and TV spots. The senior PIO should be prepared to deploy to the Incident Command Post to assist the Incident Command's PIO, write media releases, provide a list of media contacts, and represent the railroad in a Joint Information Center (JIC) when established.

Part II Section Plans

A. Management Section

A.-1: Management Section Chief

1. **Pre-event:** at the beginning of wildland fire season
 - a. Ensure that phone contact information is up to date for public safety organizations, utilities and neighboring property owners.
 - b. Ensure that the spreadsheet of division resources at risk of wildland fire is reviewed and updated.
 - c. Ensure that the list of resources that could be used to mitigate a wildland fire is accurate and that the items are available and in good repair.
 - d. Ensure that the senior PIOs are ready to support the Incident Command if needed
 - e. Contact counties and cities to confirm availability of railroad liaison for participation in ICS when established
2. **Emergency phase:** when notified of a fire by railroad employees or local authorities
 - a. Open the emergency operations center
 - b. Call back the EOC staff
 - c. Notify the ABC Railroad headquarters emergency manager of the situation
 - d. Hold the first Incident Action Planning meeting with the EOC staff, and repeat at the end of each Incident Action Period.
 - e. Review and sign each Incident Action Plan as prepared by the Planning/Intelligence Section Chief.

-
- f. Send the PIO to the jurisdiction's Incident Command Post.
 - g. Notify Operations Section Chief to call back or assign employees to surveillance of railroad property for signs of fire.
 - h. Notify Operations Section Chief to begin defensive/suppression operations against fire as needed, in accordance with the Incident Action Plan for the Incident Action Period.
 - i. Maintain a log of the section's decisions and actions.
3. **Recovery phase:** when the jurisdiction's Incident Commander declares the fire emergency over
- a. Instruct Operations Section Chief to inventory property and resources used in the wildland fire response, create a spreadsheet of item, location and priority of replacement and report that to the Logistics Chief and Management Section Chief.
 - b. Instruct Safety Officer to inventory emergency operations center support supplies, and create a spreadsheet of items to be replaced, quantities and give copies to the Management Section Chief and the Logistics Chief.
 - c. Instruct the Liaison to provide a spreadsheet of all requests and how they were handled, and if fulfilled, what personnel time, supplies or equipment were used, and provide a copy to the Management Section Chief and Logistics Chief.
 - d. Instruct the Logistics Chief to replace routine supplies and equipment that were consumed or destroyed listed by the Operations Chief, Liaison and Safety Officer, add cost to the spreadsheet and provide to the Management Section Chief.
 - e. Instruct the Logistics Chief to make a separate spreadsheet for capital equipment or projects required to restore the railroad to pre-wildland fire conditions, and estimated cost for each.
 - f. Instruct the Logistics Chief to make a separate spreadsheet for assistance provided to the jurisdiction by the railroad, including personnel time, equipment and supplies, and their costs.
 - g. Coordinate with ABC Railroad headquarters regarding whether there is a known responsible party and any insurance claims.

- h. Provide a damage assessment of railroad property and resources to ABC Railroad's organizational risk management, including the spreadsheets of routine item replacements from the Operations Section Chief, Safety Officer, Liaison and Logistics Chief and the spreadsheet of capital replacements being requested by the Operations Chief and Liaison with their priorities.
- i. Provide copies of the Incident Action Period plans and After-Action Report to the ABC Headquarters' emergency manager.
- j. Ensure that a long-term recovery process is staffed and organized to complete the restoration of railroad property and functionality, including consultation with all appropriate regulatory agencies at the local, state, and federal levels.
- k. Cooperate with the jurisdiction's After-Action Review and the creation of the After-Action Report.

A-2: Safety Officer

1. **Pre-event:** at the beginning of wildland fire season

- a. Check the emergency operations center facility to ensure that all equipment is in safe working order and all fire and electrical codes are met.
- b. Ensure that emergency operations center HVAC HEPA filters are in good working order, and in conjunction with Logistics Chief replace as needed.
- c. Check stored food and water to ensure that it is within use-by date and in adequate supply for anticipated emergency operations center staff.

