

## RSMS Quickstart Guide

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### Disclaimer

The U.S. Environmental Protection Agency (EPA) through its Office of Research and Development funded and managed the research described herein under contract EP-C-12-014 with APTIM and their subcontractor Global Quality Corporation. It has been subjected to the Agency's review and has been approved for publication. Note that approval does not signify that the contents necessarily reflect the views of the Agency. Any mention of trade names, products, or services does not imply an endorsement by the U.S. Government or EPA. The EPA does not endorse any commercial products, services, or enterprises.

### Guide

1. Open <http://rsmstest.eastus.cloudapp.azure.com/> in any browser and log in (Figure 1).

Home About Contact Log in

For official use only

Please contact ORSANCO to request a login account.

Email

Password

Remember me?

Log in

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*Figure 1*

2. **Home** will be the default page after the user has logged in (Figure 2).

Home About Contact Spills Parameters Results Flows Log off

# RSMS

Riverine Spill Modeling System (RSMS) is a free web-based system for modeling river spills.

### Origin

EPA Office of Research and Development (ORD) in 200X funded the original development of the Riverine Spill Modeling System (RSMS) The RSMS model was originally a desktop application designed to use on a Windows PC. The Ohio River Valley Water Sanitation Commission (ORSANCO), an interstate commission representing eight states and the federal government implemented the model for the Ohio River.

### Usage

The RSMS model has been used for over a decade by ORSANCO. The current version of the model uses the flow and cross sections of the river provided by the USACE HEC-RAS Model. More information about the HEC-RAS Model can be found online at the [USACE HEC-RAS website](#).

### Features

Integration with HEC-RAS, navigable dynamic plots, multiple user support, responsive web-based interface that can be used on any modern web-enabled device, including personal computers, tablets and smart phones.

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Figure 2

3. Click on the **Spills** Page.

The active spill will be shown highlighted (Figure 3).

Home About Contact **Spills** Parameters Results Flows Barges Delete Login Register Role Log off

View Edit Delete Create Simulate with Parameter ID 1

Spill ID	Description	River	River Mile	Quantity (lb)	Start	Time Zone	Duration (hrs)
82	xxx River Spill on yyyy	Ohio River	475	100000	3/17/2021 11:26:59 AM	EST	5
81	xxx River Spill on yyyy	Ohio River	475	100000	3/17/2021 11:26:48 AM	EST	5
80	test River Spill on 3/17	Ohio River	475	100000	3/17/2021 7:19:44 AM	EST	5
56	BOSC Kanawha River Spill	Kanawha River	15	1000000	12/7/2018 9:23:04 AM	EST	5
55	Louisville Christmas Spill	Ohio River	478	4000000	12/20/2017 12:00:00 PM	EST	5
50	Test Marathon Refinery Spill	Ohio River	318	100000	3/1/2017 1:53:48 PM	EST	5
<b>10</b>	<b>Microcystis Bloom - Aug-Sept 2015</b>	<b>Ohio River</b>	<b>341</b>	<b>10000</b>	<b>9/28/2015 4:00:00 AM</b>	<b>EST</b>	<b>5</b>
1	Elk Spill	Kanawha River	54	80000	1/9/2014 8:00:00 AM	EST	24

View Edit Delete Create Simulate with Parameter ID 1

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Figure 3

To create a spill, click on the **Create** action link to go to the **Create** page and use the form as shown in (Figure 4).

Home About Contact Spills Parameters Results Flows Barges Log off

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**Description**

**River**

**River Mile**

**Quantity (lb)**

**Start**

**TimeZone**

**Spill Duration (hrs)**

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Figure 4

To view the details of a spill, click on that row and then click on the **View** action link to go to the **View** page for the selected spill (Figure 5).

Home About Contact Spills Parameters Results Flows Barges Log off

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<b>Spill ID</b>	83	<b>Quantity (lb)</b>	100000
<b>Description</b>	xxx River Spill on yyyy	<b>Start</b>	4/5/2021 3:46:07 PM
<b>River</b>	Ohio River	<b>TimeZone</b>	EST
<b>River Mile</b>	475	<b>Duration (hrs)</b>	5

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Figure 5

To edit a spill, click on that row and then click on the **Edit** action link to go to the **Edit** page and use the form as shown in (Figure 6)

Home About Contact Spills Parameters Results Flows Barges Log off

Description: xxx River Spill on yyyy

River: Ohio River

River Mile: 475

Quantity (lb): 100000

Start: 4/5/2021 3:46:07 PM

TimeZone: EST

Duration (hrs): 5

Save

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Figure 6

To delete a spill, click on that row and then click on the **Delete** action link. A confirmation pop up box will appear. Click ok to delete a spill (Figure 7).

