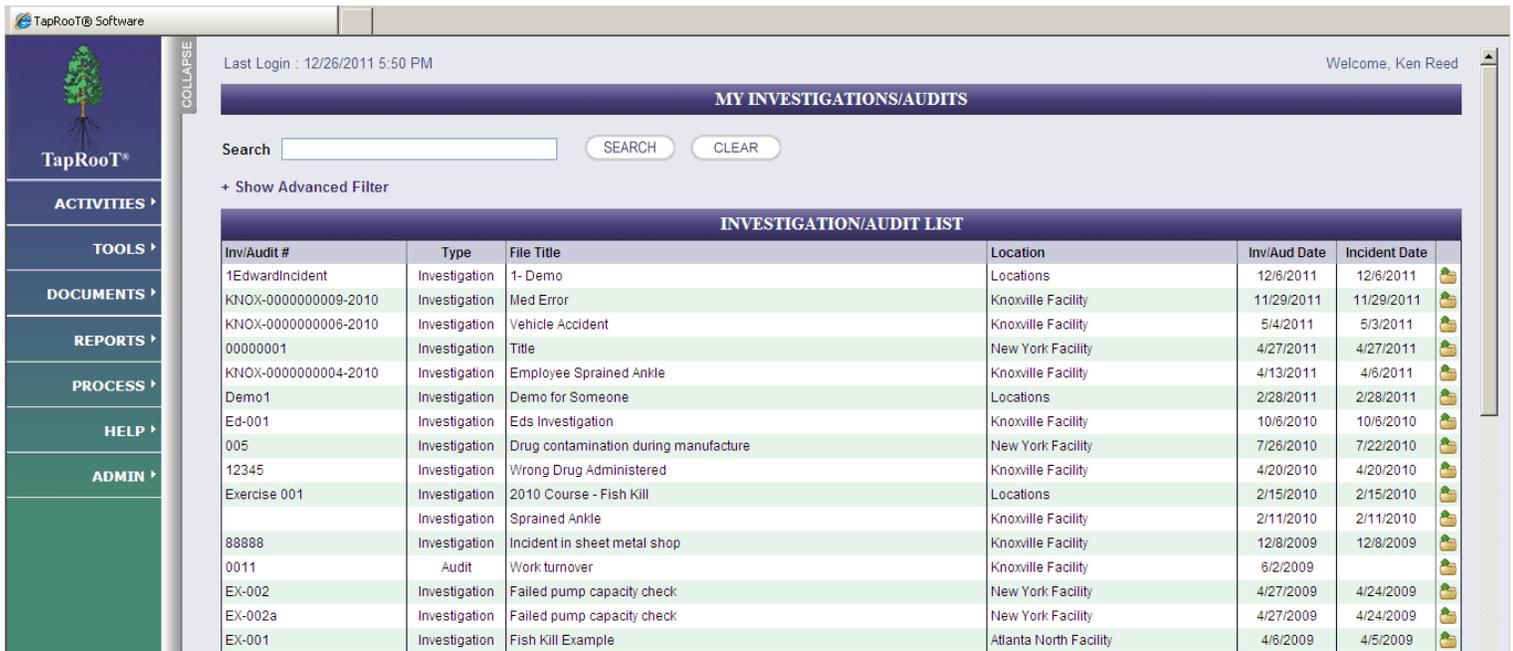


TapRoot®

Version 5 Software Tutorial



The screenshot displays the TapRoot software interface. At the top, it shows the browser address bar with 'TapRoot® Software'. The main header area includes 'Last Login : 12/26/2011 5:50 PM' and 'Welcome, Ken Reed'. Below this is a navigation menu on the left with options: ACTIVITIES, TOOLS, DOCUMENTS, REPORTS, PROCESS, HELP, and ADMIN. The main content area is titled 'MY INVESTIGATIONS/AUDITS' and features a search bar with 'SEARCH' and 'CLEAR' buttons. A '+ Show Advanced Filter' link is also present. The central part of the interface is a table titled 'INVESTIGATION/AUDIT LIST' with the following data:

Inv/Audit #	Type	File Title	Location	Inv/Aud Date	Incident Date	
1EdwardIncident	Investigation	1- Demo	Locations	12/6/2011	12/6/2011	
KNOX-0000000009-2010	Investigation	Med Error	Knoxville Facility	11/29/2011	11/29/2011	
KNOX-0000000006-2010	Investigation	Vehicle Accident	Knoxville Facility	5/4/2011	5/3/2011	
00000001	Investigation	Title	New York Facility	4/27/2011	4/27/2011	
KNOX-0000000004-2010	Investigation	Employee Sprained Ankle	Knoxville Facility	4/13/2011	4/6/2011	
Demo1	Investigation	Demo for Someone	Locations	2/28/2011	2/28/2011	
Ed-001	Investigation	Eds Investigation	Knoxville Facility	10/6/2010	10/6/2010	
005	Investigation	Drug contamination during manufacture	New York Facility	7/26/2010	7/22/2010	
12345	Investigation	Wrong Drug Administered	Knoxville Facility	4/20/2010	4/20/2010	
Exercise 001	Investigation	2010 Course - Fish Kill	Locations	2/15/2010	2/15/2010	
	Investigation	Sprained Ankle	Knoxville Facility	2/11/2010	2/11/2010	
88888	Investigation	Incident in sheet metal shop	Knoxville Facility	12/8/2009	12/8/2009	
0011	Audit	Work turnover	Knoxville Facility	6/2/2009		
EX-002	Investigation	Failed pump capacity check	New York Facility	4/27/2009	4/24/2009	
EX-002a	Investigation	Failed pump capacity check	New York Facility	4/27/2009	4/24/2009	
EX-001	Investigation	Fish Kill Example	Atlanta North Facility	4/6/2009	4/5/2009	

Tutorial Introduction

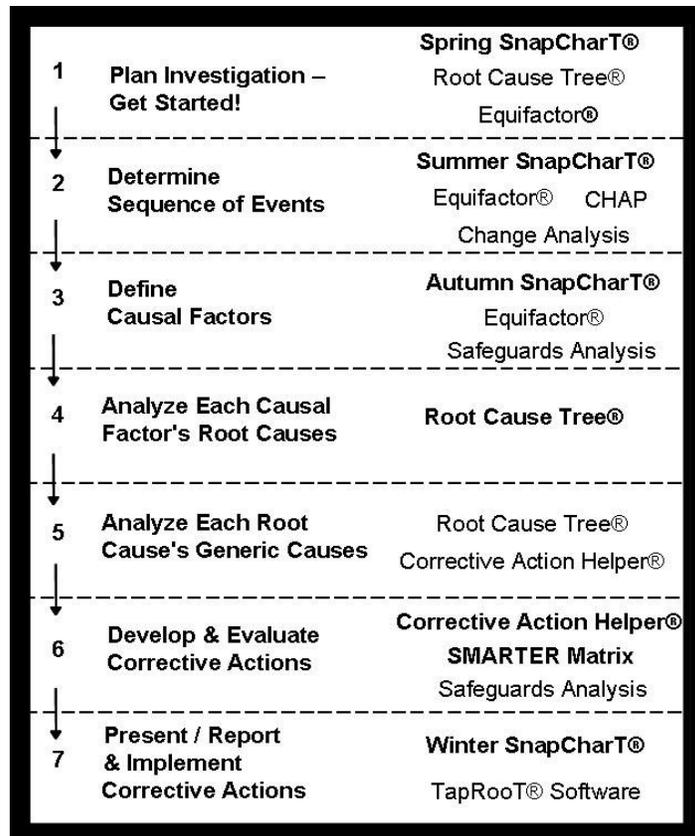
This tutorial is not intended to teach the TapRoot® process but is intended to facilitate the use of the TapRoot® Software as a tool to aid the investigator during the root cause analysis process. To learn the TapRoot® System we recommend that you attend a 2-Day or 5-Day training course. The list of public courses can be found on our website at www.taproot.com.

This tutorial will cover the 3 “core” techniques used every time the TapRoot® system is used for investigating a problem. These include SnapCharT®, Root Cause Tree®, and Corrective Action Development using SMARTER and Corrective Action Helper®. **To get the most out of the tutorial, you are invited to perform the exercises that are included in each section.**

Other “Optional” techniques (Equifactor®, Safeguards Analysis, Change Analysis, and Critical Human Action Profile (CHAP)) are included in the software and are each discussed later in this document. For help in any of these areas consult the later chapters in this tutorial or utilize the Help buttons located on the appropriate screens.

Detailed descriptions of all of these techniques can be found in the *TapRoot® Book*.

To begin this tutorial, we need to familiarize you with the main steps involved in the TapRoot® process. The basic steps are contained in the TapRoot® Process Flow below:



TapRooT® Process Flow

These 7 Step TapRooT® Process Flow is the basis of the TapRooT® System and is used to guide your investigators while using the software. We will follow the same basic principles when using the software during an investigation. From initiating an investigation to developing corrective actions and documenting our findings, the entire process is now built into this software package.

Software Configuration and Setup

Before we get into the tutorial example, let's do some initial software configuration to customize the software for your use. There are a few items that we recommend you set up right away.

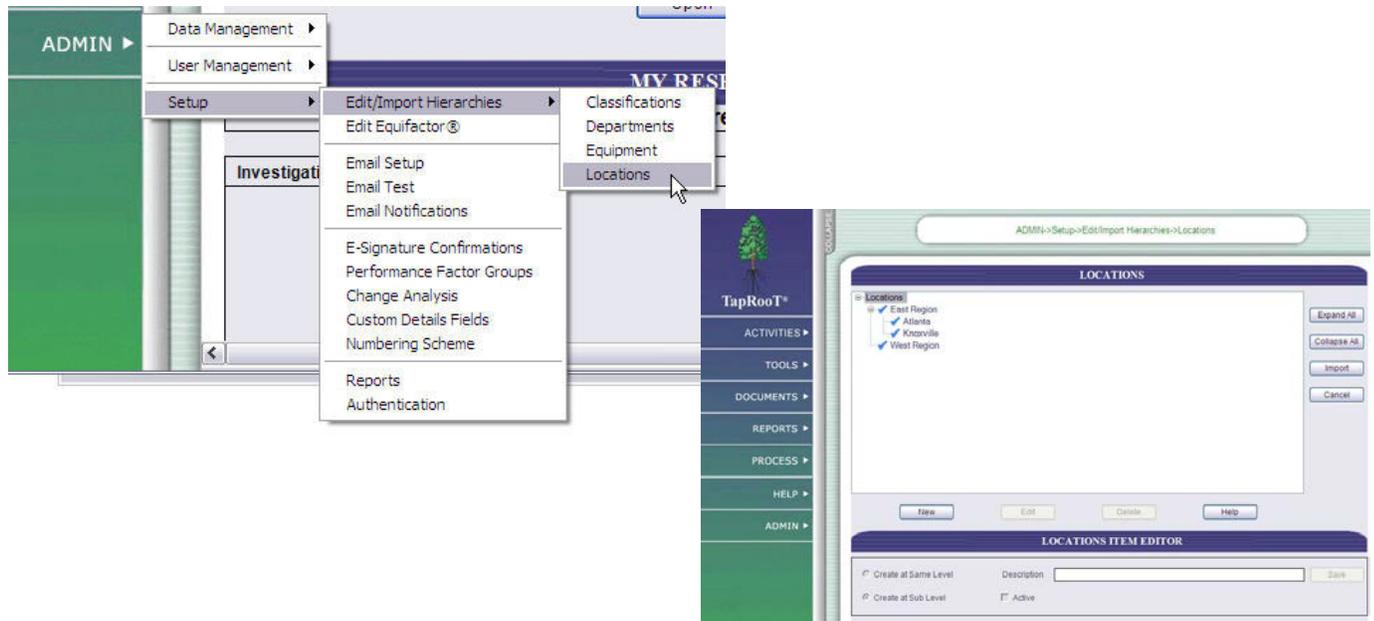
Locations and Classifications

These fields are assigned to each investigation. They are fully customizable for each user to allow you to more accurately describe the Investigations you will be working on.

Locations: These will be the locations you expect to track in the software. For example, you may have facilities all over the world, or you may have multiple buildings in your single facility. You will want to be able to distinguish which location the Incident occurred in. Therefore, you will want to set up a Location hierarchy. When you enter the initial Investigation data, you will be asked to select a single location associated with the Investigation.

