



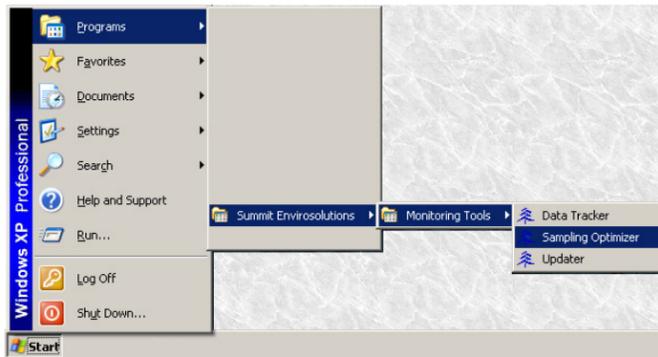
SampleOptimizer™ & SampleTracker™ Quick Start Guide
© 2009 Summit Envirosolutions, Inc.

Welcome to **SampleOptimizer™** and **SampleTracker™**! Here is a short introduction to the main functionality of the software.

Running the Installer

Simply double-click on the installer file, **MonitoringToolsSetup.msi** after downloading it. Non-governmental users will need a license file in order to use the software.

Running SampleOptimizer™

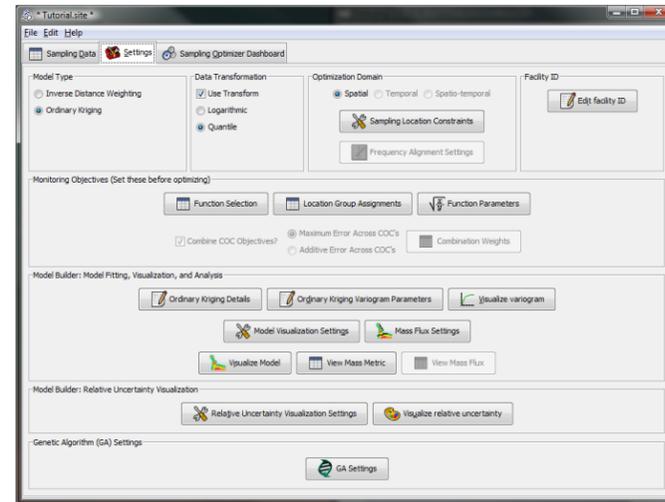


First, run **SampleOptimizer™** (see above). When the software opens, click **Load Data** and choose **Current.csv** in **c:\Program Files\Summit Envirosolutions\SampleOptimizer & SampleTracker\Tutorial**. This file is based on a spatial analysis of a real-world site. (Later, when importing your own data, make sure it conforms to this format.) Now, your screen should look like this:

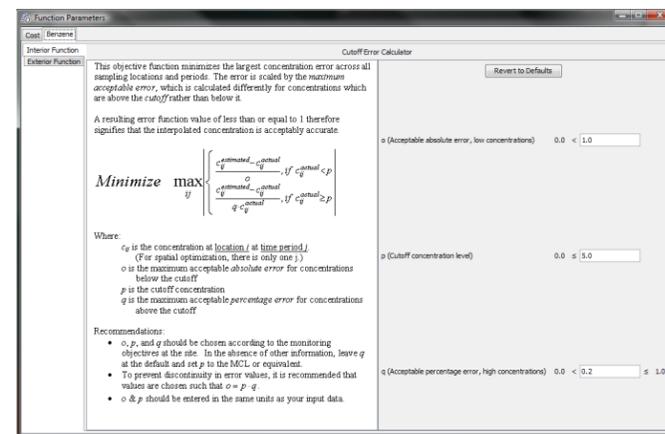
| Date | SiteID | EastCoordinate | NorthCoordinate | Benzene |
|------|-------------|----------------|-----------------|--------------------|
| 1 | Dec 4, 2006 | MW-001 | 4102238.938 | 86960.84475 1.0E-5 |
| 2 | Dec 4, 2006 | MW-002 | 4102287.557 | 86997.08925 1.0E-5 |
| 3 | Dec 4, 2006 | MW-003 | 4102259.398 | 87035.90974 1.0E-5 |
| 4 | Dec 4, 2006 | MW-004 | 4102261.073 | 87022.23322 1.0E-5 |
| 5 | Dec 4, 2006 | MW-007 | 4102303.014 | 86784.00202 1.0E-5 |
| 6 | Dec 4, 2006 | MW-008 | 4102304.946 | 86923.65733 1.0E-5 |
| 7 | Dec 4, 2006 | MW-020 | 4102315.75 | 87017.80663 1.0E-5 |
| 8 | Dec 4, 2006 | MW-011 | 4102322.899 | 86839.17967 1.0E-5 |
| 9 | Dec 4, 2006 | MW-012 | 4102325.884 | 87036.3933 1.0E-5 |
| 10 | Dec 4, 2006 | MW-013 | 4102328.976 | 87191.86734 1.0E-5 |
| 11 | Dec 4, 2006 | MW-016 | 4102349.809 | 86685.27115 1.0E-5 |
| 12 | Dec 4, 2006 | MW-017 | 4102350.787 | 86683.28787 1.0E-5 |
| 13 | Dec 4, 2006 | MW-018 | 4102353.914 | 86641.03048 1.0E-5 |
| 14 | Dec 4, 2006 | MW-020 | 4102392.5 | 86932.34936 1.0E-5 |
| 15 | Dec 4, 2006 | MW-021 | 4102393.489 | 87114.0384 11.5 |
| 16 | Dec 4, 2006 | MW-024 | 4102406.5 | 87056.0313 989.0 |
| 17 | Dec 4, 2006 | MW-027 | 4102428.75 | 86992.0 2.2 |
| 18 | Dec 4, 2006 | MW-028 | 4102428.85 | 86668.64373 1.0E-5 |
| 19 | Dec 4, 2006 | MW-031 | 4102435.991 | 87018.62239 751.0 |
| 20 | Dec 4, 2006 | MW-032 | 4102437.75 | 86972.7266 1.0E-5 |
| 21 | Dec 4, 2006 | MW-033 | 4102440.882 | 87101.3247 3038.0 |
| 22 | Dec 4, 2006 | MW-034 | 4102442.5 | 86987.5 318.0 |
| 23 | Dec 4, 2006 | MW-040 | 4102464.5 | 86979.8125 253.0 |
| 24 | Dec 4, 2006 | MW-041 | 4102465.5 | 86966.5 92.0 |
| 25 | Dec 4, 2006 | MW-042 | 4102466.0 | 87022.1406 1594.0 |
| 26 | Dec 4, 2006 | MW-049 | 4102483.0 | 86961.1641 1.0E-5 |

The **Sampling Data** tab is useful for verifying the contents of your site data and viewing some summary information.

For more details on how to prepare your own dataset, please see the Reference Manual (accessible from the Help menu). Next, go to the **Settings** tab.



The first thing you need to do is to give the GA a target for the interpolation accuracy you want at your site. Click the **Function Parameters** button and then the Benzene tab to bring up this screen:

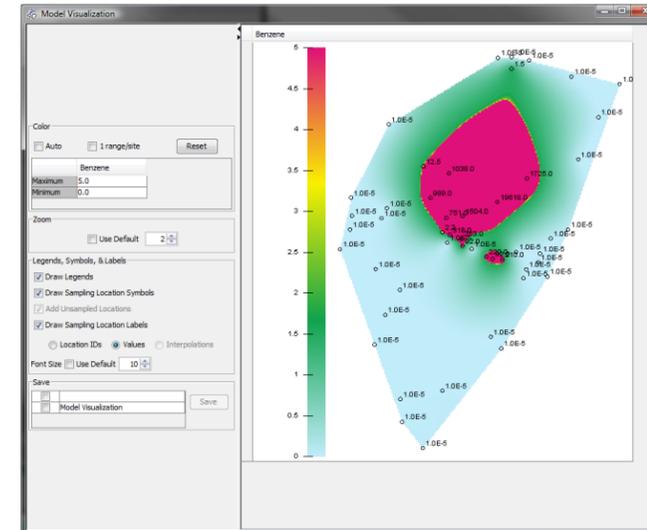


A good guideline for impacted groundwater is to use the USEPA MCL for the COC at your site as **p** (Cutoff concentration level). In this example the COC is Benzene, which has an MCL of 5 µg/L -- **set p to 5**. 20 % tends to be a good accuracy level to use, so **leave q at 0.2**. Also, **o** should be equal to **p * q -- set o to 1.0**. After you are done, close the window and click Yes to save the changes.

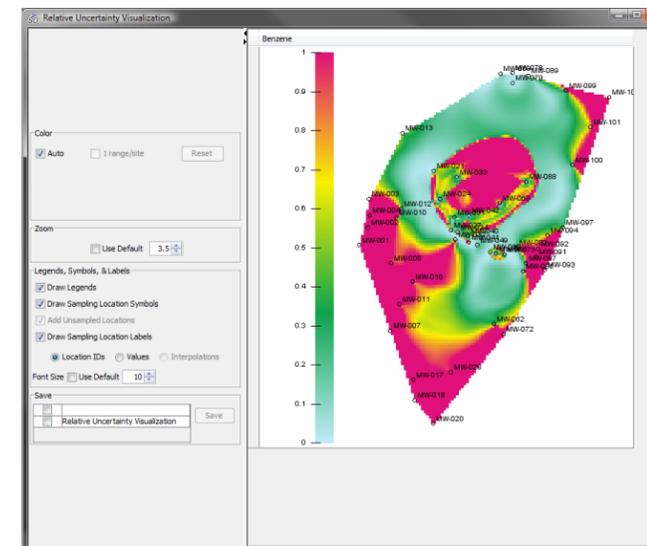
If you have an estimate of the aggregate cost per sample, you should put that value in the Cost tab. Note that this value does not affect the optimization, but is useful when comparing potential sampling plans with each other.

Next, preview the interpolation model for the site by clicking **Visualize Model**. The computation may take up to a few minutes, and then you should see the following screen. Try changing the various settings in the left to see their effects.

When optimizing your own site, make sure that the interpolation model is a reasonable representation your data before running the Optimizer.

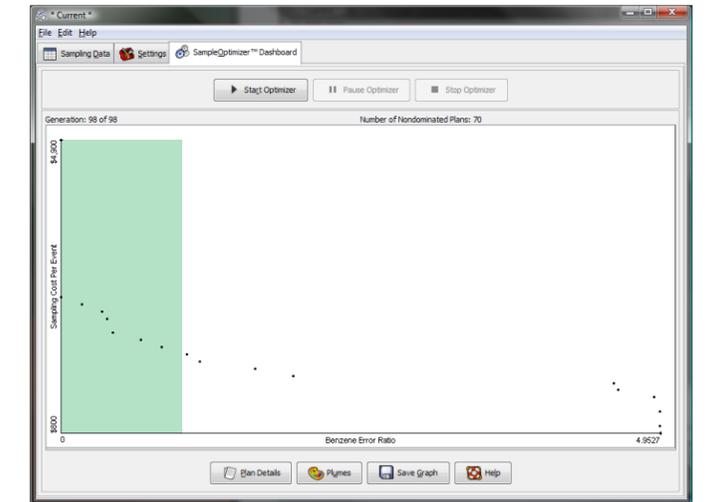


Next, look at the Relative Uncertainty map by clicking **Visualize relative uncertainty**. After 5 to 10 minutes, you should see the following screen:



The above map shows the areas of the site which are most sensitive to changes in the dataset. Red areas without sampling may be good candidates for new sampling locations, as long as information in that area of the site would be useful.

