



U.S. Department  
of Transportation  
**Federal Transit  
Administration**

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# 5

ROOT CAUSE ANALYSIS  
**5-Whys: Getting to the Root  
of the Problem**



**FTA ESMS RESOURCE SERIES**

This guidance document does not have the force and effect of law and is not meant to bind the public in any way. The document is intended only to provide clarity to the public regarding existing requirements under the law or agency policies. Recipients or sub recipients should refer to FTA's statutes and regulations for applicable requirements.

It is inevitable that organizations are going to identify problems within their environmental and sustainability management system (ESMS). A problem is often identified when a requirement is not being met within an ESMS or another environmental program. After a problem is identified, the organization needs to identify the root cause or causes pertaining to the particular problem so that appropriate action can be taken to keep the problem from recurring. The 5 Why method is one way to identify the root cause, not just symptoms, of an identified problem in a simple step-by-step manner. This document focuses on how to use the 5 Why methodology and tool. Note, the 5 Why method can be used whether or not your organization has an ESMS or another environmental program.

## OVERVIEW

Five Whys or 5 Whys is a technique to determine the underlying cause of a problem. It represents an iterative type process whereby repetitive why questions are repeated, each answer forming the basis for the next question. Typically answering 5 Why questions results in the root cause; and when addressed, should prevent the problem from reoccurring. In many cases there is not just one root cause and the 5 Why process reveals the key cause or causes.

## WHY USE 5 WHYS?

The 5 Why tool encourages and promotes simple brainstorming that assists teams in identifying the root cause(s) related to a nonconforming practice.

Asking 5 Whys allows the team to move beyond “symptoms” and reflect on the true cause of a problem; thus, preventing the team from repeating the problem.

## WHEN TO USE 5 WHYS

- When identifying possible causes for a nonconforming practice, process, etc.
- When having difficulty understanding contributing factors or causes of a nonconforming practice, problem, etc.



## The Components of 5 Whys

- 1** **Establish a cross functional team to evaluate the problem (subject matter experts)**  
Create a team with a variety of skills associated with the problem to allow a comprehensive assessment of the problem; i.e., engineers, finance, process operators, maintenance personnel, training staff, supervisors.
- 2** **The team states and formalizes the identified problem (problem statement/effect)**
  - a. Documenting the nonconforming practice (problem) helps you formalize the problem and describe it completely.
  - b. Documenting the nonconforming practice (problem) helps to make it real.
  - c. Documenting the nonconforming practice (problem) promotes the need to take action to address it.
- 3** **The team agrees on major categories of possible causes (human/method/machine/materials)**  
Major categories for causes can include, but may not be limited to:
  - equipment factors (machine)
  - supply factors (materials)
  - environmental factors, rules/policy/procedure factors (method)
  - and people/staff factors (human)
- 4** **The team asks whys related to the nonconforming practice (symptoms). The initial immediate causes are symptoms that lead you to the root cause(s).**
  - a. Keep asking why in response to each suggested cause (symptom). Discuss, communicate and document the reasons for the problem.
  - b. As a team, identify why the nonconforming practice happens, happened or is happening and document the answers.
  - c. Communicate with others to encourage participation, ownership and responsibility in solving the nonconforming practice.
- 5** **The team Identifies the final why or the root cause**
  - a. Ask as many whys as you need to get understanding at a level that can be addressed and acted upon (asking 5 times is typical) – this is the root cause.
  - b. You will know you have reached your final why because it does not make logical sense to ask why again.
  - c. 5 Whys is a good rule to follow, but be aware that you can get to the true root cause in less than 5, or it may take a few more.



## Potential Risks with Using the 5 Whys Methodology

- It is easy to focus on the symptoms instead of the causes of the problem. If you stop too early when asking why, there is a risk that you may stop at a symptom instead of the true root cause.
- If key players are not involved, it is easy to make assumptions and miss accurately identifying and defining the problems.

## Root Cause/ 5 Whys Example

Below is an example that applies the 5 Whys method to a hypothetical scenario. The example includes a worksheet template below that can be utilized.

**Scenario:** A transit authority passenger bus, while stopped to discharge passengers, experienced a diesel fuel leak curbside near a storm drain. The leak is reportable because 50 gallons of diesel fuel were discharged to a water-way (waters of the state) connected to the storm drain, contaminating stream water and killing fish.

Passengers exiting the bus notified the driver that a large amount of diesel fuel was flowing into the gutters toward the storm drain. The driver, following procedure, called the emergency response contact who dispatched a maintenance vehicle immediately. While waiting, the driver, was unable to stop the flow of diesel from the bus or the flow of fuel to the storm drain. When the response team arrived, they blocked the storm drain and placed booms around the spill area to contain the spill and clean-up excess fuel; however, more than 50 gallons of fuel had already made it through the storm drain and into the nearby stream. A private contractor was called in to clean up the stream.

Using the Components of the 5 Why, as listed above, the following is done.

# 1

### **Establish a cross functional team to evaluate the problem (subject matter experts)**

A team consisting of the driver, dispatcher, operation's supervisor, safety team member, emergency response team member, environmental team member is formed to evaluate the incident and determine the root cause.

# 2

### **State and formalize the specific problem(s) you have identified to work on (problem statement/effect):**

Problem A: While a bus was stopped to discharge passengers, diesel fuel leaked from a seal.

Problem B: The fuel traveled to a storm drain and then to a stream, contaminating a state water resource.

# 3

### **Agree on major categories of possible causes (human/method/machine/materials):**

- a. Fuel leak: faulty equipment (machine), faulty maintenance (method/human).
- b. Discharge to stream: lack of equipment (materials) to mitigate or control spill.