Classifications: Similarly, you will probably want to determine what type of Incidents you will be investigating. For example, you may have Injuries, Environmental problems, Equipment failures, Safety problems, etc. You will be asked to select the Classification of your Investigation. Note that you will be able to select *multiple* classifications (Safety and Injury, for example).

To set up your Location and Classification lists, go to *Admin > Setup > Edit/Import Hierarchies*, highlight a level, and manually add items:



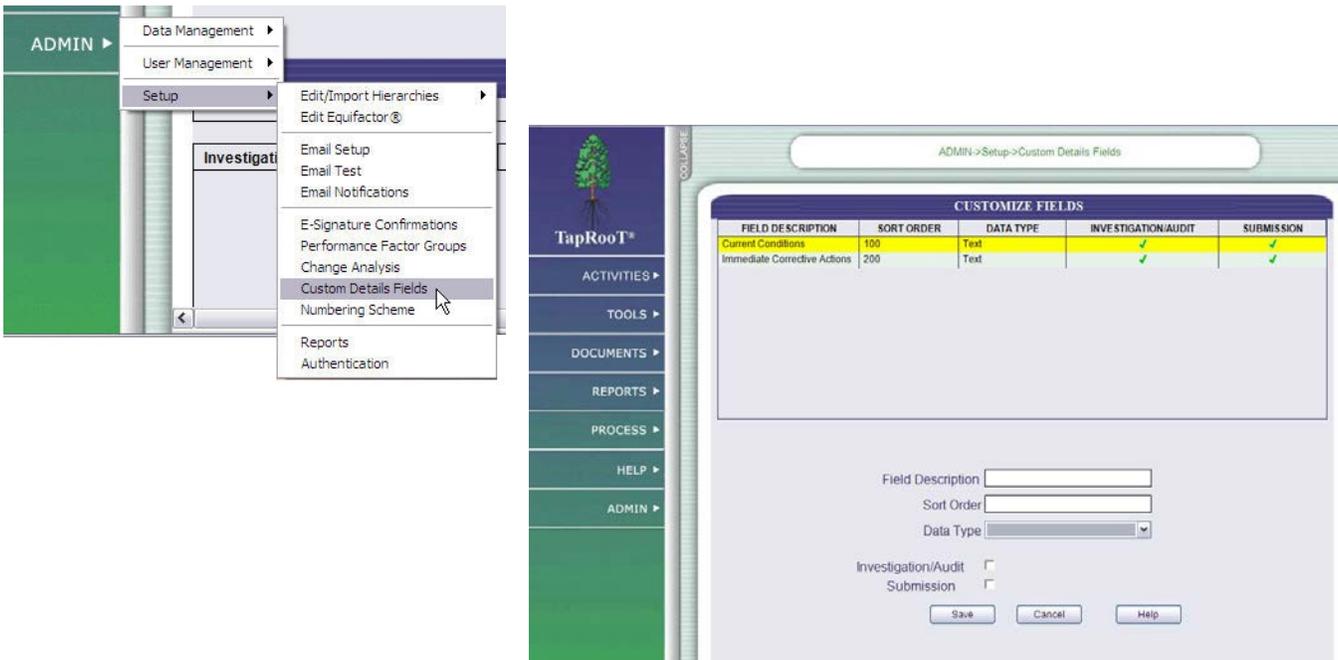
Custom Details Data Fields

When you are ready to print out your Investigation Reports, you will probably have certain things that you want to have displayed. For example, many companies want an Executive Summary section on their report that gives an overview of the Incident. This is normally expected right near the beginning of the report. Additionally, you may have requirements to record specialized data for each Investigation data for later trending, save pictures taken during the Investigation, and save electronic copies of pertinent documents (word docs, pdfs, etc).

The TapRoot® software allows you to create Custom Details Fields for these functions. You will want to decide what data you wish to collect for each of your Investigations, then create these Custom Fields.

To create these fields, select *Admin > Setup > Custom Details Fields*. On this screen, you will select:

- Name of the item (*Field Description*)
- The order you want it to display on your reports (*Sort Order*)
- The type of data to be stored there (*Data Type*)



The screenshot shows the TapRoot software interface. On the left, the 'ADMIN' menu is expanded to 'Setup', and 'Custom Details Fields' is selected. The main window displays the 'CUSTOMIZE FIELDS' configuration screen. At the top, the breadcrumb path is 'ADMIN->Setup->Custom Details Fields'. Below this is a table with the following data:

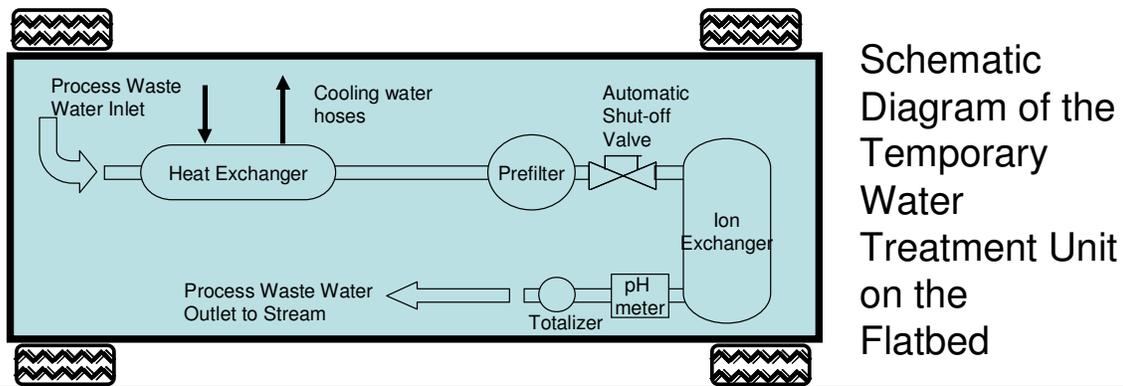
FIELD DESCRIPTION	SORT ORDER	DATA TYPE	INVESTIGATION/AUDIT	SUBMISSION
Current Conditions	100	Text	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Immediate Corrective Actions	200	Text	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Below the table, there are input fields for 'Field Description', 'Sort Order', and 'Data Type' (a dropdown menu). There are also checkboxes for 'Investigation/Audit' and 'Submission', and 'Save', 'Cancel', and 'Help' buttons at the bottom.

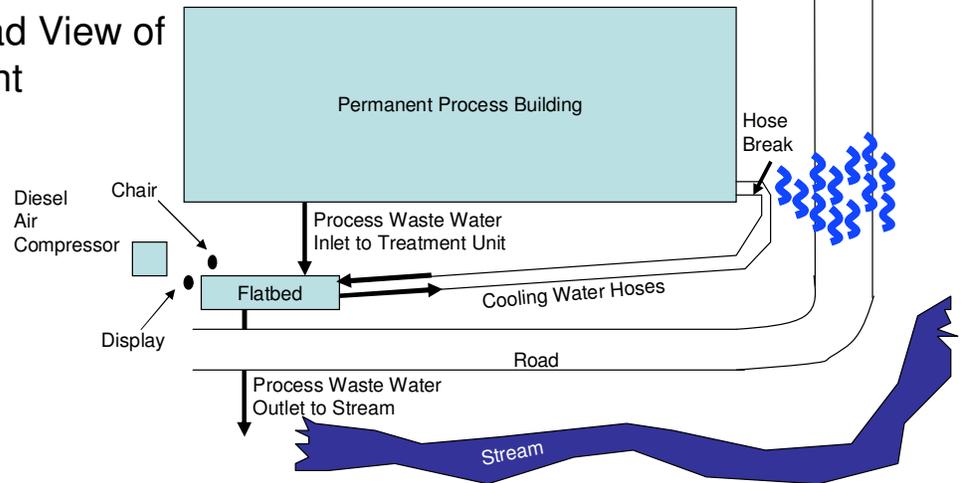
Example Incident Background

To facilitate this exercise, we want to use a simple incident involving an environmental release at an industrial facility. This incident will allow you to see each of the core techniques listed above and learn the basic flow of the software.

This Incident is one in which a temporary water treatment plant was treating wastewater before discharge to a stream. A cooling hose ruptured, allowing untreated water to be released. This killed a large number of fish in the stream. You have gathered initial information and you are now ready to initiate an investigation and perform a root cause analysis.