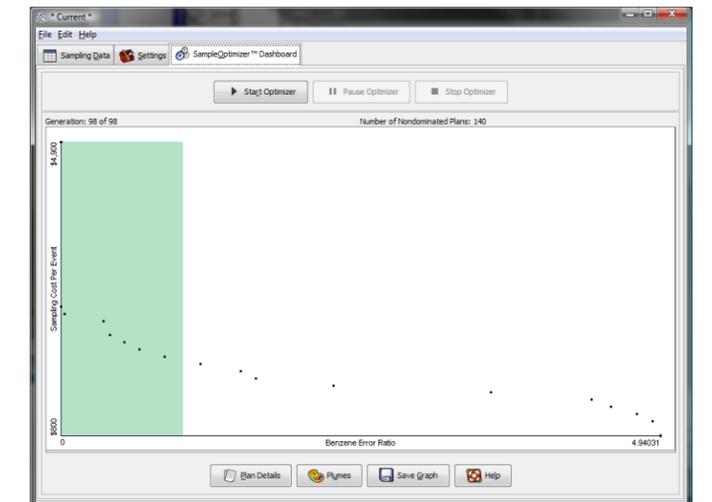
Next, go to the **SampleOptimizer™ Dashboard** tab. Click on Start Optimizer and after a few minutes of computation, your screen should look like this:



This graph shows the tradeoff between sampling cost and interpolation accuracy, with each dot representing a potential sampling plan. The area in green contains plans which satisfy the accuracy objective set in the Function Parameters screen.

Ultimately, it is up to the analyst using this software to choose a plan which offers the best tradeoff of sampling cost and interpolation accuracy. You can compare the interpolation generated by a potential sampling plan with the base case sampling plan by dragging a box around a plan (highlighted plans are shown in pink) and clicking the **Plumes** button.

The analysis can be repeated to see if better solutions can be found. Click on **Start Optimizer** again, and click Yes when asked if you would like to “double the population size and re-run”. This new run will take longer but has the potential for finding better solutions. This process can be repeated up to 4 to 5 times but usually no better solutions are found after two or three runs. The following is the result of one more run, which has several plans with both lower cost & higher accuracy than the plans in the previous run:



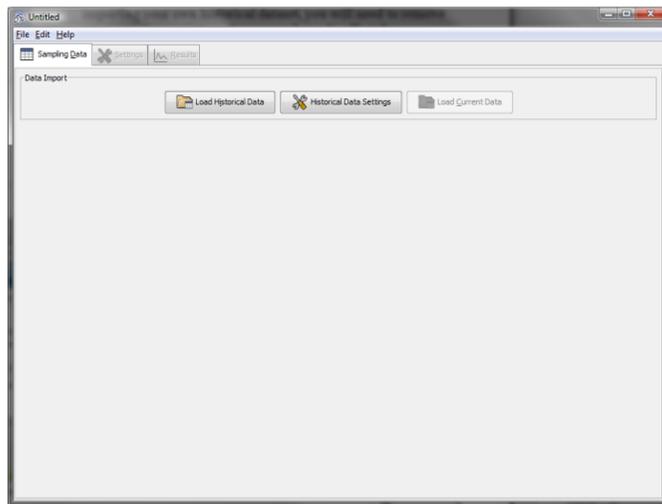
For more details, please consult the Reference Manual.

Running SampleTracker™

Now, open **SampleTracker™** (also in found in the Start Menu under All Programs\Summit Envirosolutions\SampleOptimizer & SampleTracker).

SampleTracker™ reviews new monitoring data against historical data and identifies cases where current data deviate from expectations based on the historical dataset.

A word of caution: before importing your own historical dataset, the Historical Data should be screened to (a) insure that all values are consistent with your current site conceptual model, and that (b) non-detects and duplicates have been replaced by appropriate values. See the Reference Manual section on the SampleOptimizer™ EDD for more information.