Home About Contact Spills Parameters Results Flows Barges Log off

View Edit Delete Create Simulate

rsmstest.eastus.cloudapp.azure.com says  
Are you sure you want to delete the entry with ID 83?  
OK Cancel

Spill ID	Description	River	River Mile	Quantity (lb)	Start	Time Zone	Duration (hrs)
83	xxx River Spill on yyyy	Ohio River	475	100000	4/5/2021 3:46:07 PM	EST	5

View Edit Delete Create Simulate with Parameter ID 1

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Figure 7

4. Click on the **Parameters** Page

The active parameter will be shown highlighted (Figure 8).

Parameter ID	Description	River Stations	Dispersion Factor	Decay rate (/day)	Simulation Duration (days)	Simulation Time step (hours)	Flow Tolerance (cfs)	Concentration Tolerance (mg/l)	Minimum Velocity (ft/s)	Flow Multiplier	Dead Zone Mainstem Average Velocity (cfs)	Dead Zone Exchange Rate	Dead Zone Flow Area Fraction
1	Default Simulation Parameters	49	0	0.00000	3	1	10	1	0.1	1	1	0.0000045	0.1
35	Simulation Parameters	50	0	0.00000	2	1	10	0.001	0.1	1	1	0.0000045	0.1
34	Test Simulation Parameters	150	0	0.00000	7	1	10	0.001	0.1	1	1	0.0000045	0.1
33	Simulation Parameters	80	0	0.00000	7	1	10	0.001	0.1	1	1	0.0000045	0.1

Figure 8

To create a Parameter, click on the **Create** action link to go to the **Create** page and use the form as shown in (Figure 9).

Home	About	Contact	Spills	Parameters	Results	Flows	Delete Login	Register	Role	Log off
------	-------	---------	--------	------------	---------	-------	--------------	----------	------	---------

<b>Description</b>	<input type="text" value="Simulation Parameters"/>
<b>River Stations</b>	<input type="text" value="50"/>
<b>Dispersion Factor</b>	<input type="text" value="0"/>
<b>Decay rate (/day)</b>	<input type="text" value="0.00000"/>
<b>Simulation Duration (days)</b>	<input type="text" value="3"/>
<b>Hide Advanced Settings</b>	
<b>Simulation Time step (hours)</b>	<input type="text" value="1"/>
<b>Flow Tolerance (cfs)</b>	<input type="text" value="10"/>
<b>Concentration Tolerance (mg/l)</b>	<input type="text" value="0.001"/>
<b>Minimum Velocity (ft/s)</b>	<input type="text" value="0.1"/>
<b>Flow Multiplier</b>	<input type="text" value="1"/>
<b>Dead Zone</b>	
<b>Mainstem Average Velocity (cfs)</b>	<input type="text" value="1"/>
<b>Exchange Rate</b>	<input type="text" value="0.0000045"/>
<b>Flow Area Fraction</b>	<input type="text" value="0.1"/>

Figure 9

To view the details of a parameter, click on that row and then click on the **View** action link to go to the **View** page for the selected parameter (Figure 10).

Home		About		Contact		Spills		Parameters		Results		Flows		Delete Login		Register		Role		Log off	
Sim Params ID	1	Concentration	1	Description	Default Simulation Parameters	Tolerance (mg/l)		Minimum Velocity (ft/s)	0.1	Flow Multiplier	1	<b>DeadZone</b>		Mainstem Average Velocity (cfs)	1	Exchange Rate	0.0000045	Flow Area Fraction	0.1		
River Stations	49	Dispersion Factor	0	Decay rate (/day)	0.00000	Simulation Duration (days)	3	Simulation Time step (hours)	1	Flow Tolerance (cfs)	10										

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Figure 10

To edit a parameter, click on that row and then click on the **Edit** action link to go to the **Edit** page and use the form as shown in (Figure 11).