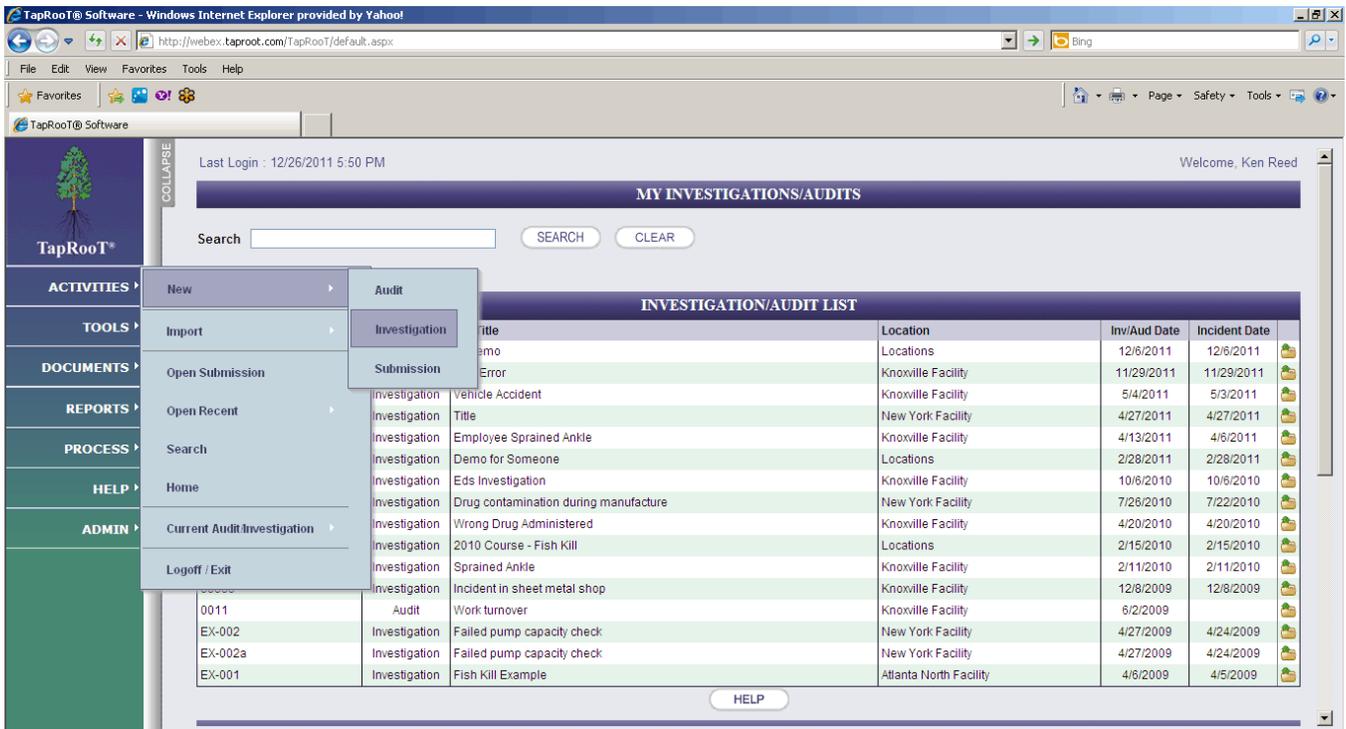
Overhead View of The Plant



Water Treatment Facility Layout

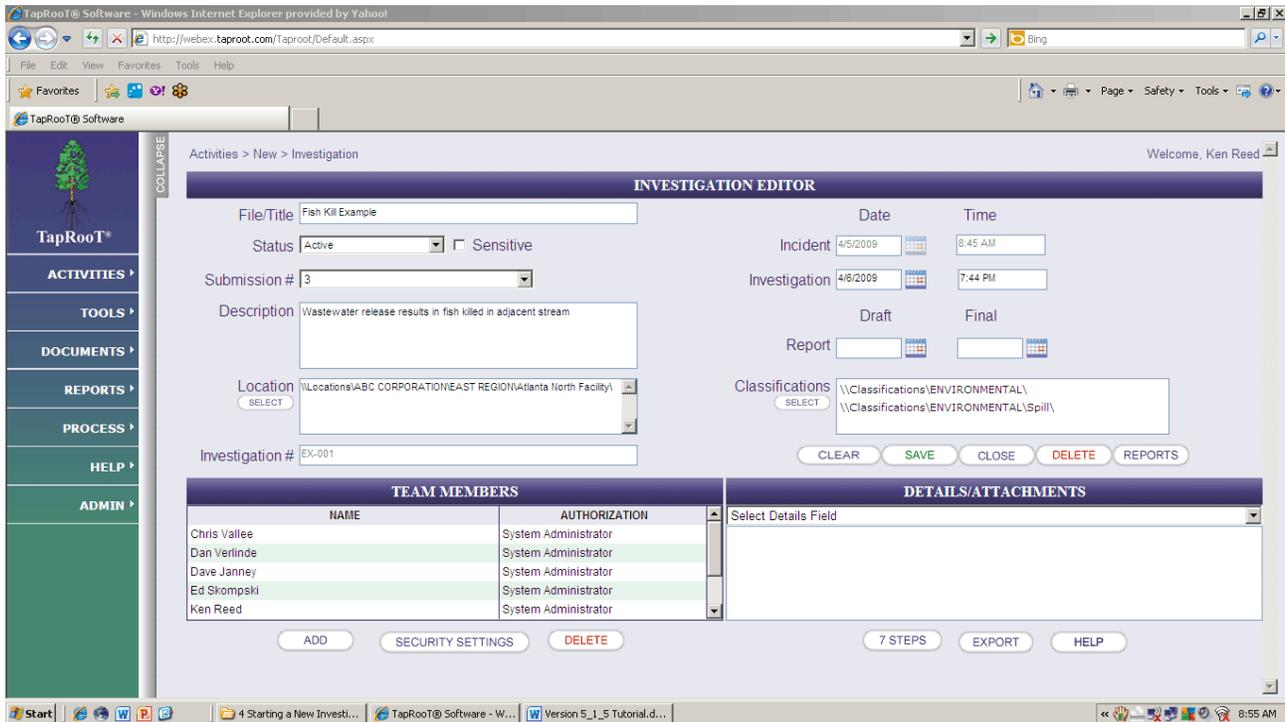
Starting a New Investigation

The first step will be to start a new investigation in the TapRoT® Software. On the Left Menu, select the *Activities > New > Investigation* item to begin the process of initiating an investigation:



From the Landing Page

This will take you to the Investigation Editor. All of the general information about the Investigation will be entered on this screen:



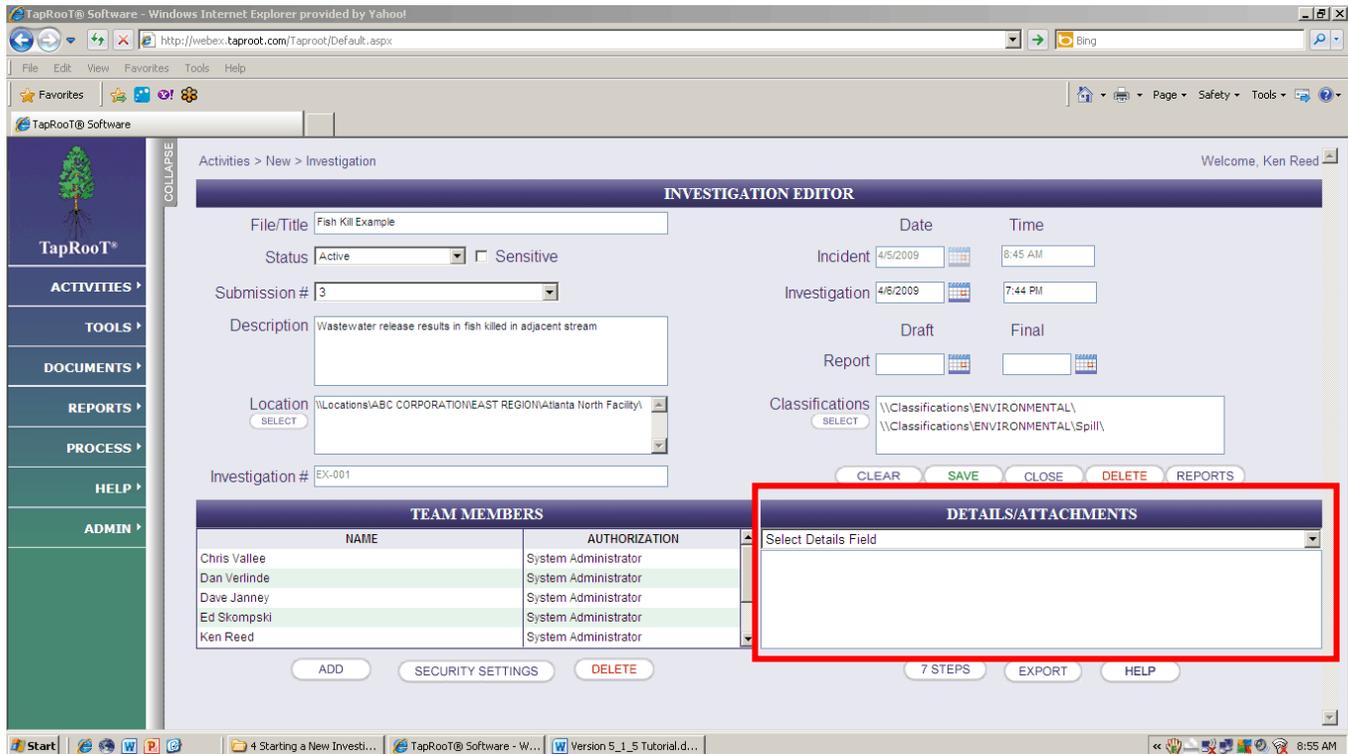
Investigation Editor

There is certain initial information that is required by the software before you can save the investigation. The items shown above are required entries. For the Enterprise version of the software, you will also have to add team members and assign a Team Leader before saving. So first enter the following:

1. Title (click into the “File / Title” text box, and begin typing): Fish Kill Example.
2. Description: Enter a short description of the investigation.
3. Location: Select the default, unless you have Locations available.
4. Investigation #: if the number field is blank and editable (if the words ---Pending--- appear, you are using the auto-incident numbering option from the Software Options tool on the System Administration menu and you do not have to enter an incident number. It will be generated for you upon the first save).
5. Incident Date and Time: This is the date and time that the incident occurred. Only the Date is required.
6. Investigation Date and Time: This is the date and time that the investigation was initiated. Only the Date is required.
7. Classifications: Select the default, unless you have Classifications available.
8. Click the “Save” button.

Details / Attachments Fields

The Details / Attachments area of the Investigation Editor allows you to enter pertinent descriptive information and attachments that help you describe your investigation.



Details / Attachments Fields

These fields are of 2 general types:

- Data fields, which allow you to type in the data on this screen
- Attachment fields, which allow you to attach documents (pdf, Word, etc) to your investigations

There are a few pre-defined fields available in the drop-down box. However, the user has the ability to add customized fields under *Admin > Setup > Custom Details Fields*. There are several choices for field types available to the user, including Text and Currency.

NOTE: Any of the fields that have data entered into them will show up on the Investigation Report (See Reports section for more information). If no text is entered, the fields do not show up in the report. This is a great way to customize the report format to

better match your company's requirements. We encourage you to use these fields to your advantage.

Entering Data

- To enter data, simply highlight the desired title in the drop-down list, and then type in the blank area below the drop-down list.

Attaching Documents

- To attach a document, highlight the desired title in the dropdown box (note that the title must be a *Binary/Attachment* data type when the custom field was originally defined).

For this exercise practice entering data by selecting at least 1 text field and 1 numeric field and add some random information. Then click the *Save* Button (located above the Details / Attachments area) to save what you have entered.

Investigation Navigation

Once an investigation is saved from the Investigation Editor, you now have access to the TapRooT® 7-Step Investigation Process Flow diagram:

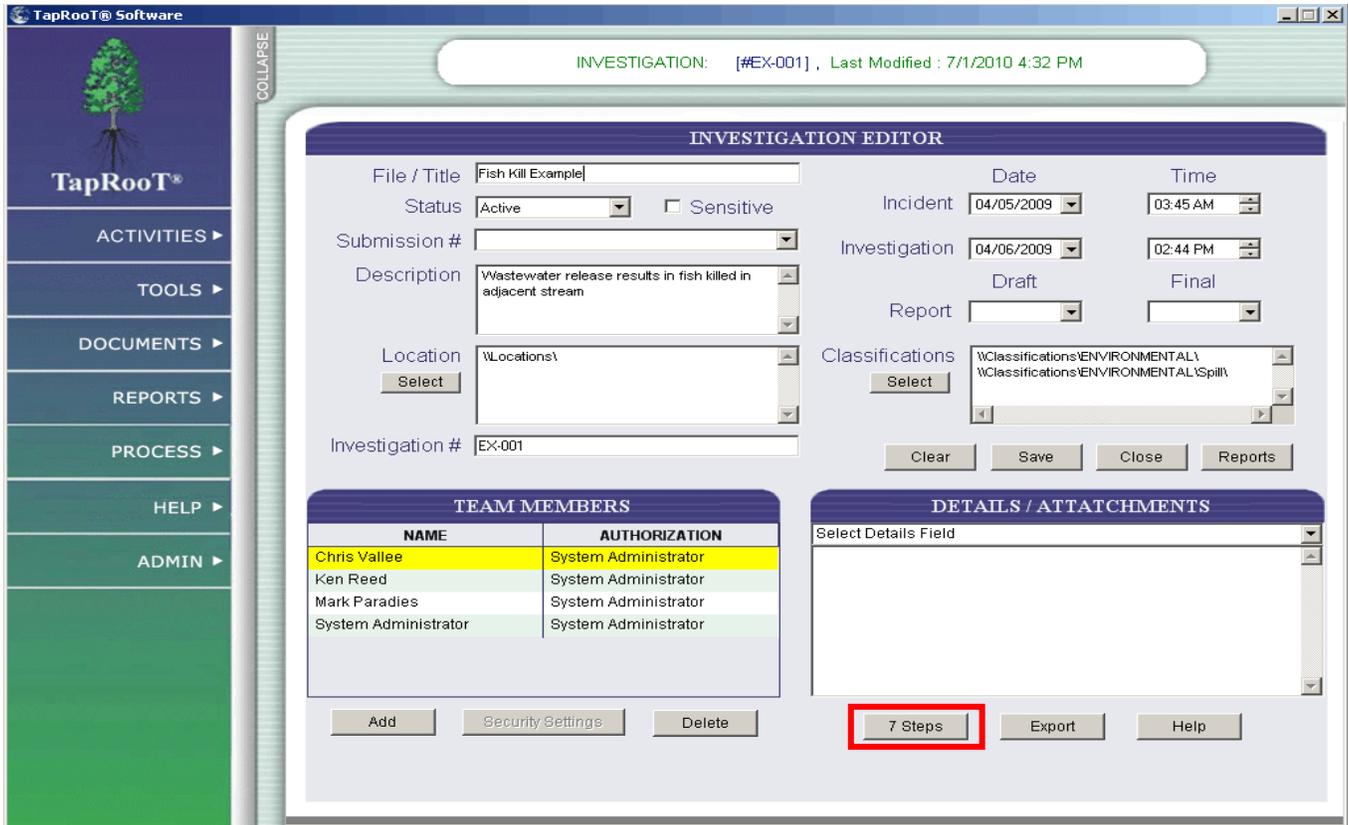
Investigation Number: EX-001
Investigation Title: Fish Kill Example

OPEN INVESTIGATION INFO SAVE CLOSE

Step Completed	Process Step	Techniques	Manage Documents
<input checked="" type="checkbox"/>	1 Plan Investigation - Get Started	Spring SnapCharT® Root Cause Tree® Equipactor®	OPEN OPEN OPEN
<input checked="" type="checkbox"/>	2 Determine Sequence of Events	Summer SnapCharT® Equipactor® CHAP Change Analysis	OPEN OPEN OPEN OPEN
<input checked="" type="checkbox"/>	3 Define Causal Factors	Autumn SnapCharT® Equipactor® Safeguards Analysis	OPEN OPEN OPEN
<input checked="" type="checkbox"/>	4 Analyze Each Causal Factor's Root Causes	Root Cause Tree®	OPEN
<input checked="" type="checkbox"/>	5 Analyze Each Root Cause's Generic Causes	Root Cause Tree® Corrective Action Helper®	OPEN OPEN
<input checked="" type="checkbox"/>	6 Develop & Evaluate Corrective Actions	Corrective Action Helper® SMARTER MATRIX Safeguards Analysis	OPEN OPEN OPEN
<input type="checkbox"/>	7 Present/Report & Implement Corrective Actions	Winter SnapCharT® Software Reports	OPEN OPEN

7-Step Process Flow

This diagram allows you to track where you are in the investigation process, giving you ready access to the tools available in each step. This is the normal method you will use to navigate through an investigation. To access the 7-Step Process Flow, click on the *7 Steps* button on the Investigation Editor screen:



7 Steps Button

Or, you can access the 7 Step Process flow right from your Landing Page. Once you have started an Investigation, just *Search* for your investigation, then click the *OPEN* folder next to the name:

Access from Landing Page

Once you have displayed the 7-Step Process Flow, you can then either open a new document (by clicking on the appropriate *New* button), or open a tool you have previously saved (by clicking on *Open*).