First, click on **Load Historical Data** and choose **Historical.csv** in **c:\Program Files\Summit Envirosolutions\SampleOptimizer & SampleTracker\Tutorial**. This file is based on a real-world site. (Later, when importing your own data, make sure it conforms to this format.) Now your screen should look like this:

| Date | MW-001 | MW-002 | MW-003 | MW-004 | MW-007 | MW-008 | MW-010 | MW-011 | MW-012 | MW-013 | MW-016 | MW-017 | MW-018 |
|--------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Dec 11, 1990 | | | | | | | | | 1.0E-5 | | | | |
| May 18, 1993 | | | | | | | | | 1.0E-5 | | | | |
| Jul 7, 1993 | | | | | | | | | 1.0E-5 | 1.0E-5 | | | |
| Aug 10, 1994 | | | | | | | | | 1.0E-5 | 1.0E-5 | 1.0E-5 | | |
| May 3, 1995 | | | | | | | | | 1.0E-5 | 1.0E-5 | 1.0E-5 | | |
| Aug 10, 1995 | | | | | | | | | 1.0E-5 | 1.0E-5 | 1.0E-5 | | |
| Nov 7, 1995 | | | | | | | | | 1.0E-5 | 1.0E-5 | 1.0E-5 | | |
| Feb 19, 1996 | | | | | | | | | 1.0E-5 | 1.0E-5 | 1.0E-5 | | |
| Aug 19, 1997 | | | | | | | | | 1.4 | 1.0E-5 | 1.0E-5 | | |
| Dec 9, 1997 | | | | | | | | | | | | | |
| Jul 31, 1998 | | | | | | | | | 1.0E-5 | | 1.0E-5 | | |
| Nov 5, 1998 | | | | | | | | | 1.0E-5 | | 1.0E-5 | | |
| Apr 8, 1999 | | | | | | | | | 1.0E-5 | | 1.0E-5 | | |
| Sep 8, 1999 | | | | | | | | | 1.0E-5 | 1.0E-5 | 1.0E-5 | | |
| Dec 20, 1999 | | | | | | | | | 1.0E-5 | 8.2 | 1.0E-5 | | |
| Apr 12, 2000 | | | | | | | | | 1.0E-5 | | 1.0E-5 | 1.0E-5 | |
| Aug 29, 2000 | | | | | | | | | 1.0E-5 | 5.1 | 1.0E-5 | 1.0E-5 | |
| Jan 24, 2001 | | | | | | | | | 1.0E-5 | 2.5 | 1.0E-5 | 1.0E-5 | 1.0E-5 |
| Jun 4, 2001 | | | | | | | | | 1.0E-5 | 1.9 | 1.0E-5 | 1.0E-5 | 1.0E-5 |
| Jan 30, 2002 | | | | | | | | | 1.0E-5 | 1.3 | 1.0E-5 | 1.0E-5 | 1.0E-5 |
| Jan 8, 2003 | | | | | | | | | 1.0E-5 | 2.0 | 1.0E-5 | 1.0E-5 | 1.0E-5 |
| May 31, 2005 | | | | | | | | | 1.0E-5 | 2.7 | 1.0E-5 | 1.0E-5 | 1.0E-5 |
| Nov 7, 2005 | | | | | | | | | 1.0E-5 | 1.0E-5 | 1.0E-5 | 1.0E-5 | 1.0E-5 |
| May 30, 2006 | | | | | | | | | 1.0E-5 | 1.0E-5 | 1.0E-5 | 1.0E-5 | 1.0E-5 |

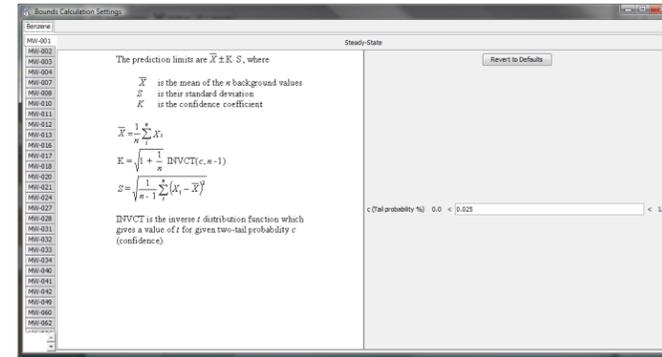
Next, click on “Load Current Data” and choose Current.csv in **C:\Program Files\Summit Envirosolutions\SampleOptimizer & SampleTracker\Tutorial**, and your screen should look like this:

| Date | MW-001 | MW-002 | MW-003 | MW-004 | MW-007 | MW-008 | MW-010 | MW-011 | MW-012 | MW-013 | MW-016 | MW-017 | MW-018 |
|-------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Dec 4, 2006 | 1.0E-5 |

