A derailment and the fatalities of two railroad workers on April 3, 2016 has led to an investigation by the National Transportation Safety Board (NTSB). This investigation will look for recommendations to prevent future derailments, as well as other impacted goals, including the deaths of two workers and injury to 37 passengers.

"Basic rules of railroading and federal regulations should have prevented the Amtrak derailment near Philadelphia on Sunday that killed two maintenance workers."

- Ashley Halsey III, reporting in The Washington Post

**Track Workers Killed by Train**

### Compliance With Safety Procedures Under Investigation

A derailment and the fatalities of two railroad workers on April 3, 2016 has led to an investigation by the National Transportation Safety Board (NTSB). This investigation will look for recommendations to prevent future derailments, as well as other impacted goals, including the deaths of two workers and injury to 37 passengers.

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- Ashley Halsey III, reporting in The Washington Post

### Cause Map

**Problem**

- **Problem:** Amtrak crash; workers killed
- **When:** April 3, 2016
- **Time:** 7:53 a.m.
- **Where:** Chester, PA
- **Unit, area, equipment:** Amtrak train 89
- **Task being performed:** Maintenance crew working on rails

**Impact to the Goals**

<table>
<thead>
<tr>
<th>Goal Impacted</th>
<th>Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Worker Safety</td>
<td>2 maintenance workers killed</td>
</tr>
<tr>
<td>Public Safety</td>
<td>37 passengers injured</td>
</tr>
<tr>
<td>Customer Service</td>
<td>Train derailed</td>
</tr>
<tr>
<td>Property/Equipment</td>
<td>Damage to train, construction equipment</td>
</tr>
<tr>
<td>Labor/Time</td>
<td>Response, investigation</td>
</tr>
</tbody>
</table>

**Frequency**

- 2 track-worker fatalities on Northeast corridor since March 1, 2016

**Analysis**

**More Detailed Cause Map** - Add detail as information becomes available.

**Solutions**

It appears that multiple procedural requirements were not followed, but more thorough investigation is required to determine why and what can be done in the future to improve safety by preventing derailments and worker fatalities.

### Cause Mapping

**Problem Solving + Incident Investigation = Root Cause Analysis**

**Step 1. Problem**

- What's the Problem?

**Step 2. Analysis**

- Why did it happen?

**Step 3. Solutions**

- What will be done?

**Cause Map**

- Workers in/on near heavy equipment
- Ineffective watch
- Insufficient time for conductor to brake
- Train placed into emergency ~5 seconds before collision
- Supplemental-shunting device not in place
- Train unable to brake in time
- Failure of PTC system
- Issues with braking system
- Speed of train (106 mph)
- Track speed at location is 110 mph
- No flagman

**Effect**

- Track speed at location is 110 mph
- No flagman

**Why?**

- Trains allowed on track
- Train on track

**Cause**

- Work notification improperly cancelled?
- Mis-communication between night & day crews?
- Workers failed to secure permission?
- Workers in/on near heavy equipment
- Ineffective watch
- Insufficient time for conductor to brake
- Train placed into emergency ~5 seconds before collision
- Supplemental-shunting device not in place
- Train unable to brake in time
- Failure of PTC system
- Issues with braking system
- Speed of train (106 mph)
- Track speed at location is 110 mph
- No flagman

**Evidence**

- Evidence: Per Pennsylvania Emergency Management Agency
- Evidence: Villanova University
- Evidence: Per railroad
- Evidence: Per railroad
- Evidence: Per railroad
- Evidence: National Transportation Safety Board
- Evidence: Per railroad
- Evidence: Federal investigation
- Evidence: Schneider Electric

**Steps**

1. **Problem**
   - What? Problem(s)
   - When? Date
   - Where? Time
   - Different, unusual, unique
   - Facility, site
   - Unit, area, equipment
   - Task being performed
2. **Analysis**
   - More Detailed Cause Map
   - Add detail as information becomes available.
3. **Solutions**
   - It appears that multiple procedural requirements were not followed, but more thorough investigation is required to determine why and what can be done in the future to improve safety by preventing derailments and worker fatalities.

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