# 4

### **Ask Whys related to the nonconforming practice (symptoms) as set out in 3.a and 3.b above:**



<b>PROBLEM</b>	<b>A: FUEL LEAK</b>	<b>B: DISCHARGE TO A STREAM</b>
	After checking maintenance records, it was found that the seal had not been replaced according to the maintenance schedule which contributed to the discharge.	Once the spill was identified and emergency response called, the driver took no actions to mitigate the spill and prevent contamination of state waters.
<b>WHY 1?</b>	<b>Why was the Preventive Maintenance (PM) not conducted?</b>	<b>Why did the driver take no action?</b>
	While the PM specifies an action, there are no checks in place to ensure that maintenance activities are carried out on schedule.	The driver had no way of controlling the spill. With the exception of a radio and procedures for calling in the discharge, there were no tools available to the driver (booms, shovel, sand) to use to help stop the flow of diesel fuel.
<b>WHY 2?</b>	<b>Why are there no checks in place?</b>	<b>Why were there no procedures or tools available for the driver?</b>
	The procedure for maintenance does not provide instructions to check or verify maintenance is performed.	The emergency response plan for the company did not identify spills as a risk.
<b>WHY 3?</b>	<b>Why are there no instructions to verify task completion?</b>	<b>Why was this type of emergency situation not identified?</b>
	The SOP failed to specify verification of the PM and instead relied on common practice (verbal and on-the-job training) with no check required.	There were no previous incidents of this nature.
<b>WHY 4?</b>	<b>Why did the SOP fail to specify verification of the PM?</b>	<b>Why were potential emergencies not considered?</b>
	The SOP did not go through the proper review and approval process prior to release.	The plan was flawed by not assessing potential emergencies.
<b>WHY 5?</b>	<b>Why did it not go through the review and approval process?</b>	<b>Why wasn't the plan comprehensive?</b>
	The review and approval of processes prior to release was not effective because the organization did not determine how to review processes or who was responsible for approval.	The company did not conduct periodic assessments to review the adequacy of the plan.
<b>NOTE:</b>	At this point it is determined that the root cause regarding the fuel leak was related to a poorly developed SOP that lacked a verification process to ensure that PM tasks are completed.	At this point it is determined that the root cause for the release not being addressed by the driver was a flawed emergency response plan.



# 5

## Identify the final Why or the root cause for each identified problem.

- **Root Cause of Fuel Leak:** The review and approval of processes prior to release was not effective because the organization did not determine how to review processes or who was responsible for approval.
- **Root Cause of Discharge to Stream:** The Emergency Response Plan was inadequate with respect to fuel spills while busses are operating.

## NEXT STEPS

After using the 5 Why process, the organization can now take action developing and implementing the appropriate corrective or preventive actions (process change) to ensure that the problem does not occur again on this bus, on other vehicles, or at other facilities or divisions.

For example, for the first root cause, the organization will ensure that the process for reviewing and approving SOPs is determined. Once it is determined, the existing SOP is reviewed and a verification step is added in the SOP for vehicle maintenance and the staff trained on the update procedures. Effectiveness of the process change is verified through evidence of review and approval of processes; staff carrying out the change; and records indicating the review and approval of the document is completed and that the maintenance was performed.

For the second root cause, the organization will update the company Emergency Response Plan to address spills while buses are operating and determine the feasibility of the addition of a small spill kit which can be carried on the bus to provide immediate response to a spill. A new SOP may need to be developed, training provided, a validation process established to ensure that the spill kits are appropriately located and periodically inspected to ensure they are intact, and emergency drills periodically conducted to test the effectiveness of the corrective action.

Using the 5 Why process described in this example should result in improved operations, better trained personnel, reduced spills, cost savings, and protection of the environment.

## FINAL THOUGHTS

Every organization is going to encounter problems within its ESMS at one point or another. Identifying the causes of the problem are paramount to ensuring the problem does not recur or occur elsewhere within the system; thus, ensuring the integrity of the ESMS. The 5 Why method is one way to identify the causes of an identified problem in a simple step-by-step manner.



## ADDITIONAL RESOURCES

For more comprehensive information on the components of an ESMS it is recommended you take the FTA ESMS Introductory Online Course available through the National Transit Institute.

The ESMS Institute, when offered, provides guidance and tools to successfully develop, implement, maintain and sustain an ESMS for your organization.

- [EPA website](#)  
*Provides information and resources related to Environmental Management Systems (EMSs).*
- [International Organization for Standardization](#) information, publications and products.
- [American Public Transportation Association \(APTA\) sustainability resources](#)
- [Center for Environmental Excellence by AASHTO](#)
- [FTA ESMS website](#)  
*Provides links to webinars, brochures, and resources from the ESMS Resource Series.*
- [FTA ESMS Introductory Online Course](#)



# 5 WHYS WORKSHEET

Define the Problem:

Why is it happening?

Why is that?



Why is that?



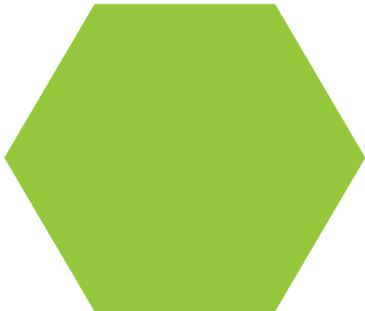
Why is that?



Why is that?



You don't want to list 5 different reasons; you want to go deep on 1 reason.



Action:

