



NATIONAL TRANSPORTATION SAFETY BOARD  
**Investigative Hearing**

Washington Metropolitan Area Transit Authority Metrorail train 302 that encountered heavy smoke in the tunnel between the L'Enfant Plaza Station and the Potomac River Bridge on January 12, 2015

<b>GROUP</b>	
<b>EXHIBIT</b>	

Agency / Organization

Title



# Tunnel Ventilation Assessment Checklist

June 2015

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To complete these forms, FTA recommends that the SSO Program Manager and other SSO agency staff, as appropriate:

- Meet with a cross-organizational team from the RFGPTS, including senior operations and maintenance personnel, training managers, organized labor, any tunnel ventilation specialists at the agency, and the Chief Safety Officer;
- Review the Track Mileage Table and Tunnel Ventilation General Assessment Form;
- Supplement completion of the Tunnel Ventilation General Assessment Form by:
  - Reviewing the information provided by the RFGPTS; and
  - Ensuring the RFGPTS provides a safety risk evaluation of Tunnel Ventilation Systems that do not comply with NFPA 130 requirements to ensure that mitigations are in place that result in the same protections for passengers and employees.
- Participate in the completion of the site-specific Tunnel Ventilation System Assessments;
- Review and comment, as appropriate, in the space provided as prompted or to clarify responses;
- Supplement completion of the Tunnel Ventilation System Assessment Forms by:
  - Conducting field observations of RFGPTS assessment activities, using the form instructions as a guide;
  - Reviewing RFGPTS maintenance and inspection procedures for tunnel ventilation systems; and
  - Reviewing maintenance and inspection records.

**Appendix 1: Rail Fixed Guideway Public Transportation System (RFGPTS) Track Mileage Reported to the National Transit Database (NTD), 2014**

State	RFGPTS	Mode	First Year of Service	Directional Route Miles	Track at grade Miles	Track elevated Miles	Open-Cut below grade Miles	Subway below grade Miles	Track below grade Miles
Arizona	Phoenix METRO	LR	2008	39.2	42.3	0.7	0.0	0.0	<b>0.0</b>
	Tucson Modern Streetcar	SR	2014	3.5	3.9	0.0	0.0	0.0	<b>0.0</b>
Arkansas	Little Rock River Rail	SR	2004	3.8	3.0	0.5	0.0	0.0	<b>0.0</b>
California	Bay Area Rapid Transit District (BART)	HR	1972	209.0	154.4	57.1	0.0	56.1	<b>56.1</b>
	Los Angeles Metro (LACMTA)	HR	1993	31.9	1.3	0.0	0.2	32.6	<b>32.8</b>
		LR	1990	136.3	72.0	41.5	16.7	5.6	<b>22.3</b>
	San Francisco Muni (SFMTA)	CC	1873	8.8	8.8	0.0	0.0	0.0	<b>0.0</b>
		LR	1980	64.4	53.1	0.0	0.2	14.9	<b>15.1</b>
		SR	1976	18.7	21.7	0.0	0.0	0.0	<b>0.0</b>
	North County Transit District (Sprinter)	YR	2008	44.0	31.7	0.8	0.0	0.0	<b>0.0</b>
	Sacramento RTD	LR	1987	76.1	70.5	4.6	0.0	0.0	<b>0.0</b>
	San Diego Trolley (MTS)	LR	1981	108.4	89.3	10.7	1.4	1.2	<b>2.6</b>
Santa Clara VTA	LR	1987	81.0	67.1	10.8	1.4	0.3	<b>1.7</b>	
Colorado	Denver RTD	LR	1994	94.2	63.3	27.7	2.4	0.6	<b>3.0</b>
District of Columbia	DC Metro (WMATA)	HR	1976	211.8	136.6	18.9	3.1	111.2	<b>114.3</b>
	DC Streetcar	SR	TBD						
Florida	Miami-Dade (Metrorail)	HR	1984	49.8	9.9	48.4	0.0	0.0	<b>0.0</b>
		MG	1986	8.5	0.0	9.4	0.0	0.0	<b>0.0</b>
	Jacksonville Skyway	MG	1989	5.4	0.0	5.4	0.0	0.0	<b>0.0</b>