The check marks on the left are for your use. You can use them to help you track where you are in the investigation. You can put a check mark in the steps that are complete, then click the *Save* button at the top to preserve the checkmarks.

If you wish to see the Investigation Editor, just click on the *Open Investigation Info* button at the top.

This screen is a terrific way to guide your investigators through the TapRootT® process, as well as giving you a central location to start or view any TapRootT® tool.

SnapCharT® Basics

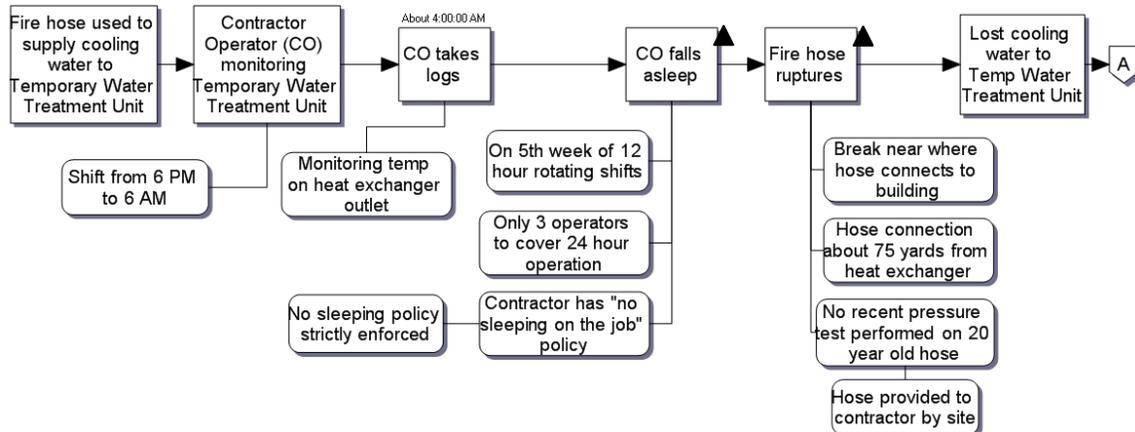
Now that we have learned how to document some of the basic details of your investigation, we need to learn more about one of our core techniques, the SnapCharT®.

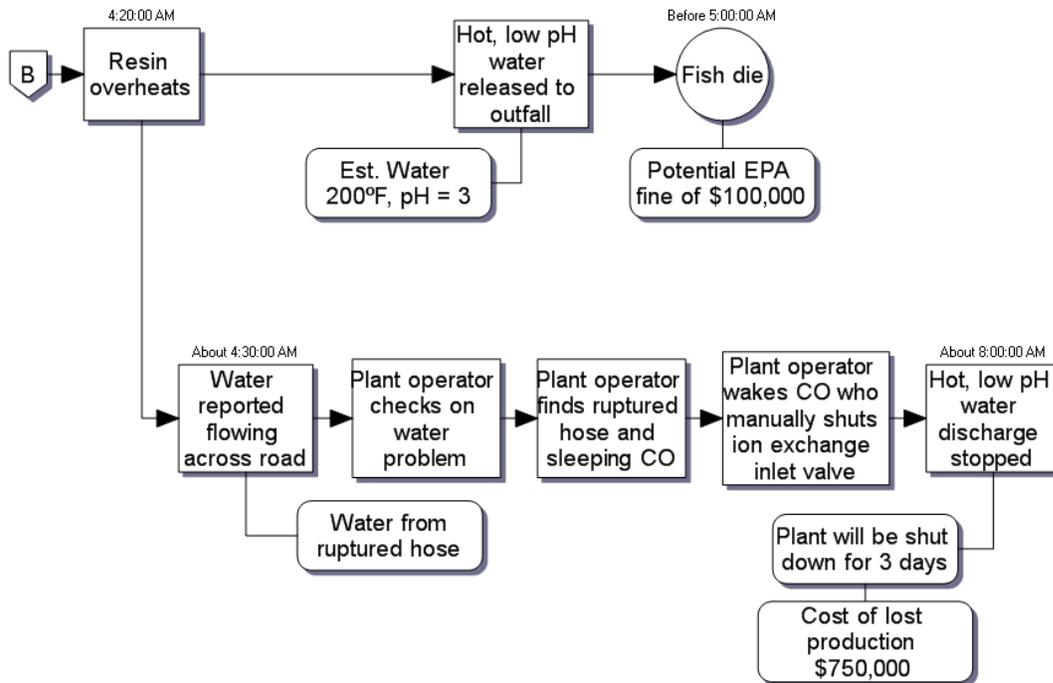
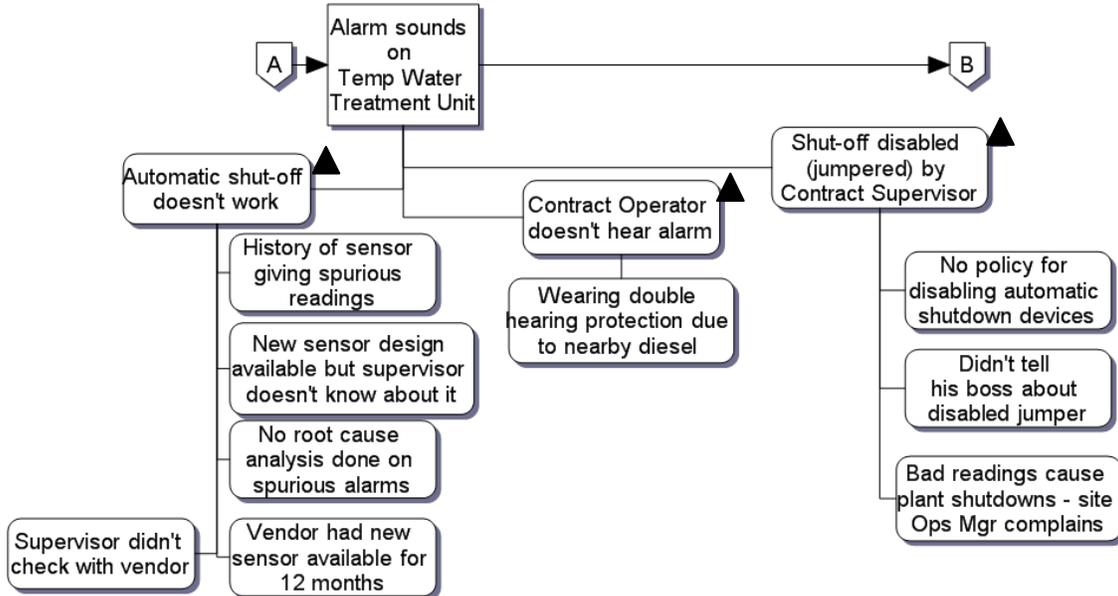
What is a SnapCharT®?

SnapCharT®s can be thought of as timelines that provide a chronological representation of the Incident being investigated. They are used primarily as a source of organization for data collected, as well as a tool for identifying causal factors that led to an Incident.

Building a SnapCharT® is accomplished by using 5 simple shapes: circle (Incident), rectangle (Event), oval (Condition), home plate (Connector) and the triangle (Causal Factor). These five shapes help us draw the picture of what occurred and present it in a “time-line” format.

Below you will find an example of a SnapCharT® that relates to this tutorial.





SnapCharT® For Fish Kill Investigation

The chart is read from left to right and top to bottom. This chart shows us the full range of shapes and gives you an idea of how a SnapCharT® looks when complete.

SnapCharT® Details

You can start your SnapCharT® from the 7-Step Process flow by clicking on *OPEN* next to the Spring SnapCharT®:

The screenshot shows the TapRoot Software web interface. The main content area is titled "INVESTIGATION PROCESS FLOW" and displays the following information:

- Investigation Number: EX-001
- Investigation Title: Fish Kill Example
- Buttons: OPEN INVESTIGATION INFO, SAVE, CLOSE

Step Completed	Process Step	Techniques	Manage Documents
<input checked="" type="checkbox"/>	1 Plan Investigation - Get Started	Spring SnapCharT® Root Cause Tree® Equipactor®	OPEN OPEN OPEN
<input checked="" type="checkbox"/>	2 Determine Sequence of Events	Summer SnapCharT® Equipactor® CHAP Change Analysis	OPEN OPEN OPEN OPEN
<input checked="" type="checkbox"/>	3 Define Causal Factors	Autumn SnapCharT® Equipactor® Safeguards Analysis	OPEN OPEN OPEN

This will bring up 2 windows: a blank SnapCharT® window, and an Overview window:

The screenshot shows the SnapCharT® software interface. The main window is titled "SnapCharT®" and contains the following elements:

- Chart Attributes:** (Sets Default Font and Page Size) with options for Default Font and Set Page Size.
- Create Chart:** A section with icons for creating different chart shapes. Below it, text reads: "Select desired shape above and double-click in chart to add shape".
- Shape Attributes:** (Only Available when Shape selected on Chart)
 - Text:** Includes font (Arial), color (Black), and size (14) dropdowns, along with bold, italic, and underline buttons.
 - Data:** Includes checkboxes for Causal Factor and Assumption, and a Shape Color dropdown.
 - Date/Time:** Includes dropdowns for Date (7/23/2010) and Time (1:44:46 PM).
- Overview Window:** A smaller window titled "Overview" is open in the bottom right corner, showing a blank chart area.
- Bottom Bar:** Contains buttons for Save, SaveAs, Close, Print, Export, Import, Undo, Redo, and Help.

SnapCharT® Tool

The SnapCharT® tool is a drawing program that is set up to aid the investigator in electronically drawing SnapCharT®s. To save your SnapCharT® to the database, use the “Save” or “Save As” buttons at the bottom.

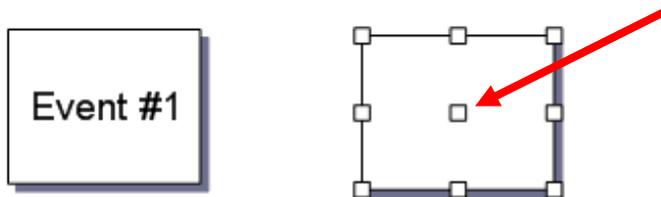
NOTE: The SnapCharT®s developed are not fully saved until the “Save” or “Save As” button is used.

Overview Window

The Overview window can be used as a rapid navigation tool for large, complex SnapCharT®s. You can drag the white square around and highlight the area of interest on the SnapCharT® in the window. The main SnapCharT® window will scroll to follow. Note that the Overview window is often hidden behind the main SnapCharT® window. You may need to look behind that window.

Drawing Shapes

To place a shape on the chart, select the shape you want from the “Create Chart” toolbar on the top left, and then double-click the area of the chart where you want it placed. To reposition the shape, click on it and drag it **by grabbing the center square “handle”** inside the shape:



To delete a shape, select it and press the delete key on your keyboard.

Incident

To insert an Incident, select the circle shape from the toolbar and double-click the location on the chart where you want to place the shape. The Incident is a brief statement of the reason you are doing the investigation.

Event

To insert an Event, select the box shape from the toolbar and double-click the location on the chart where you want to place the shape. Events are the actions that actually happened. Include only one action in each box, using the job function of the person (no names) and an action verb. Dates and times can be listed above the box. Arrange these events chronologically from left to right.