SampleTracker™ automatically chooses between static and decreasing bounds depending on the historical data present at a sampling location. The bounds tightness is predefined but can be customized by clicking on “Bounds Calculation Settings” in the **Settings** tab.

| Sampling location ID | Benzene |
|----------------------|----------------|
| MW-001 | Steady-State |
| MW-002 | Steady-State |
| MW-003 | Time Dependent |
| MW-004 | Steady-State |
| MW-007 | Steady-State |
| MW-008 | Steady-State |
| MW-010 | Steady-State |
| MW-011 | Steady-State |
| MW-012 | Steady-State |
| MW-013 | Steady-State |
| MW-016 | Steady-State |
| MW-017 | Steady-State |
| MW-018 | Steady-State |
| MW-020 | Steady-State |
| MW-021 | Time Dependent |
| MW-024 | Time Dependent |
| MW-027 | Steady-State |
| MW-028 | Steady-State |
| MW-031 | Steady-State |
| MW-032 | Steady-State |
| MW-033 | Steady-State |

Note that you can customize the bounds’ tightness by clicking on **Bounds Calculation Settings**; they default to a 95% prediction confidence interval.

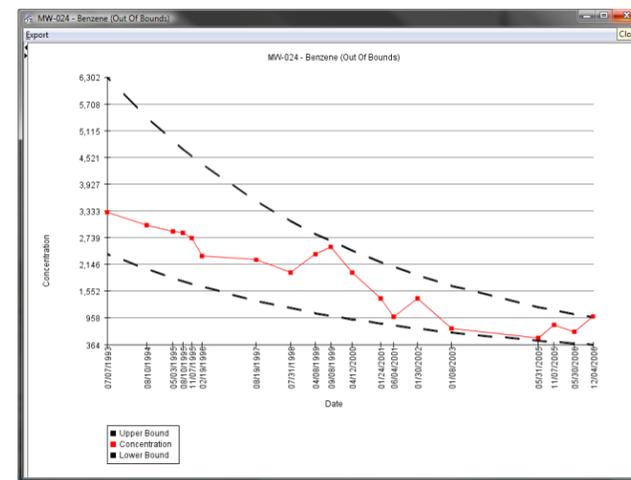


Next, go to the **Results** Tab and click **Calculate Results** to get this screen:

| Sampling Location ID | COC | Lower Bound | Concentration | Upper Bound |
|----------------------|---------|--------------|----------------|----------------|
| MW-001 | Benzene | 0.00001 | 0.00001 | 0.00001 |
| MW-002 | Benzene | 0.00001 | 1.8427185 | 0.00001 |
| MW-003 | Benzene | 0.00000001 | 0.00001 | 0.00060845 |
| MW-004 | Benzene | 0.00001 | 0.00001 | 0.00001 |
| MW-007 | Benzene | 0.00001 | 5.43940158 | 0.00001 |
| MW-008 | Benzene | 0.00001 | 0.00001 | 0.00001 |
| MW-010 | Benzene | 0.00001 | 1.107.47334621 | 0.00001 |
| MW-011 | Benzene | 0.00001 | 0.00001 | 0.00001 |
| MW-012 | Benzene | 0.00001 | 0.82303916 | 0.00001 |
| MW-013 | Benzene | 0.00001 | 0.00001 | 0.00001 |
| MW-016 | Benzene | 0.00001 | 0.00001 | 0.00001 |
| MW-017 | Benzene | 0.00001 | 0.00001 | 0.00001 |
| MW-018 | Benzene | 0.00001 | 0.00001 | 0.00001 |
| MW-020 | Benzene | 0.00001 | 0.00001 | 0.00001 |
| MW-021 | Benzene | 3.64497689 | 12.5 | 34.99202206 |
| MW-027 | Benzene | 0.00001 | 32.2 | 307.39724038 |
| MW-028 | Benzene | 0.00001 | 3.5016444 | 0.00001 |
| MW-031 | Benzene | 531.99247876 | 751 | 1,204.00752124 |
| MW-032 | Benzene | 0.00001 | 0.00001 | 0.00001 |