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	Hillsborough (HART) TECO Trolley	SR	2002	5.4	3.5	0.0	0.0	0.0	0.0
	<a href="#">Fort Lauderdale Wave</a>	LR	TBD						
Georgia	MARTA (Atlanta)	HR	1971	96.1	58.2	24.4	0.0	21.1	21.1
	Atlanta Streetcar	SR	2014	2.7	2.88	0.0	0.0	0.0	0.0
Hawaii	<a href="#">Honolulu HART</a>	HR	TBD						
Illinois	Chicago Transit Authority (CTA)	HR	1947	207.8	95.3	166.3	2.7	23.5	26.2
Louisiana	New Orleans RTA	SR	1979	26.9	18.6	0.0	0.0	0.0	0.0
Maryland	Maryland Transit Administration (MTA)	HR	1970	29.4	18.0	5.0	0.0	11.0	11.0
		LR	1970	57.6	52.7	4.9	0.0	0.0	0.0
Massachusetts	Massachusetts Bay Transportation Authority (MBTA)	HR	1897	76.3	56.0	4.0	10.0	38.0	48.0
		LR	1897	51.0	60.0	4.0		14.0	14.0
Michigan	Detroit People Mover	MG	1987	2.9	0.0	2.9	0.0	0.0	0.0
Minnesota	Metro Transit (Hiawatha)	LR	2004	24.7	23.5	2.1	0.4	3.5	3.9
Missouri	St. Louis Metro	LR	1993	91.1	54.9	21.0	14.5	5.9	20.4
	<a href="#">Delmar Loop Trolley</a>	LR	TBD						
New Jersey	NJT Newark Light Rail	LR	1935	12.4	10.6	0.0	0.0	3.3	3.3
	NJT Hudson-Bergen Light Rail	LR	2000	34.1	32.9	3.6	0.0	0.0	0.0
	NJT River LINE Light Rail	YR	2004	69.7	56.7	0.0	0.0	0.0	0.0
	Port Authority Transit Corporation (PATCO)	HR	1969	31.5	12.6	17.7	2.3	5.8	8.1

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New York	New York City Transit (NYCT)	HR	1904	687.5	137.3	225.3	29.5	437.8	<b>467.3</b>
	Staten Island Railroad	HR	1860	28.6	3.0	14.0	14.5	0.2	<b>14.7</b>
	Niagara Frontier Transportation Authority (NFTA)	LR	1986	12.4	4.4	0.0	0.0	9.7	<b>9.7</b>
North Carolina	Charlotte Area Transit System (CATS)	LR	2007	18.6	6.6	2.7	0.0	0.0	<b>0.0</b>
Ohio	Greater Cleveland Regional Transit Authority (GCRTA)	HR	1955	38.1	37.5	3.8	0.0	0.6	<b>0.6</b>
		LR	1913	30.4	27.0	2.9	3.1	0.0	<b>3.1</b>
	Cincinnati Streetcar	SR	TBD						
Oregon	Tri-County Metropolitan Trans. Dist. of OR (TriMet)	LR	1986	104.3	78.6	8.2	10.9	6.4	<b>17.3</b>
	Portland Streetcar	SR	2001	14.8	14.8	0.0	0.0	0.0	<b>0.0</b>
Pennsylvania	Southeastern Pennsylvania Transportation Authority (SEPTA)	HR	1907	74.9	39.0	17.0	0.0	43.8	<b>43.8</b>
		SR	1906	82.9	212.3	0.0	0.0	5.0	<b>5.0</b>
	Port Authority of Allegheny County (PAAC)	LR	1984	49.6	41.6	3.0	0.0	6.6	<b>6.6</b>
		IP	1870	0.2	0.2	0.0	0.0	0.0	<b>0.0</b>
	Cambria County Transportation Authority (CCTA)	IP	1891	0.3	0.3	0.0	0.0	0.0	<b>0.0</b>
Puerto Rico	Tren Urbano	HR	2004	20.6	10.5	11.7	1.5	1.8	<b>3.3</b>
Tennessee	Memphis Area Transit Authority (MATA)	SR	1993	10.0	10.2	0.3	0.0	0.0	<b>0.0</b>