2. **Emergency phase:** when notified of a fire by Management Section Chief

- a. Respond to emergency operations center when notified.
- b. Receive a briefing on the wildland fire.
- c. Participate in every Incident Action Planning meeting.
- d. Ensure the psychological safety of emergency operations center staff by scheduling rotating rest periods, providing hydration and snacks from the emergency operations center stores, and—in conjunction with the Logistics Section Chief—providing regular meals as the emergency circumstances permit.
- e. Assist with any family emergencies by offering resources or releasing the staff members in conjunction with the Management Section Chief
- f. Maintain a log of the Safety function's decisions and actions.

3. **Recovery phase:** when the Management Section Chief declares the fire emergency over

- a. Inventory all emergency operations center supplies, and make a spreadsheet of items that need to be replaced; provide copies of the spreadsheet to the Logistics and Management Section Chiefs.
- b. Coordinate replenishment of emergency supplies with the Logistics Chief.
- c. Coordinate replacement of the HVAC system HEPA filter with maintenance.
- d. Provide written input for the district's After-Action Plan to the Management Section Chief.

A-3: Public Information Officer (PIO)

1. **Pre-event:** at the beginning of wildland fire season

- a. Review media contact information and update.
- b. Review contents of professional emergency response kit and replace/update items.
- c. Check all rechargeable batteries, power cords, and extension cords for working condition.
- d. Check flashlight batteries and add new spares; hearing aid batteries and add new spares; extra pair of glasses; personal medications (minimum 10-day supply), 10 quarts of drinking water and water bottle or cup; other personal items for safety and comfort when working in the Incident Command Post, including being prepared for inclement weather.
- e. Obtain briefing on fire season expectations from Planning/Intelligence Section Chief.

2. **Emergency phase:** when notified of a fire by Management Section Chief

- a. Report to the emergency operations center.
- b. Receive a briefing on the wildland fire.
- c. When directed by the Management Section Chief, the Senior PIO will go to the jurisdiction's Incident Command Post and assist the PIO as needed.
- d. The Senior PIO will join the JIC as the railroad's representative if one is opened.

- e. Other PIOs will provide media briefings regarding the railroad's role in the wildland fire event, including schedule changes, track closures and other railroad-specific information.
- f. Senior PIO at the ICP/JIC and other PIOs will maintain a log of the PIO function's decisions and actions.

3. **Recovery phase:** when the Management Section Chief declares the fire emergency over

- a. Close out all forms and activities at the JIC or Incident Command Post.
- b. Inventory all emergency supplies, and make a spreadsheet of railroad-supplied emergency kit items that need to be replaced; provide copies of the spreadsheet to the Logistics and Management Section Chiefs.
- c. Coordinate replenishment of railroad-supplied emergency kit items with the Logistics Chief.
- d. Provide written input for the district's After-Action Plan to the Management Section Chief.

A-4: Liaison

1. **Pre-event:** at the beginning of wildland fire season

- a. Review and update internal railroad contact information.
- b. Review contents of professional emergency kit and replace/update items.
 - 1. Check all rechargeable batteries, power cords, and extension cords for working condition
 - 2. Check flashlight batteries and add new spares; hearing aid batteries and add new spares; extra pair of glasses; personal medications (minimum 10-day supply), 10 quarts of drinking water and water bottle or cup; other personal items for safety and comfort when working in the Incident Command Post, including being prepared for inclement weather.
- c. Obtain briefing on fire season expectations from Planning/Intelligence Section Chief.