Condition

To insert a condition, select the oval shape from the toolbar and double-click the location on the chart where you want to place the shape. Conditions are information, including problems about the action/event. Use precise, factual, non-judgmental words and quantify when possible.

Entering Text Inside a Shape

To enter text inside a shape, first select the shape, and then click inside the large editing box at the top center of the screen. The text will center automatically. When entering text, the shape will grow automatically to fit the text.

In this “Shape Attributes” area, you can also determine your font, shape color, etc.

Entering Text Outside of a Shape

To enter text outside of the shapes, click on the  button on the toolbar. Then click on the screen where you want to enter the text. When the text cursor appears, enter your text. Press the button again to turn off text mode. If you would like to move entered text, select it and drag it using the center handle.

Connecting Shapes

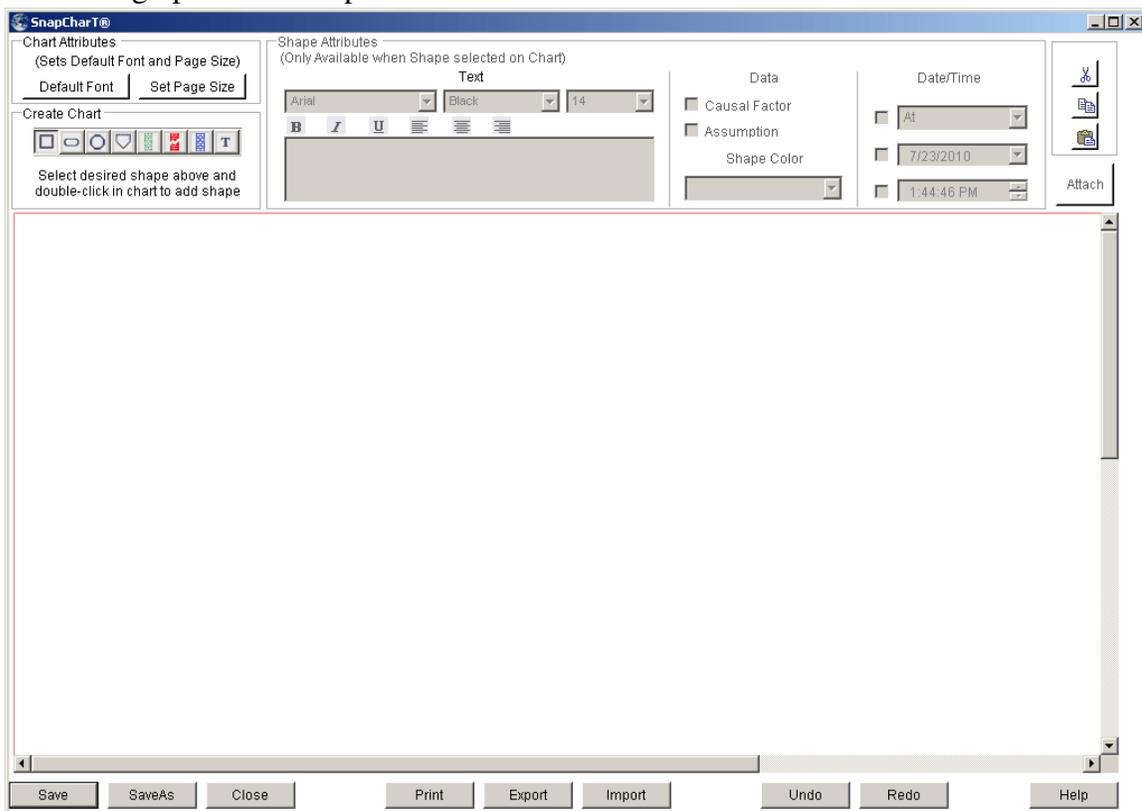
After aligning the shapes it is time to draw connecting lines between them. To connect two shapes, click and hold in the center of one shape and drag the line that appears to the center of the shape to connect to. The lines will center on the shapes automatically. Events are connected to each other by solid arrows. Conditions are connected to each other and to Events by solid lines. Incidents are connected to the Events by solid arrows.

Building your SnapCharT®

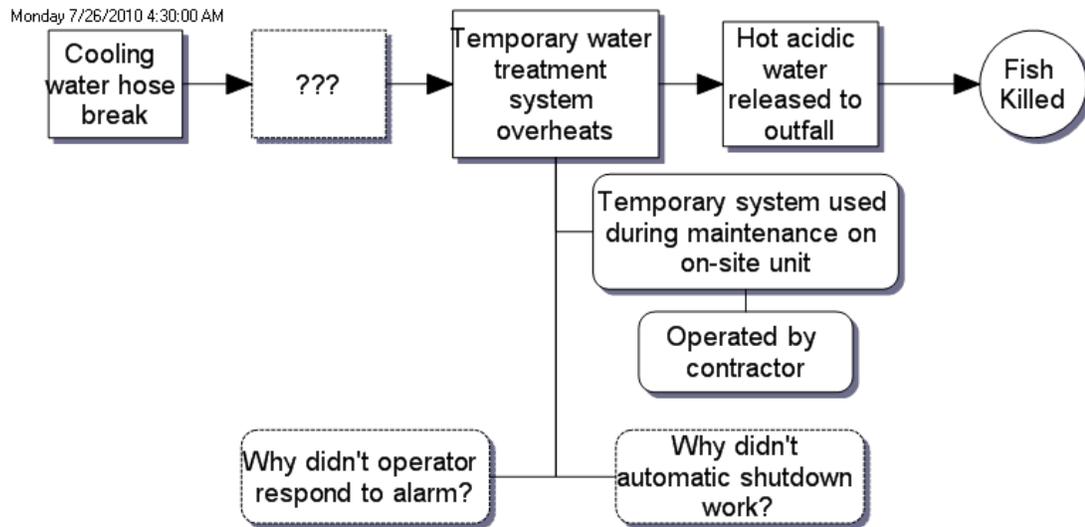
Now, let's build the SnapCharT® for our Fish Kill Investigation. If you haven't done so already, start a new Spring SnapCharT®. You can start your SnapCharT® from the 7-Step Process Flow by clicking on *OPEN* next to the Spring SnapCharT®, then clicking on the *New* button:



This will bring up a blank SnapCharT® window.



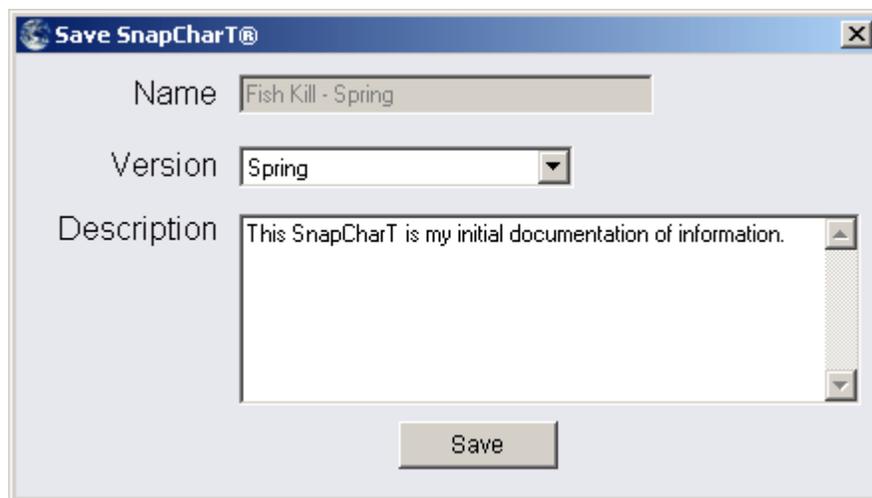
For the Spring SnapCharT®, we will start with only the basic information that we currently have, plus any questions we will want to answer about the Incident. Build the following SnapCharT® in your software:



Spring Fish Kill SnapCharT®

This is all the information we have right now, plus some questions we will have to answer with interviews, record reviews, etc.

To save this SnapCharT®, click the *Save* button. You will see the following window:



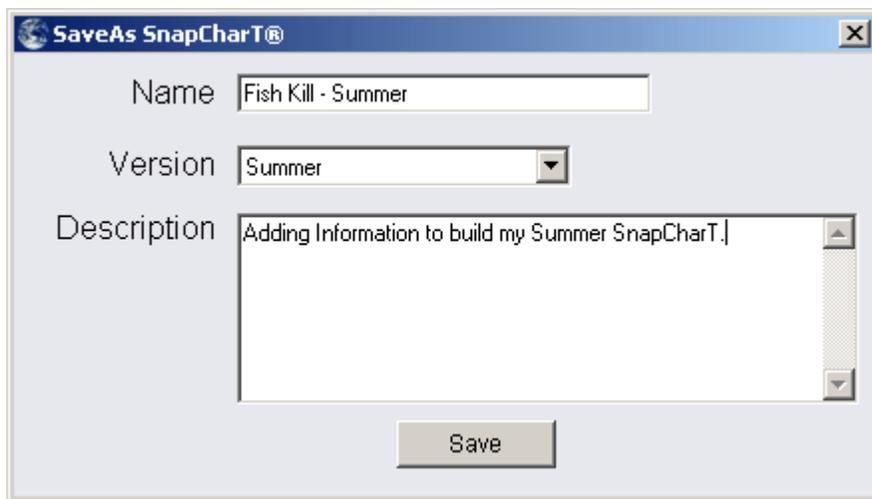
You must enter a unique name for your SnapCharT®. We recommend using the name of the Investigation + the season of the SnapCharT®, as shown above. The Description is

optional. Click *Save*, and your spring SnapCharT® is now saved. Click *Close* to exit the SnapCharT® software. This takes you back to the 7-Step Process Flow page.

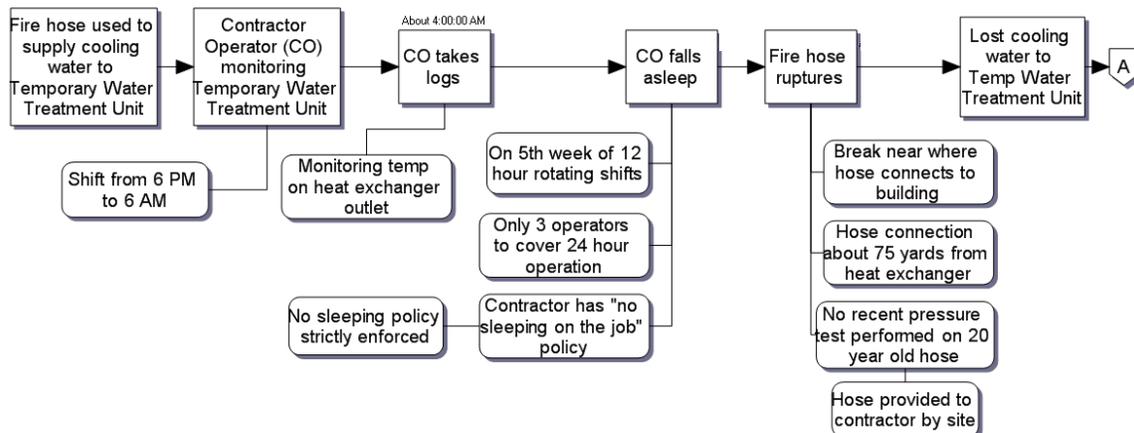
Summer SnapCharT®:

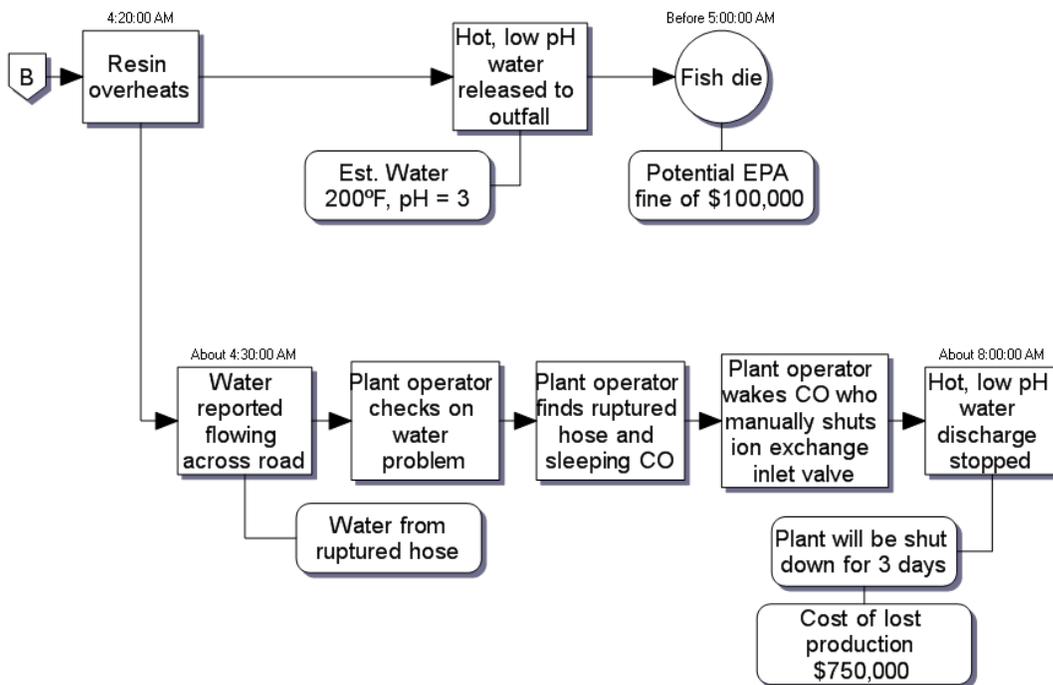
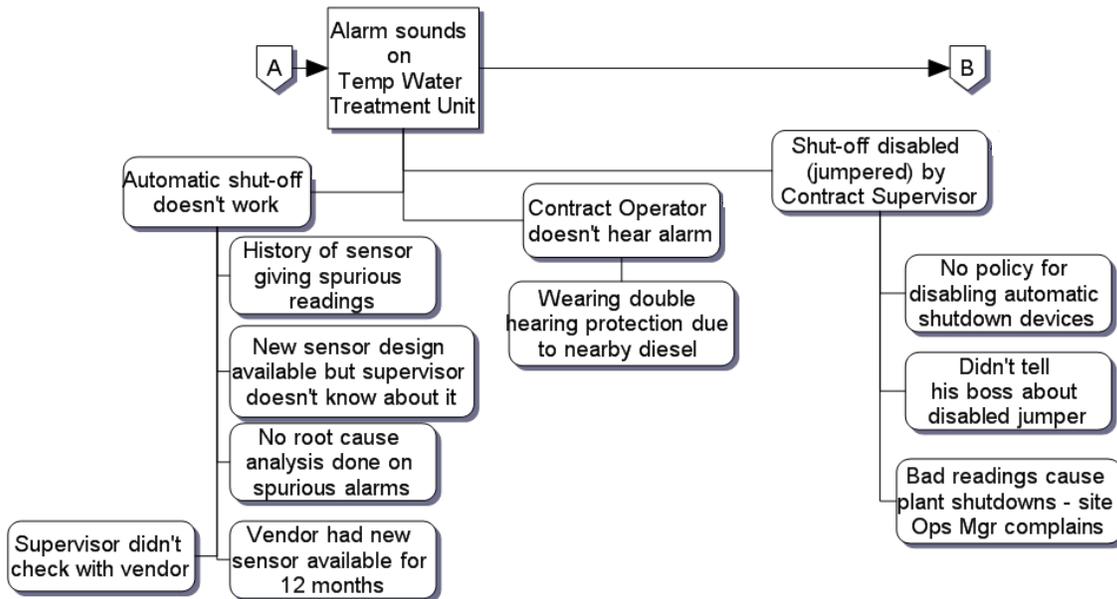
What is the next step? You are currently on the 7-Step Process Flow Page. We have completed Step 1 (Spring SnapCharT®), and we are now on Step 2 (Summer SnapCharT®).

Now here's a trick. You can now use your Spring SnapCharT® to continue building the Summer SnapCharT®! On the Process Flow Page, *Open* the **Spring SnapCharT®**. Once it opens, you can now immediately click the *Save As* button at the bottom of the SnapCharT® window to save a copy of your SnapCharT® as a Summer SnapCharT®.



Once you click *Save*, you now have a new SnapCharT® to start working from. Build and *Save* the following Summer SnapCharT®:



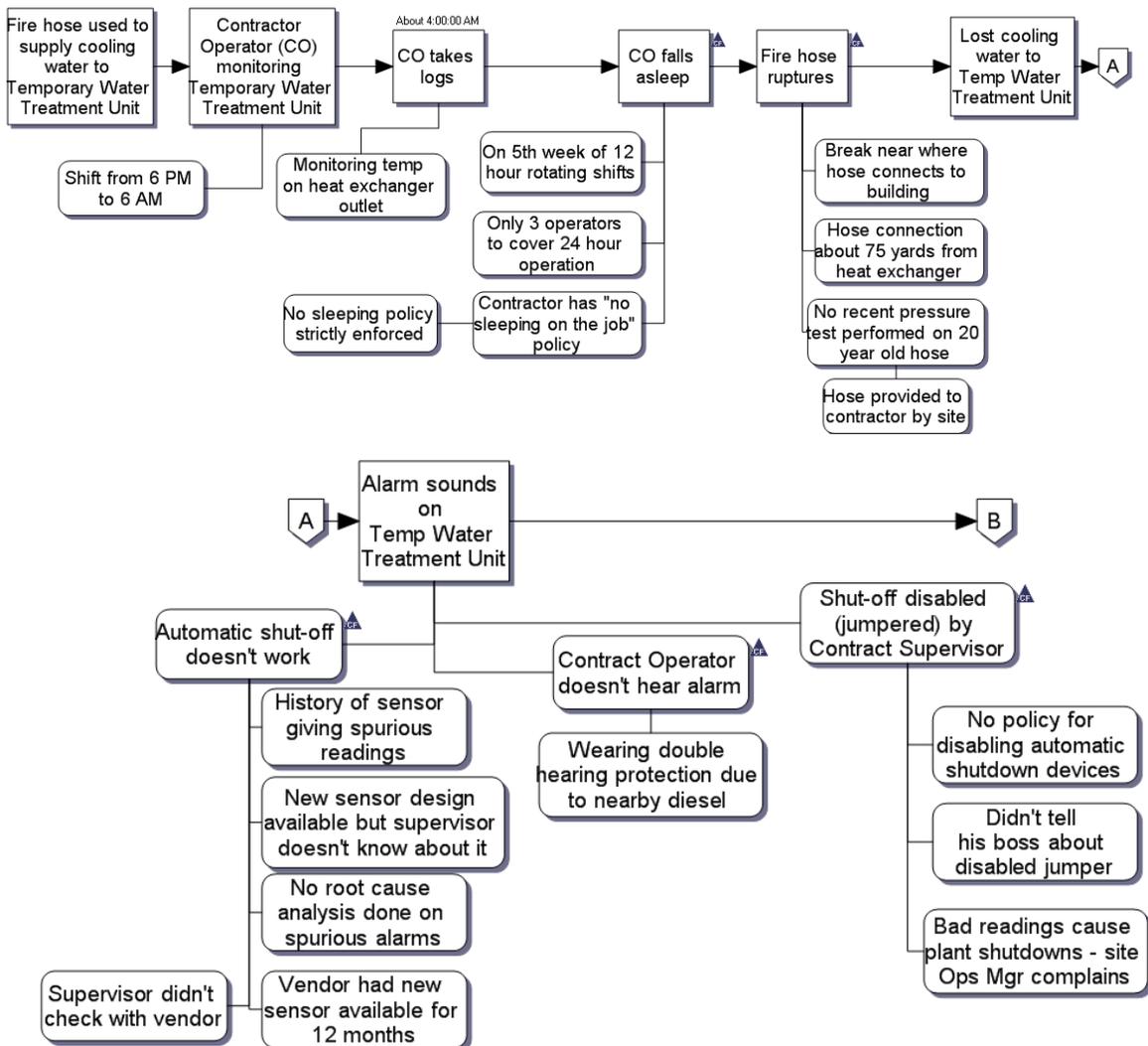


Causal Factors

Causal Factors are Conditions or Events that could have prevented the incident or lessened its severity and are designated by a dark triangle.

Step 3 of the 7-Step Process Flow is very similar to Step 2. In this case, you will now identify your Causal Factors. Open your Summer SnapCharT®, then *Save As* an Autumn SnapCharT®. To mark a Condition or Event as a Causal Factor, select the shape you are interested in, then check the “Causal Factor” checkbox at the top of the SnapCharT® window. A small triangle will appear above the indicated shape. **Note that the SnapCharT® with your Causal Factors must be identified as an Autumn SnapCharT®.**

For our example, we will identify 5 CF’s:



Save this SnapCharT®, and you now have 3 SnapCharT®s (Spring, Summer, Autumn), one with Causal Factors identified.

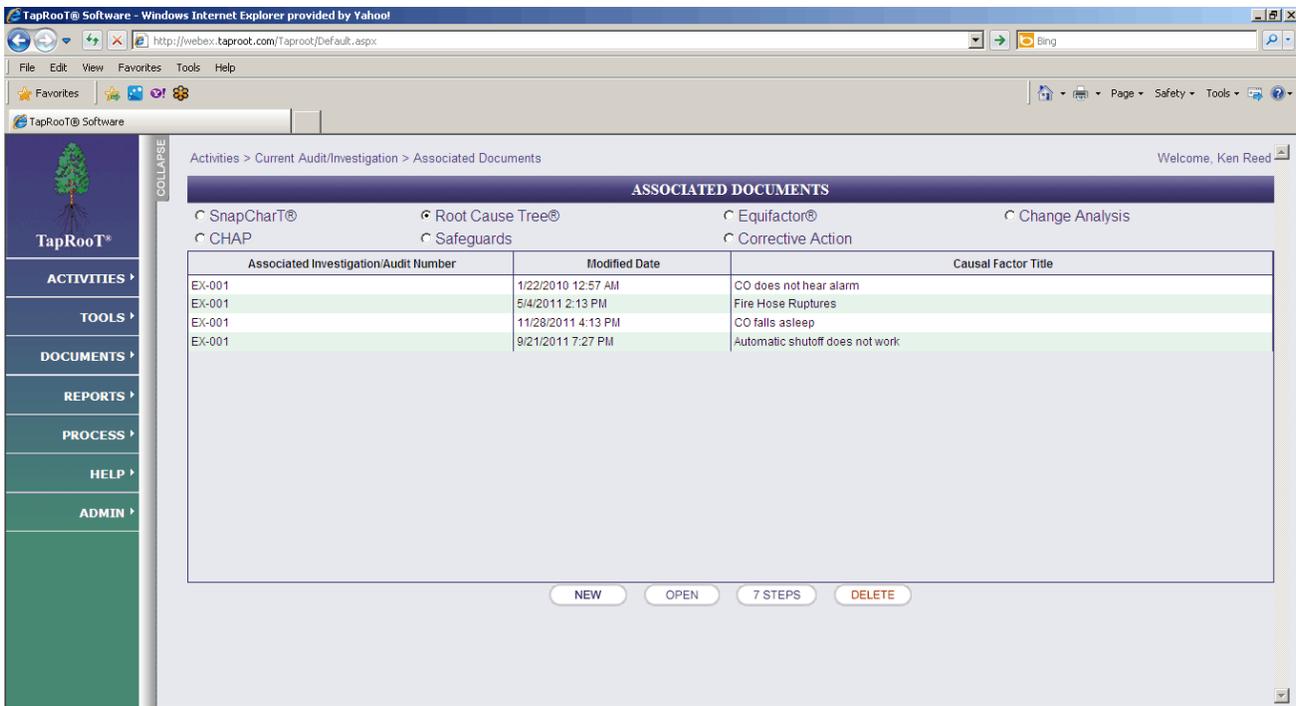
Note that, as soon as you save the Autumn SnapCharT® with the Causal Factors, the TapRoot® Software automatically generates blank Root Cause Tree®s for each Causal Factor. In this example, there are 5 RCT's ready to go.

One last note: The software automatically generates blank Root Cause Tree®s from your Causal Factors **only from Autumn SnapCharT®s**. This prevents generating multiple Root Cause Trees if you have Causal Factors identified on multiple SnapCharT®s. For example, if you have Causal Factors identified on both your Autumn SnapCharT® *and* your Winter SnapCharT® (for management presentations), we do NOT want the software to generate blank Root Cause Tree®s from both SnapCharT®s. Therefore, the software will only generate blank Root Cause Tree®s from Autumn SnapCharT®s. **You must identify your Causal Factor SnapCharT® as an Autumn SnapCharT®.**

Root Cause Tree®

Now that we have taken you through the process of drawing SnapCharT®s and identifying Causal Factors, our next step will be to utilize the Root Cause Tree® to find the Root Causes.

TapRoot® performs a root cause analysis on each of the Causal Factors in order to find the Root Causes of the Incident. So for each of the Causal Factors we identified during the development of the Autumn SnapCharT®, we need to do a separate root cause analysis using the Root Cause Tree®. In Step 3 of the process, we saved the Autumn SnapCharT® with the Causal Factors identified. The software automatically generated blank Root Cause Trees for each of these Causal Factors:



To perform the root cause analysis, go to Step 4 on the 7-Step Process Flow Page. Remember, the software has already generated blank Root Cause Tree®, so we will *Open* these Tree®s:

INVESTIGATION PROCESS FLOW

Investigation Number: EX-001
Investigation Title: Fish Kill Example

OPEN INVESTIGATION INFO SAVE CLOSE

Step Completed	Process Step	Techniques	Manage Documents
<input checked="" type="checkbox"/>	1 Plan Investigation - Get Started	Spring SnapCharT® Root Cause Tree® Equipactor®	OPEN OPEN OPEN
<input checked="" type="checkbox"/>	2 Determine Sequence of Events	Summer SnapCharT® Equipactor® CHAP Change Analysis	OPEN OPEN OPEN OPEN
<input checked="" type="checkbox"/>	3 Define Causal Factors	Autumn SnapCharT® Equipactor® Safeguards Analysis	OPEN OPEN OPEN
<input checked="" type="checkbox"/>	4 Analyze Each Causal Factor's Root Causes	Root Cause Tree®	OPEN
<input checked="" type="checkbox"/>	5 Analyze Each Root Cause's Generic Causes	Root Cause Tree® Corrective Action Helper®	OPEN OPEN
<input checked="" type="checkbox"/>	6 Develop & Evaluate Corrective Actions	Corrective Action Helper® SMARTER MATRIX Safeguards Analysis	OPEN OPEN OPEN
<input type="checkbox"/>	7 Present/Report & Implement Corrective Actions	Winter SnapCharT® Software Reports	OPEN OPEN

Select the Root Cause Tree® you want to work on, click *Open*, then select the *Root Cause Tree®* button:

Activities > Current Audit/Investigation > Associated Documents

Welcome, Ken Reed

ASSOCIATED DOCUMENTS

SnapCharT® Root Cause Tree® Equipactor® Change Analysis
 CHAP Safeguards Corrective Action

Associated Investigation/Audit Number	Modified Date	Causal Factor Title
EX-001	1/22/2010 12:57 AM	CO does not hear alarm
EX-001	5/4/2011 2:13 PM	Fire Hose Ruptures
EX-001	11/28/2011 4:13 PM	CO falls asleep
EX-001	9/21/2011 7:27 PM	Automatic shutoff does not work

NEW **OPEN** 7 STEPS DELETE

TapRoot® Software

EXPAND

INVESTIGATION [#EX-001], Root Cause Tree®, Last Modified : 5/20/2010 2:24 PM

CAUSAL FACTOR EDITOR

Causal Factor Information

Title	<input type="text" value="CO falls asleep"/>	Root Cause Tree	<input type="text"/>
Comments	<input type="text"/>	Analysis Status	<input type="text"/>

RELATED DEPARTMENTS

- Departments
 - HR
 - Maintenance
 - Operations

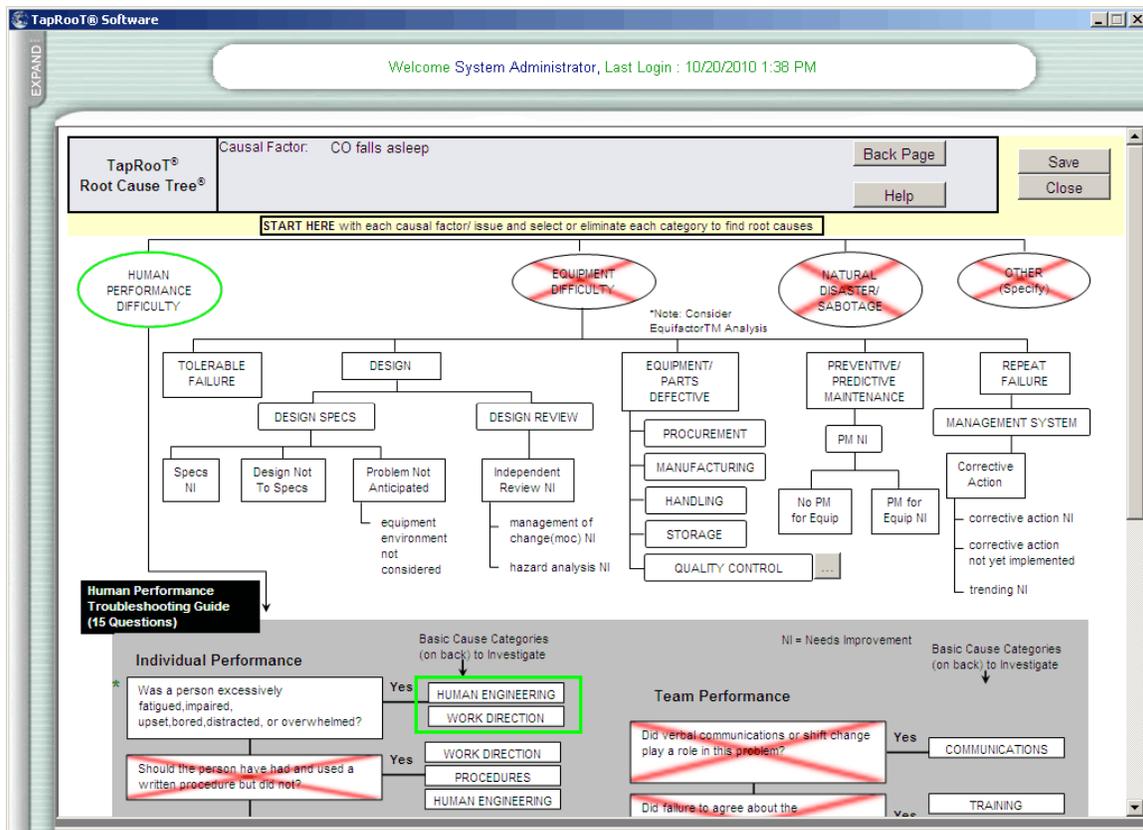
RELATED EQUIPMENTS

- Equipment

Save Close Help **Root Cause Tree®** Analysis Summary

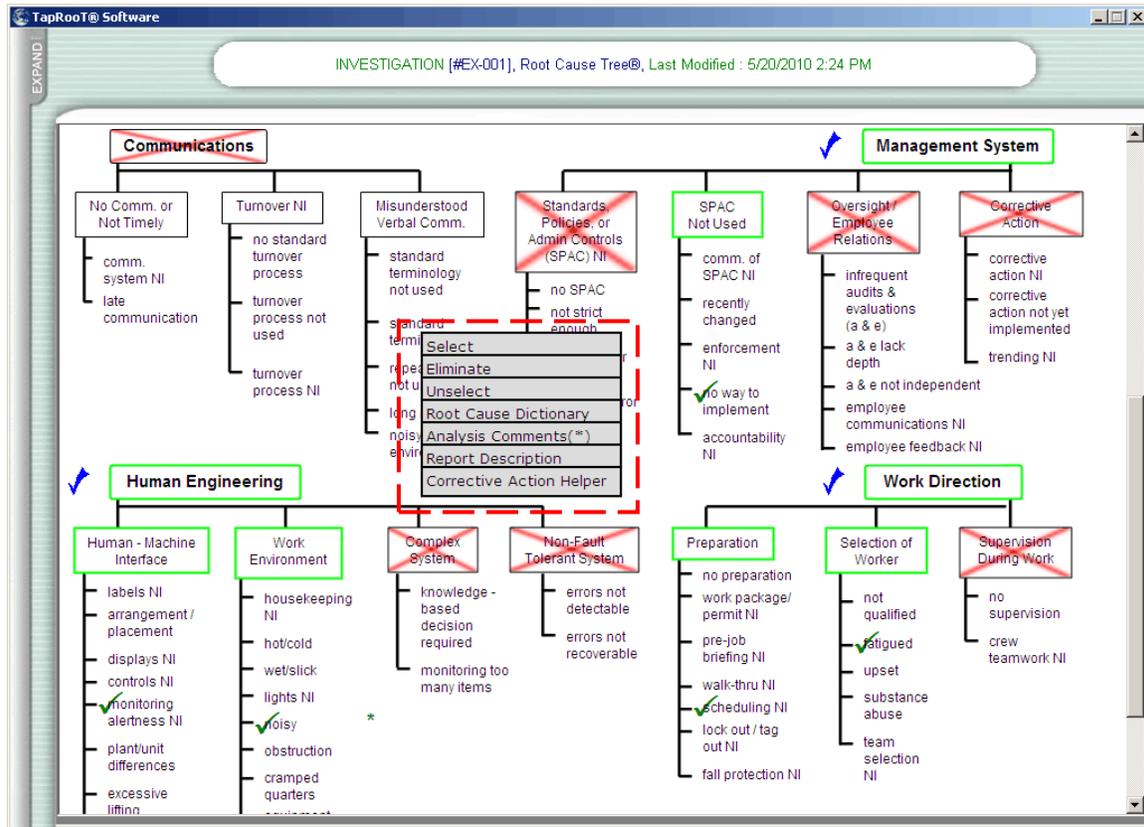
Root Cause Tree®

This is the primary tool for performing root cause analysis in the TapRoot® system. This technique is a top to bottom flow, using a process of selection and elimination to determine the Root Causes for a causal factor (listed at the top of the tree). To work through the Root Cause Tree®, simply left-click on an item to select it, click again to eliminate it, and click a third time to clear the item.



Root Cause Dictionary:

You can right-click on each item on the Root Cause Tree® to bring up a menu. This right-click menu provides (among other things) access to the Root Cause Dictionary. This supplies all of the definitions for each of the different areas on the Root Cause Tree®. By selecting the Root Cause Dictionary from this menu, the definition of the associated location on the Root Cause Tree® will appear. These definitions should be used as the basis for any decision made while analyzing a Causal Factor through the Root Cause Tree®.



Right Click Menu

Right-click Menu

Other right-click functions on the Root Cause Tree® include:

Analysis Comments is a field that allows you to document the thought process used to select or eliminate a part of the tree

Report Description is a field that allows you to describe the particular level of the Root Cause Tree® in terms understandable to your audience when documenting the analysis. This report description replaces the root cause path (Human Performance Difficulty \ Procedures \ Wrong \ Typo for example) on the documentation if you choose to use them.

Corrective Action Helper® opens a help section that will give you guidance with ideas to fix every root cause listed on the tree. This section is described in more detail later in this tutorial.

For this example, I would like you to select and eliminate the 5 Root Causes in the above picture for the first Causal Factor only. For a real analysis you would analyze all Causal Factors. For the purposes of this tutorial we are only going to look at one.

Once you have selected and eliminated the proper items, select the *Front Page* button, select *Save*, and then select the *Close* button to enter this analysis into the database. We will now proceed to Corrective Actions.

Corrective Actions

Before writing your Corrective Actions, we want to introduce you to several tools that are provided to help you write more effective Corrective Actions.

SMARTER

When entering a Corrective Action (CA), you should follow a simple but effective technique to make sure that the action being developed will solve the root causes found. This technique is called SMARTER. This is a seven step review for any CA. Each of these seven attributes should be included when writing your CA. The seven steps include:

Specific (detail):

Corrective Action Description

Measurable (measurable CA plus measurable schedules):

Verification section of the Corrective Action Details

Accountable (Person, finding the proper accountable person)

Implementation Responsible Person / Department

Reasonable (Does the CA match the outcome and Root Cause)

Can be included on the Description of the Corrective Action Details

Timely (Schedules)

Due dates

Effective (Effectiveness Review)

Validation section of the Corrective Action Details

Reviewed (for unintended consequences)

Can be included on the Description of the Corrective Action Details

By measuring your CA by these seven criteria, you will build more effective Corrective Actions and thus reduce the likelihood of recurrence and the risk and/or severity of any re-occurrence.