Home		About		Contact		Spills		Parameters		Results		Flows		Delete Login		Register		Role		Log off	
Description	<input type="text" value="Default Simulation Parametr"/>	River Stations	<input type="text" value="49"/>	Dispersion Factor	<input type="text" value="0"/>	Decay rate (/day)	<input type="text" value="0.00000"/>	Simulation Duration (days)	<input type="text" value="3"/>	<b>Hide Advanced Settings</b>											
Simulation Time step (hours)	<input type="text" value="1"/>	Flow Tolerance (cfs)	<input type="text" value="10"/>	Concentration Tolerance (mg/l)	<input type="text" value="1"/>	Minimum Velocity (ft/s)	<input type="text" value="0.1"/>	Flow Multiplier	<input type="text" value="1"/>	<b>Dead Zone</b>											
		Mainstem Average Velocity (cfs)	<input type="text" value="1"/>	Exchange Rate	<input type="text" value="0.0000045"/>	Flow Area Fraction	<input type="text" value="0.1"/>														
<input type="button" value="Save"/>																					

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Figure 11

To delete a parameter, click on that row and then click on the **Delete** action link. A confirmation pop up box will appear. Click ok to delete a parameter (Figure 12).

Parameter ID	Description	River Stations	Dispersion Factor	Velocity (/day)	Duration (days)	Time Step (hours)	Flow (cfs)	Concentration (mg/l)	Velocity (ft/s)	Flow Multiplier	Dead Zone Mainstem Average Velocity (cfs)	Dead Zone Exchange Rate	Dead Zone Flow Area Fraction
1	Default Simulation Parameters	49	0	0.00000	3	1	10	1	0.1	1	1	0.0000045	0.1
37	Simulation Parameters	50	0	0.00000	3	1	10	0.001	0.1	1	1	0.0000045	0.1
35	Simulation Parameters	50	0	0.00000	2	1	10	0.001	0.1	1	1	0.0000045	0.1
34	Test Simulation Parameters	150	0	0.00000	7	1	10	0.001	0.1	1	1	0.0000045	0.1

Figure 12

5. Click on the **Spills** Page

To run a simulation, click on that row and then click on the Simulate button. The simulation will run a spill alongside a parameter the *set of values* inside a parameter can be set up on the **Parameters** Page. When the simulation is complete a pop up box will be shown and the results from the run can be seen on the **Results** Page (Figure 13).

Spill ID	Description	River	Volume	Concentration	Start Time	Time Zone	Duration (hrs)
80	test River Spill on 3/17	Ohio River	475	100000	3/17/2021 7:19:44 AM	EST	5
56	BOSC Kanawha River Spill	Kanawha River	15	1000000	12/7/2018 9:23:04 AM	EST	5
55	Louisville Christmas Spill	Ohio River	478	4000000	12/20/2017 12:00:00 PM	EST	5
50	Test Marathon Refinery Spill	Ohio River	318	100000	3/1/2017 1:53:48 PM	EST	5
10	Microcystis Bloom - Aug-Sept 2015	Ohio River	341	10000	9/28/2015 4:00:00 AM	EST	5
1	Elk Spill	Kanawha River	54	80000	1/9/2014 8:00:00 AM	EST	24

Figure 13

6. Click on the **Results** Page

The active result will be shown highlighted (Figure 14).

Results ID	Run Date Time	Spill ID	Spill Description	River	Parameters ID	Parameters Description
315	4/5/2021 7:50:55 PM	80	test River Spill on 3/17	Ohio River	1	High Decay Rate Simulation Parameters
314	4/5/2021 7:45:52 PM	10	Microcystis Bloom - Aug-Sept 2015	Ohio River	1	High Decay Rate Simulation Parameters
313	3/15/2021 7:58:01 PM	56	BOSC Kanawha River Spill	Kanawha River	1	High Decay Rate Simulation Parameters
312	3/15/2021 7:53:31 PM	56	BOSC Kanawha River Spill	Kanawha River	1	High Decay Rate Simulation Parameters
239	1/6/2020 9:02:33 PM	55	Louisville Christmas Spill	Ohio River	1	High Decay Rate Simulation Parameters

Figure 14

To view the details of a result, click on that row and then click on the **View** action link to go to the **View** page for the selected result (Figure 15).