2. **Emergency phase:** when notified of a fire by the Management Section Chief

- a. Report to the emergency operations center
- b. Receive a briefing on the wildland fire

- c. When directed by the Management Section Chief go to the jurisdiction's Incident Command Post and provide the Liaison Office with information on railroad fire-related conditions.
 - d. When requests for railroad assistance are made by the Incident Commander, relay the message to the Management Section Chief and get direction on what assistance may be provided by the railroad.
 - e. Create a spreadsheet of all requests and how they were fulfilled, and at what cost, and provide a copy to the Management Section Chief.
 - f. Determine if there is a responsible party or insurance coverage to reimburse railroad aid, and provide that information to the Management Section Chief.
 - g. Maintain a log of the section's decisions and actions.
3. **Recovery phase:** when the Management Section Chief declares the fire emergency over
- a. Inventory all emergency supplies, and make a spreadsheet of railroad-supplied emergency kit items that need to be replaced; provide copies of the spreadsheet to the Logistics and Management Section Chiefs.
 - b. Coordinate replenishment of railroad-supplied emergency kit items with the Logistics Chief.
 - c. Create a spreadsheet of all requests for assistance from the jurisdiction and how they were handled, and if fulfilled, what personnel time, supplies or equipment were used, and provide a copy to the Management Section Chief and Logistics Chief.
 - d. Provide written input for the district's After-Action Plan to the Management Section Chief.

B. Operations

B-1. Operations Section Chief

1. **Pre-event:** at the beginning of wildland fire season

- e. Ensure that employee call-back schedules are current.
- f. Ensure that employee call-back contact information is current.
- g. In collaboration with the Logistics Chief ensure that there is adequate food and water, medical kits and personal protective equipment available for railroad employee emergency responders.

- h. Inventory supplies and equipment needed to respond to a wildland fire on railroad property, and ensure that they are available in adequate supply.
- i. Ensure that mitigation measures have been taken, such as brush clearance along right-of-way and around structures.
- j. Inventory any railroad fire response equipment like fire trains or water tanks and ensure that they are ready for deployment.

2. Emergency phase: when notified of a fire by the Management Section Chief

- a. Go to the emergency operations center and get a briefing.
- b. When authorized by the Management Section Chief, call back employees needed for property surveillance, property defense and fire suppression.
- c. Establish a watch schedule for personnel rotation.
- d. Following the Incident Action Plan, protect railroad property, including expedient brush clearance, wetting roofs, track and right-of-way, removal of property at risk when possible.
- e. Collaborate with local jurisdiction on response through the Liaison as authorized by the Management Section Chief.
- f. Participate in Incident Action Plan development.
- g. Maintain a log of the section's decisions and actions.

3. Recovery phase: when the Management Section Chief declares the fire emergency over

- a. Create a spreadsheet of all resources used to respond to the disaster on railroad property, including personnel time, supplies or equipment were used, and provide a copy to the Management Section Chief and Logistics Chief.
- b. Provide written input for the district's After-Action Plan to the Management Section Chief.

C. Planning/Intelligence Section

C-1. Planning/Intelligence Section Chief

1. Pre-event: at the beginning of wildfire season

- c. Obtain a briefing on wildfire season from the local National Weather Service office.

- d. Review all maps and other GIS information for accuracy and current information.
- e. Review reporting information like the supply information logging forms (ICS 201), phone numbers/text numbers for counties and cities in the division.
- f. Ensure that all Planning/Intelligence Section technology equipment is working and that software is up-to-date.

2. Emergency phase: when notified of a fire by the Management Section Chief

- a. Go to the emergency operations center and get a briefing.
- b. Lead the Incident Action Planning meetings, including delivering a briefing on weather, fire predictions, and topography information.
- c. Take notes during the Incident Action Planning meeting, including the Management Section's Chief's direction.
- d. Create the hard copy Incident Action Plan and get the Management Section's Chief's review and signature.
- e. Distribute the Incident Action Plan to all officers and section chiefs to guide their management of the event during the Incident Action Period.
- f. Complete the Situation Status Report (ICS 201) for each Incident Action Period and distribute to the Management Section Chief.
- g. Maintain a log of the section's decisions and actions.

3. Recovery phase: when the Management Section Chief declares the fire emergency over

- a. Complete all documentation of emergency operations center activities managed by the Planning/Intelligence Section – Incident Action Plans, ICS 201, including maps and organization charts.
- b. Collect all documentation of emergency operations center activities from each section chief, including section logs and resources spreadsheets.
- c. Assemble a binder of emergency operations center documentation for the division's archives, including all Incident Action Plans, all spreadsheets of resources used, all ICS 201 forms, and the After-Action Plan when it is completed. Make a digital copy of the binder for the Management Section Chief to send to the ABC Railroad headquarters emergency manager.
- d. Provide written input for the district's After-Action Plan to the Management Section Chief.

D. Logistics Section

D-1. Logistics Section Chief

1. **Pre-event:** at the beginning of wildfire season

- a. Review all open purchase orders, contracts, and other instruments that would enable rapid procurement of essential supplies and services during a wildland fire.
- b. Review all contact information for local vendors that might be needed during wildfire response, such as food vendors, sporting goods stores for replacement boots and socks, and hardware stores for replacement gloves, N-95 masks and small tools.
- c. Ensure that all emergency operations center technology is working and has current software, including radios, telephones, cell phones, computers, servers, internet connections and any other devices.
- d. Notify each section chief to review their emergency operations center station and test all the technology they will need in an emergency.

2. **Emergency phase:** when notified of a fire by the Management Section Chief

- a. Go to the emergency operations center and get a briefing.
- b. Participate in the Incident Action Planning meetings.
- c. Maintain a log of the section's decisions and actions.
- d. Provide procurement, purchasing, and acquisition support for all sections and officers as directed by the Management Section Chief

3. **Recovery phase:** when the Management Section Chief declares the fire emergency over

- a. Complete all documentation of procurement, purchasing, and acquisitions; prepare all spreadsheets of replacement supplies and equipment with costs, of all requested replacements with costs, and all items given to or used by or for the local jurisdiction's response to the wildland fire; provide hardcopies to the Planning/Intelligence Section Chief and digital copies to the Management Section Chief.
- b. Provide written input for the district's After-Action Plan to the Management Section Chief.

E. Finance Section

E-1. Finance Section Chief

1. **Pre-event:** at the beginning of wildfire season

- a. Review all technology available in the emergency operations center and ensure that all software is current and compatible with software used day-to-day in the finance offices.
- b. Review all budgets to determine where emergency funds might be sourced for wildland fire-related purchases, including emergency operations center food and supplies.
- c. Review all insurance policies with natural hazards/wildland fire endorsements, and ensure that current contact information for the companies is in the section's emergency operations center documentation

2. **Emergency phase:** when notified of a fire by the Management Section Chief

- a. Go to the emergency operations center and get a briefing.
- b. Participate in the Incident Action Planning meetings.
- c. In collaboration with the Logistics Section, track all expenses related to the wildland fire response, whether by the emergency management center, the Operations Section or the Logistics Section.
- d. At the end of each calendar day, collect all receipts for each item ordered and received and log them into a spreadsheet of all wildland fire-related expenses, and safeguard all original receipts.
- e. Maintain a log of the section's decisions and actions.

3. **Recovery phase:** when the Management Section Chief declares the fire emergency over

- a. Complete all documentation of emergency operations center activities managed by the Finance Section—receipts, spreadsheets, logs
- b. Assemble a binder of the section's documentation for reimbursement efforts—responsible party, government agency, insurance companies, local jurisdiction or other sources of financial assistance. Make a digital copy of the binder for the Management Section Chief to send to the ABC Railroad headquarters emergency manager. Give the hardcopy to the Planning/Intelligence Section. Keep a digital copy for the division's Finance Department.
- c. Provide written input for the district's After-Action Plan to the Management Section Chief.

ABOUT THE AUTHORS

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Frances L. Edwards is the deputy director of the Mineta Transportation Institute's Allied Telesis National Transportation Security Center, professor emerita in the San Jose State University Political Science Department, and an instructor in the Master of Science in Transportation Management for MTI. She also teaches courses for TSA Surface Inspectors through ENSCO. She is the Principal Investigator for this research. She is the co-author of four books, fourteen publications for MTI, and numerous articles and book chapters. She is a Certified Emergency Manager with more than 20 years' field experience.

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