Corrective Action Helper®

Another CA technique that is built into the TapRoot® System Software is called Corrective Action Helper®. This help is provided for each level of the Root Cause Tree® that could be selected as a possible Root Cause for a Causal Factor. This can be accessed while actually developing your Corrective Actions in the software. Now we will

continue with the Fish Kill Example, developing a CA. First, go back to the 7-Step Process Flow, and *OPEN* a new Corrective Action:

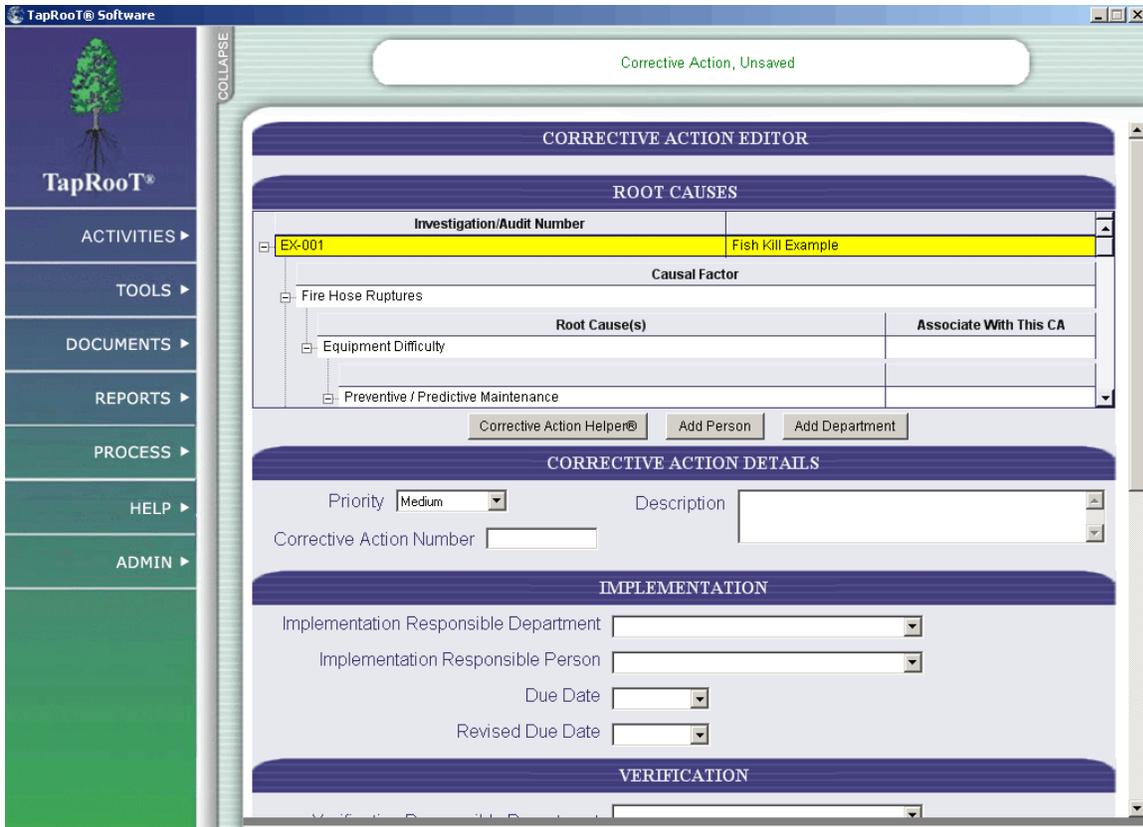
Investigation Number: EX-001
Investigation Title: Fish Kill Example

OPEN INVESTIGATION INFO SAVE CLOSE

Step Completed	Process Step	Techniques	Manage Documents
<input checked="" type="checkbox"/>	1 Plan Investigation - Get Started	Spring SnapCharT® Root Cause Tree® Equipactor®	OPEN OPEN OPEN
<input checked="" type="checkbox"/>	2 Determine Sequence of Events	Summer SnapCharT® Equipactor® CHAP Change Analysis	OPEN OPEN OPEN OPEN
<input checked="" type="checkbox"/>	3 Define Causal Factors	Autumn SnapCharT® Equipactor® Safeguards Analysis	OPEN OPEN OPEN
<input checked="" type="checkbox"/>	4 Analyze Each Causal Factor's Root Causes	Root Cause Tree®	OPEN
<input checked="" type="checkbox"/>	5 Analyze Each Root Cause's Generic Causes	Root Cause Tree® Corrective Action Helper®	OPEN OPEN
<input checked="" type="checkbox"/>	6 Develop & Evaluate Corrective Actions	Corrective Action Helper® SMARTER MATRIX Safeguards Analysis	OPEN OPEN OPEN
<input type="checkbox"/>	7 Present/Report & Implement Corrective Actions	Winter SnapCharT® Software Reports	OPEN OPEN

7-Step Process Flow

This will take us to the Corrective Action Editor, where we will work on writing our Corrective Actions:



Corrective Action Editor

This window is divided into 2 areas.

The top window (Root Causes) lists all the Root Causes that were identified on all of our Root Cause Tree®s, grouped by Causal Factor. Additionally, there are 2 buttons to *Add Person* and *Add Departments* to add people and departments to the drop-down lists found in the Implementation, Verification, and Validation sections below.

The main window (with the right-hand scroll bar) will allow you to scroll down to the Corrective Action Details, where we will start writing our Corrective Actions. This window is divided into four sections:

Corrective Action Details section

- a. Corrective Action number
- b. Priority (Reserved for future use)
- c. Details: Actual corrective action description

Implementation, Verification, and Validation sections:

- a. Responsible Department drop-down.
- b. Responsible Person drop-down.
- c. Due Date and Due Date Offset. The due date is the date that the CA is required to be completed. The Due Date Offset automatically sets the due date to be the number of days after the last section of the CA is completed.

By filling out each section on the editor, you will ensure that you have a complete, verified CA that will be measured for long-term for effectiveness (validation).

To fill in a Corrective Action:

1. Select which root causes are associated with that particular CA. This is done in the Root Causes section by placing a check mark next to the Root Cause. Note that you are allowed to select multiple Root Causes to be addressed with a single CA
2. Give the CA a number.
3. Write the CA in the Description field. Use the Corrective Action Helper® to give you some ideas and guidance for writing your Corrective Action. To use the Corrective Action Helper®, select the Root Cause you are trying to fix (it turns yellow), then click the *Corrective Action Helper*® button. This will bring up the Corrective Action Helper® Dialog. This dialog will provide you with ideas on ways to fix a particular root cause, along with different reference documents that could help the investigator through further research.
4. In the **Implementation** section, fill out who is accountable for completing the CA, that person's department, and the due date for completing the CA.
5. In the **Verification** section, fill out who will check to verify that the CA has been completed. Describe how it is to be verified, who will do the verification, and the due date for this verification.
6. In the **Validation** section, discuss how you will check to make sure the CA actually fixed the problem. This will check the effectiveness of your CA. This is often completed by conducting an audit to see if the mistake has reoccurs.
7. Once all of these sections have been filled in, click the *Save* button at the bottom of the page. **The Corrective Action is not saved until this button is clicked.**
8. Click the *Close* button to exit the editor and start a new Corrective Action from the 7-Step Process Flow.

For the Fish Kill example, fill in the information shown on the following figures. Don't forget to click *Save*, then *Close* to save your Corrective Action. You can then start a new Corrective Action from the 7-Step Process Flow.

TapRooT® Software

Corrective Action, Unsaved

CORRECTIVE ACTION EDITOR

ROOT CAUSES

Scheduling NI	<input checked="" type="checkbox"/>
Selection of Worker	
Fatigued	<input checked="" type="checkbox"/>

Causal Factor

- CO does not hear alarm

Corrective Action Helper® Add Person Add Department

CORRECTIVE ACTION DETAILS

Priority: Description:

Corrective Action Number:

IMPLEMENTATION

Implementation Responsible Department:

Implementation Responsible Person:

Due Date:

Revised Due Date:

VERIFICATION

Verification Responsible Department:

TapRooT® Software

Corrective Action, Unsaved

Revised Due Date:

VERIFICATION

Verification Responsible Department:

Verification Responsible Person:

Due Date Due Date Offset

Revised Due Date:

Verification Plan:

* Number of calendar days following completion that due date is set.

VALIDATION

Verification Responsible Department:

Verification Responsible Person:

Due Date Due Date Offset

Due Date:

Revised Due Date:

Validation Strategy:

* Number of calendar days following completion that due date is set.

Save Close Help

Access to Existing Corrective Actions

To edit an existing CA or to simply see a summary of the Corrective Actions already developed, return to the 7-Step Process page. In Step 6, click on the *OPEN* button, and then select the CA you wish to edit or view.

Updating Status of Corrective Actions

As you complete the various portions of your Corrective Actions, you will want to update them. You can do this from your software Landing Page, under **My Responsible Items**:

MY RESPONSIBLE ITEMS					
Corrective Actions					
Investigation #	Investigation Title	CA Number	Corrective Actions	Priority	Due Date
0001	Wrong Drug Administer	002	Update Operations Instruction STK-003A, discussi	Medium	07/05/2010
0001	Wrong Drug Administer	001	Place labels on storeroom shelves indicating drug	Medium	07/09/2010
EX-002	Failed pump capacity ch	001	Update overhaul procedure to include a new step,	Medium	07/30/2010
		1	Generate work order to fix light 23A-4.	Medium	08/06/2010
EX-001	Fish Kill Example	001	Update company policy VM-0023 to include time on	Medium	11/22/2010
		1	Update pre-job brief policy to include the following	Medium	11/24/2010

Highlight the Corrective Action you wish to update the status, and click on the *Status* button. This will allow you to type in a general status message, or allow you to sign off that portion of the Corrective Action as complete.

Welcome System Administrator, Last Login : 11/22/2010 11:34 AM

CORRECTIVE ACTION STATUS

IMPLEMENTATION

Responsible Department: Due Date:

Responsible Person: Completion Date:

Corrective Action Details:

Implementation Status:

VERIFICATION

Responsible Department: Due Date:

Responsible Person: Completion Date:

Verification Plan:

Verification Status:

Reports

There are 2 options for generating reports from within the TapRooT® Software:

Individual Investigation Reports

These reports are unique to each Investigation. The reports allow you to print and export the results of each investigation. To access the reports, go to the 7-Step Process, and click on the *New Software Report* button in Step 7.

Global Reports

These reports give an overview of all the Investigations or Audits that are in your database. Items such as Corrective Action and Root Cause Distribution reports are available. You can access these reports from the left menu *Reports* item.

Tutorial Summary

You are now prepared to work through the TapRoot® System Software and investigate problems and issues for Root Causes. This software is designed to be used as a tool in the hands of trained TapRoot® investigators. This tutorial is not meant to be used by untrained people with the expectation that they will now understand the TapRoot® investigation process. Rather, it is designed to help those that are already trained in the TapRoot® techniques get the most out of the software tools.

This tutorial covered an industrial accident and subsequent Investigation. Be aware that the tool can also be used in a proactive manner by helping you perform audits of processes before an Incident occurs. The Audit database utilizes the same principles and techniques to approach an Audit or observation. The only difference would be the reason for the Audit. All of the other TapRoot® techniques still apply.

There are several other TapRoot® techniques included in the software. These include:

1. **Equifactor®:** This technique is used to evaluate an equipment problem. It helps the user get to the physical cause of a failure, allowing the user to then use the rest of the TapRoot® tools to understand the real root cause of the failure.
2. **Safeguards Analysis:** This technique is used to analyze the strengths and weaknesses of a system. You can make a Safeguards list containing Hazards, Targets, and Safeguards that apply to a particular investigation, and then identify in your SnapCharT® (using the Safeguards walls) the location of those Safeguards, along with the location of new Safeguards that will be added as part of CA development.
3. **Change Analysis:** Change Analysis is used to investigate any change that occurred in the systems that apply to the incident or problem. This utilizes a series of questions to evaluate if there was a change and if so, what was the impact.
4. **Critical Human Action Profile (CHAP):** This technique is used to conduct a detailed task analysis that is then used to identify and evaluate critical human actions that occurred during an incident.

Please review the topics listed above to get the most out of the TapRoot® System Software. They are covered in great detail in the *TapRoot® Book*. All of these techniques can be accessed in the software from the 7-Step Investigation Process page.