Scenario ID	Run Date Time	Spill ID	Spill Description	River	River Mile	Quantity (lb)	Spill Start Date Time	Duration (hrs)	Spill Time Zone	Parameter ID	Parameter Description	Segments	Flow Tolerance	Concentration	Tolerance	Minimum Velocity	Dispersion	Leading Edge	Parameter	Trailing Edge	Parameter	Global Flow Multiplier	Time Step Length	Reporting Timestep Length	Decay Rate	Simulation Duration (day)	Dead Zone Average Velocity	Dead Zone Exchange Rate	Dead Zone Flow Area Multiplier	First Time Step	Last Time Step	Last Mile	Max Concentration	Spill Location Main Stem	Spill Location Tributary
315	4/5/2021 7:50:55 PM	80	test River Spill on 3/17	Ohio River	475	100000	3/17/2021 7:19:44 AM	5	EST	1	High Decay Rate Simulation Parameters	50	10	0.001		0.1	0	0			0	1	1	1	0	5	1	4.5E-06	0.1	0	119	253.6	0.7468	506.8	0

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Figure 15

To delete a result, click on that row and then click on the **Delete** action link. A confirmation pop up box will appear. Click ok to delete a result (Figure 16).

Results ID	Run Date Time	Spill ID	Spill Description	River	Parameters ID	Parameters Description
315	4/5/2021 7:50:55 PM	80	test River Spill on 3/17	Ohio River	1	High Decay Rate Simulation Parameters
314	4/5/2021 7:45:52 PM	10	Microcystis Bloom - Aug-Sept 2015	Ohio River	1	High Decay Rate Simulation Parameters
313	3/15/2021 7:58:01 PM	56	BOSC Kanawha River Spill	Kanawha River	1	High Decay Rate Simulation Parameters
312	3/15/2021 7:53:31 PM	56	BOSC Kanawha River Spill	Kanawha River	1	High Decay Rate Simulation Parameters
239	1/6/2020 9:02:33 PM	55	Louisville Christmas Spill	Ohio River	1	High Decay Rate Simulation Parameters
238	1/6/2020 9:00:56 PM	55	Louisville Christmas Spill	Ohio River	1	High Decay Rate Simulation Parameters

Figure 16

To view the charts of a result, click on that row and then click on the **Charts** action link to go to the **Charts** page for the selected result. There are four different charts on this page.

1. CXPLT results (Figure 17)

- The CXPLT chart shows the spill concentration at a certain distance from the spill location.
- The user can use the slider bar below the graph to change what hour of the spill the graph represents.
- There's also a checkbox titled *Autoscale*, which will enable or disable auto-scaling of the Y-axis.

2. CTPLT results (Figure 18)

- The CTPLT chart shows the spill concentration at a certain hour after the spill start time.
- The user can use the slider bar below the graph to change what mile past the spill location the graph represents.
- There's also a checkbox titled *Autoscale*, which will enable or disable auto-scaling of the Y-axis.

3. Leading, Trailing, and Peak Concentration results (Figure 19)

This graph has four lines that show how long it takes for each part of the plume to reach a certain distance from the initial spill.

- Trailing Edge.
- Peak Arrival.
- Leading Edge.
- Peak Concentration.

4. Mass Balance results (Figure 20)

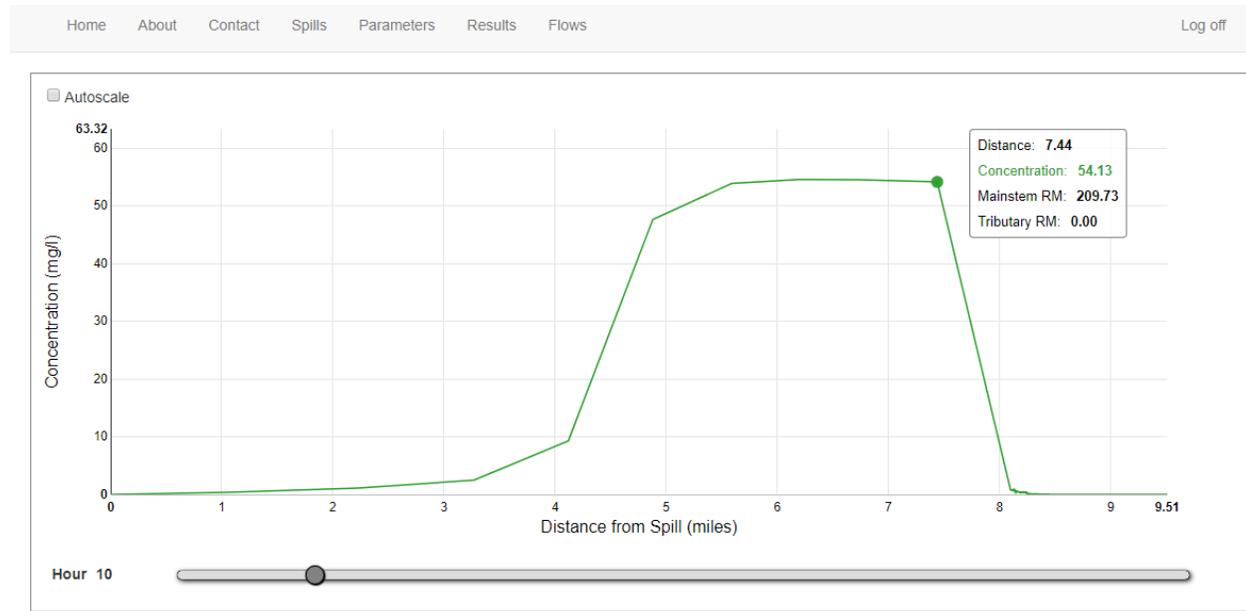


Figure 17 – Spill Plume at a particular time (hours since spill)

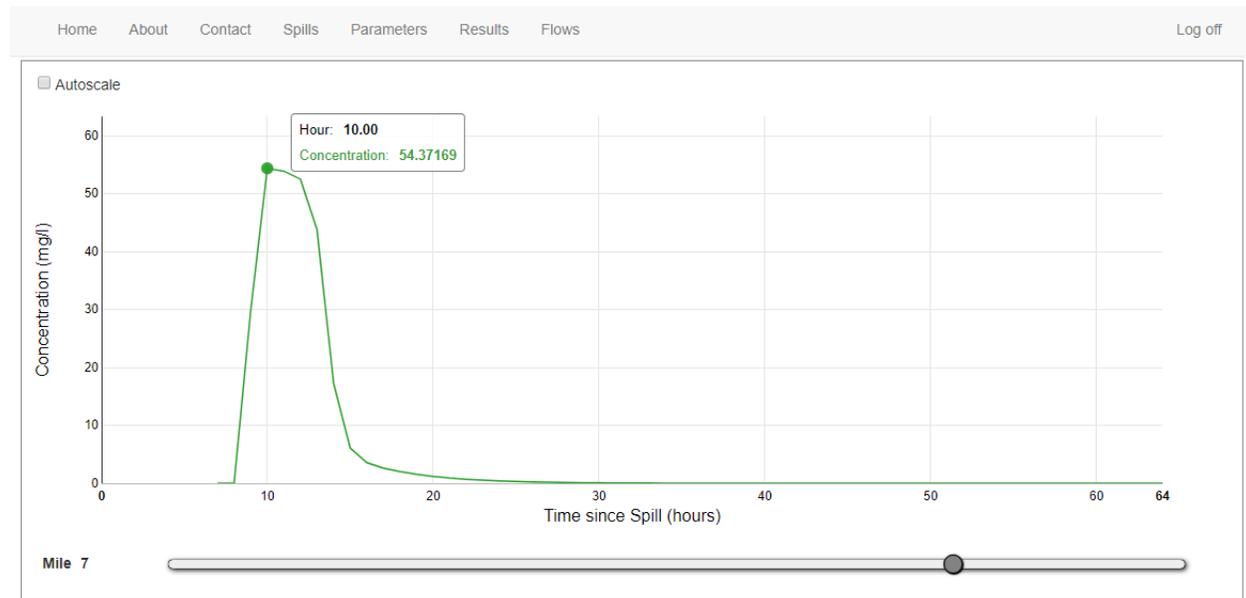


Figure 18 – Spill Plume at a particular distance (miles from spill location)

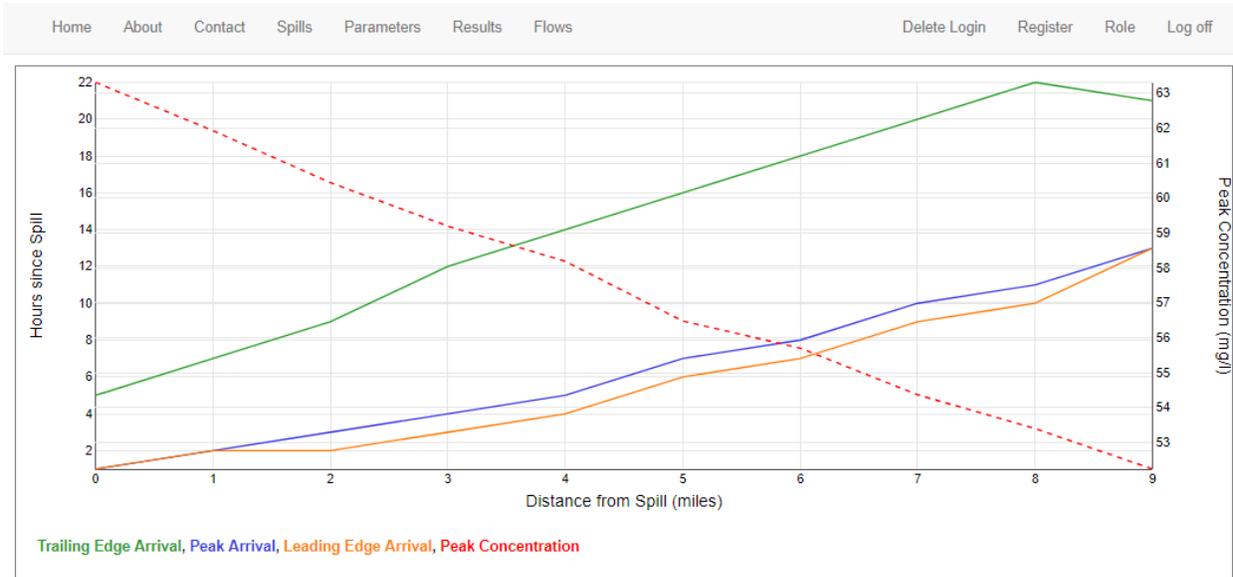
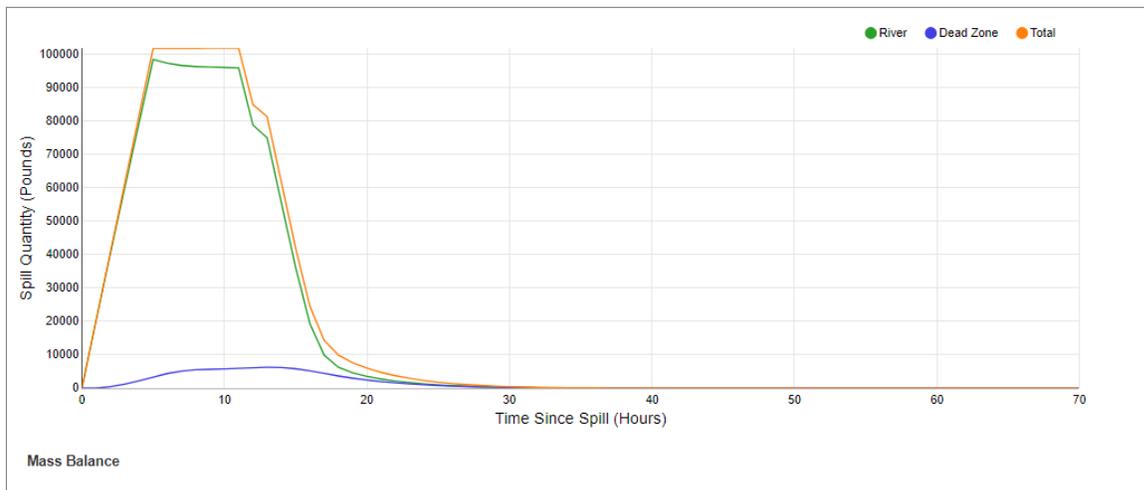


Figure 19



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Figure 20

To view the results of a scenario on a map, click on that row and then click on the **Map** action link to go to the **Map** page for the selected result. (Figure 21).