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	Chattanooga Area RTA (CARTA)	IP	1895	2.0	1.0	0.0	0.0	0.0	0.0
Texas	Dallas Area Rapid Transit (DART)	LR	1996	171.4	116	67.6	2.2	6.2	8.4
	Houston METRO	LR	2004	14.8	18.2	0.0	0.0	0.0	0.0
	McKinney Avenue Transit Authority	SR	1989	4.2	3.7	0.0	0.0	0.0	0.0
	Dallas Streetcar	SR	2015	2.2	1.4	0.8	0.0	0.0	0.0
Utah	Utah Transit Authority (UTA)	LR	1999	93.9	101.8	4.3	0.0	0.0	0.0
Virginia	Hampton Roads Transit (HRT)	LR	2011	14.8	6.1	1.3	0.0	0.0	0.0
Washington	Sound Transit Central Link	LR	2009	30.8	20.7	12.7	0.0	5.1	5.1
	Sound Transit Tacoma Link	LR	2003	3.6	2.7	0.0	0.0	0.0	0.0
	Seattle Monorail	MG	1962	1.8	0.0	1.8	0.0	0.0	0.0
	South Lake Union Streetcar	SR	2007	2.7	2.6	0.0	0.0	0.0	0.0
West Virginia	Morgantown People Mover	MG	1975	6.3	4.0	4.7	0.0	0.0	0.0
Wisconsin	Kenosha Transit	SR	2000	1.9	1.9	0.0	0.0	0.0	0.0
	Milwaukee Streetcar	SR	TBD						

Blue = New System in Engineering or Construction  
 Green = Existing System coming into FTA's SSO program

## Tunnel Ventilation System Assessment Form Instructions

State Safety Oversight Agencies (SSOAs) are required to submit completed versions of the following forms to FTA by August 31, 2015.

The instructions for completing the forms are as follows:

### Appendix 2: Tunnel Ventilation System Site Assessment Form Complete one form per individual tunnel ventilation location.

- Box 1** Individual tunnel ventilation location
- Box 2** Date of inspection
- Box 3** Time of inspection
- Box 4** Indicate whether the ventilation system complies with NFPA 130 (historic agencies may not be in compliance) (A safety risk analysis is requested for partial or non-compliant RTAs)
- Box 5** Names of the individuals on the inspection team (note: personally identifying information, such as names, will be redacted prior to submission to NTSB)
- Box 6** Date of the last inspection for this location
- Box 7** Review the inspection history for the tunnel ventilation system location and note previous findings or relevant observations
- Box 8** Indicate the physical condition of the listed components
- Box 9** Indicate the fan shaft damper operation type
- Box 10** Verify operational capabilities of the listed tunnel ventilation system equipment
- Box 11** Perform visual checks of the listed tunnel ventilation system components
- Box 12** Identify condition of the listed areas

### Appendix 3: Tunnel Ventilation System General Assessment Form

Complete one form per RFGPTS.

- Box 1** Identify the department(s) responsible for maintenance and inspection of the tunnel ventilation system
- Box 2** Identify the department(s) responsible for tunnel ventilation remote operation
- Box 3** Identify the department(s) authorized to take local control of fans
- Box 4** Identify if there are procedures in place for local control
- Box 5** Provide total count of tunnel fans
- Box 6** Provide total count of tunnel ventilation shafts
- Box 7** Indicate whether all ventilation systems at the RFGPTS comply with NFPA 130 (A safety risk analysis is requested for partial or non-compliant RTAs)
- Box 8** Indicate tunnel ventilation system inspection schedule
- Box 9** Indicate whether individuals responsible for tunnel ventilation remote operation receive training
- Box 10** Indicate whether refresher training is required for individuals responsible for tunnel ventilation remote operation
- Box 11** Indicate whether municipal response agencies, such as fire, police, or EMS, receive familiarization training on the location and operation of the tunnel ventilation system
- Box 12** Indicate whether the RFGPTS has developed Emergency Ventilation Systems and Tunnel Operating Procedures
- Box 13** Indicate whether the RFGPTS has developed an Emergency Tunnel Ventilation Test Program
- Box 14** Indicate whether adverse weather conditions (ex.: heavy snow or rain) have an impact on tunnel ventilation and how
- Box 15** Indicate the tools and equipment required for maintenance activities from the provided list