The “In Bounds” and “Out Of Bounds” tabs show the **COC/location** combinations which have been determined to be in or out of the bounds.

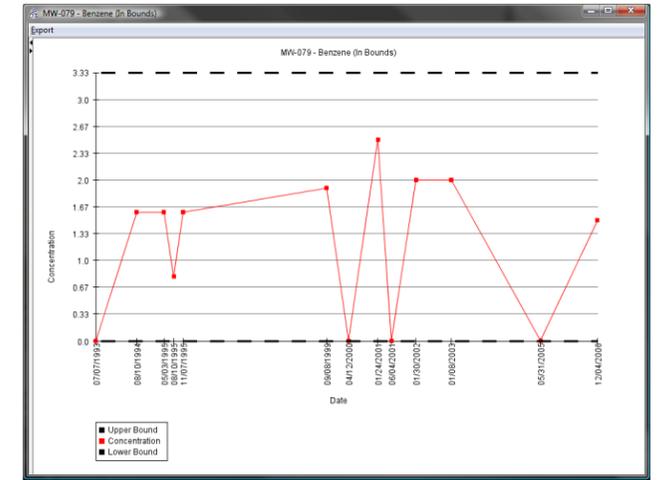
To see the graph for a **COC** at a location, click the desired row in the table and then click the **View Graph** button. If you choose the graph for **MW-024**, you should see the following graph:



In this case the values are decreasing and **SampleTracker™** has applied **Time Dependent** Bounds. While this location’s newest data point is very similar to the historical dataset, and barely

outside the bounds range, there is a recent upward trend through 3 of the past 4 samples, and this location may be a candidate for further scrutiny.

Similarly, if you choose the graph for **MW-079** you should see the following graph.



In this case the values are consistent over a range and this location’s newest data point is very similar to the historical dataset.

To use the **Mass Metric** or **Mass Flux Tracking** features, first import **Historical.csv** into **SampleOptimizer™** and click “View Mass Metric” in the **Settings** tab. After a few minutes of calculation, you can then export the results to a **CSV** which you can track separately or together with the rest of the site data in **SampleTracker™**. The **Mass Metric** results for this example should look like this (historical first, then current):

| Date | SiteID | Benzene |
|---------|-------------|-----------------|
| Q3 1994 | Mass Metric | 26,431,605.6648 |
| Q2 1995 | Mass Metric | 26,528,211.7646 |
| Q3 1995 | Mass Metric | 20,362,376.8703 |
| Q4 1995 | Mass Metric | 10,470,882.562 |
| Q1 1996 | Mass Metric | 19,025,106.1845 |
| Q3 1999 | Mass Metric | 4,493,458.0582 |
| Q2 2000 | Mass Metric | 27,243,824.7731 |
| Q1 2001 | Mass Metric | 27,258,132.9315 |
| Q2 2001 | Mass Metric | 17,344,840.215 |
| Q1 2002 | Mass Metric | 26,356,030.5962 |
| Q1 2003 | Mass Metric | 34,673,663.9404 |
| Q2 2005 | Mass Metric | 16,233,846.5192 |
| Q4 2005 | Mass Metric | 6,474,132.7449 |
| Q2 2006 | Mass Metric | 24,800,730.3996 |

For more details and examples, please consult the **Reference Manual**.