## Appendix 2: Tunnel Ventilation System Site Assessment Form

**1** Location

**2** Date

**3** Time

**4** Does the Tunnel Ventilation System comply with the requirements of NFPA 130? Check one.

(If No, or Partially is checked, please provide a safety risk analysis)

Yes

No

Partially

**5** Inspector(s)

**6** Date of last inspection

**7** Inspection records review notes

**8** Physical condition of Tunnel Ventilation System components. Check one.

**a)** Fan

Non-Operational

Restricted Use

Fair Condition

Good Condition

New or Like New

**b)** Airway

Non-Operational

Restricted Use

Fair Condition

Good Condition

New or Like New

**c)** Louver

Non-Operational

Restricted Use

Fair Condition

Good Condition

New or Like New

**d)** Motor-operated dampers

Non-Operational

Restricted Use

Fair Condition

Good Condition

New or Like New

**e)** Drive trains/belts

Non-Operational

Restricted Use

Fair Condition

Good Condition

New or Like New

**Appendix 2: Tunnel Ventilation System Site Assessment Form**

**9** Type of damper operation. Check one.

- Pneumatic       Motor Control       Temperature Actuated

**10** Verify operation of the following Tunnel Ventilation System components. Check one.

<b>a)</b> Dampers	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
<b>b)</b> CO monitoring equipment (if equipped)	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
<b>c)</b> Local control panel accurately reflects current operating mode	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
<b>d)</b> Fan operates in forward (Supply)	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
<b>e)</b> Fan operates in reverse (Exhaust)	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
<b>f)</b> Fan reaches full operating speed within 180 seconds of activation	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
<b>g)</b> Fan achieves full rotational reversal within 90 seconds	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
<b>h)</b> Fans are controlled remotely	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
<b>i)</b> Dampers are controlled remotely	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
<b>j)</b> Local control overrides remote control	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
<b>k)</b> Operations Control Center receives verification of proper response by emergency ventilation fans	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
<b>l)</b> Operations Control Center receives verification of proper response by all inter-related devices (dampers)	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A

**11** Visually check for the presence of the following items within the fan shaft. Check one.

<b>a)</b> Screen, inlet bell, fan, outlet transition, and dampers	<input type="checkbox"/> Present	<input type="checkbox"/> Not Present	<input type="checkbox"/> N/A
<b>b)</b> By-pass dampers	<input type="checkbox"/> Present	<input type="checkbox"/> Not Present	<input type="checkbox"/> N/A
<b>c)</b> Motor control equipment, thermostats, and local controls	<input type="checkbox"/> Present	<input type="checkbox"/> Not Present	<input type="checkbox"/> N/A

**Appendix 2: Tunnel Ventilation System Site Assessment Form**

<b>d)</b> Drainage	<input type="checkbox"/> Present	<input type="checkbox"/> Not Present	<input type="checkbox"/> N/A
<b>e)</b> Acoustic treatment	<input type="checkbox"/> Present	<input type="checkbox"/> Not Present	<input type="checkbox"/> N/A
<b>f)</b> Dry fire standpipe system	<input type="checkbox"/> Present	<input type="checkbox"/> Not Present	<input type="checkbox"/> N/A
<b>g)</b> Access hatchway	<input type="checkbox"/> Present	<input type="checkbox"/> Not Present	<input type="checkbox"/> N/A
<b>h)</b> Surface grating	<input type="checkbox"/> Present	<input type="checkbox"/> Not Present	<input type="checkbox"/> N/A
<b>i)</b> Steel stairs and ladders, as required	<input type="checkbox"/> Present	<input type="checkbox"/> Not Present	<input type="checkbox"/> N/A
<b>j)</b> A.C. lighting	<input type="checkbox"/> Present	<input type="checkbox"/> Not Present	<input type="checkbox"/> N/A
<b>k)</b> Emergency lighting	<input type="checkbox"/> Present	<input type="checkbox"/> Not Present	<input type="checkbox"/> N/A
<b>l)</b> Convenience outlet	<input type="checkbox"/> Present	<input type="checkbox"/> Not Present	<input type="checkbox"/> N/A
<b>m)</b> Surveillance system	<input type="checkbox"/> Present	<input type="checkbox"/> Not Present	<input type="checkbox"/> N/A
<b>n)</b> Telephone or other communication device	<input type="checkbox"/> Present	<input type="checkbox"/> Not Present	<input type="checkbox"/> N/A
<b>12</b> Verify that the following items are clean and free of debris. Check one.			
<b>a)</b> Airways	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
<b>b)</b> Ventilation shaft	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
<b>c)</b> Stairways (if applicable)	<input type="checkbox"/> Yes	<input type="checkbox"/> No	

***Please sign and date each inspection form.***

RFGPTS Inspector: \_\_\_\_\_

Date: \_\_\_\_\_

SSO Agency Representative: \_\_\_\_\_

Date: \_\_\_\_\_

**Appendix 3: Tunnel Ventilation System General Assessment Form**

**1** Does upkeep and maintenance of the Tunnel Ventilation System rely on more than one department? Check one.

Yes  No

a) If Yes, please list the departments:

**2** What department is responsible for tunnel fan remote operation?

**3** How many departments are authorized to take local control of fans? Please list the departments:

**4** Are procedures in place for Local Control?

Yes  No  
 Yes  No

a) Are the procedures reviewed?

**5** How many tunnel fan shafts does your agency have?

**6** How many tunnel ventilation shafts does your agency have?

**7** Do all Tunnel Ventilation Systems comply with the requirements of NFPA 130? Check one.

(If No, or Partially is checked, please provide a safety risk analysis)

Yes  No  Partially

**8** How often is the Tunnel Ventilation System inspected? Check one.

Monthly  Quarterly  Biannually  Annually  
 Yes  No

a) Are inspection results reviewed and logged?

**9** Do the individuals responsible for tunnel fan remote operation receive training to perform this task? Check one.

Yes  No  N/A

**10** Is refresher training required for this task? Check one.

Yes  No  N/A

<p><b>a) How often?</b></p>	<input type="checkbox"/> Annual	<input type="checkbox"/> Biennial	<input type="checkbox"/> Triennial
<p><b>11</b> Have municipal response agencies received familiarization training on the location and operation of the Tunnel Ventilation System? Check one.</p>	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
<p><b>12</b> Have Emergency Ventilation Systems and Tunnel Operating Procedures been developed? Check one. If Yes, please submit a copy with this form.</p>	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
<p><b>13</b> Has an Emergency Tunnel Ventilation Test Program been developed? Check one. If Yes, please submit a copy with this form.</p>	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
<p><b>14</b> How are adverse weather conditions managed with relation to tunnel ventilation?</p>			
<p><b>15</b> What tools and equipment are required for maintenance activities?</p> <p>a) Check all that apply.</p> <p>b) Please write in any additional tools and equipment necessary to perform this task.</p>	<input type="checkbox"/> Multi-Meter	<input type="checkbox"/> Rags	
	<input type="checkbox"/> Hand tools	<input type="checkbox"/> Lubrication	
	<input type="checkbox"/> LOTO locks and tags	<input type="checkbox"/> Flashlight	

**Assessment Contact Information:**

**Name:** \_\_\_\_\_

**Title:** \_\_\_\_\_

**Email:** \_\_\_\_\_

**Phone Number:** \_\_\_\_\_

*Please sign and date each inspection form.*

RFGPTS Inspector: \_\_\_\_\_

Date: \_\_\_\_\_

SSO Agency Representative: \_\_\_\_\_

Date: \_\_\_\_\_