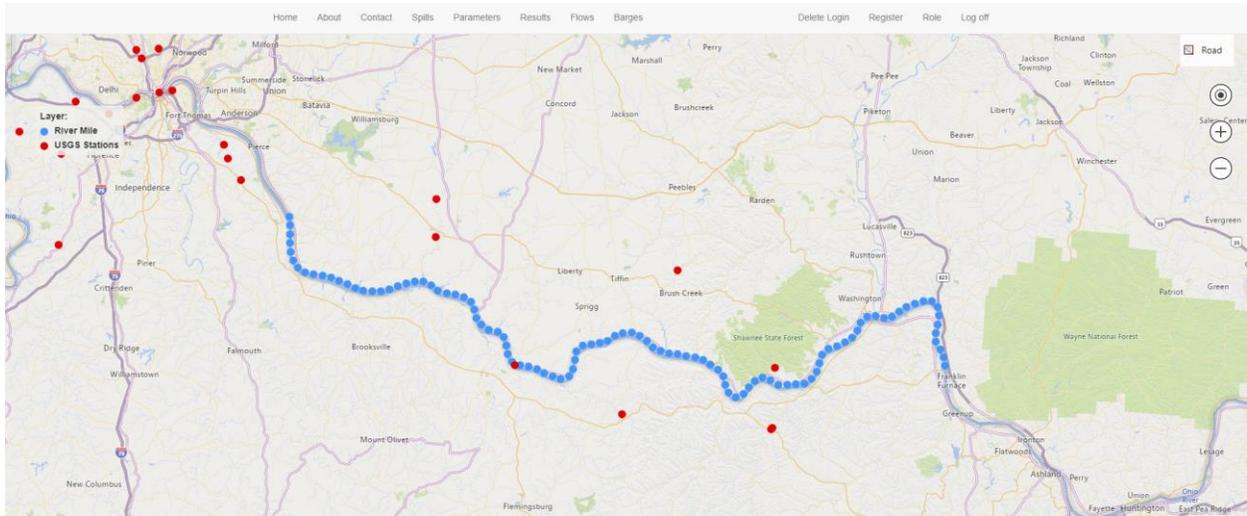


Figure 21

Clicking on a blue pushpin will show a graph of the Spill plume at that river mile (Figure 22).

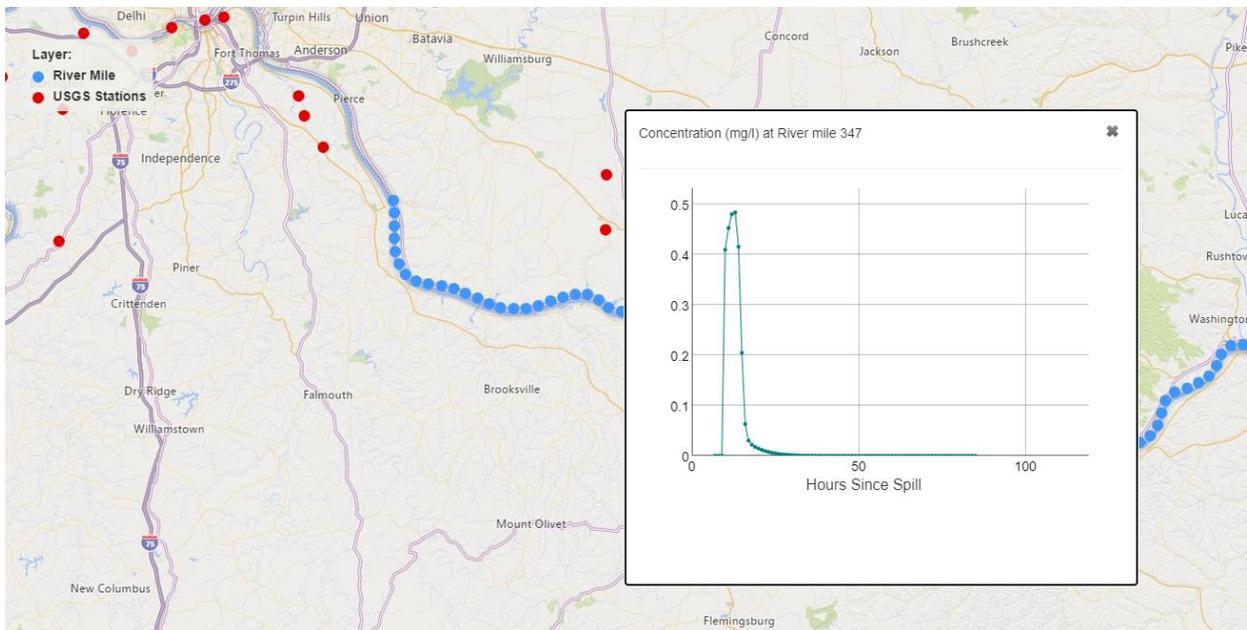


Figure 22

Red pushpins represent USGS stations on the rivers affected by the spill (Figure 23 and 24). Clicking on a red pushpin shows for Flow and Stage data graphs for that USGS station.

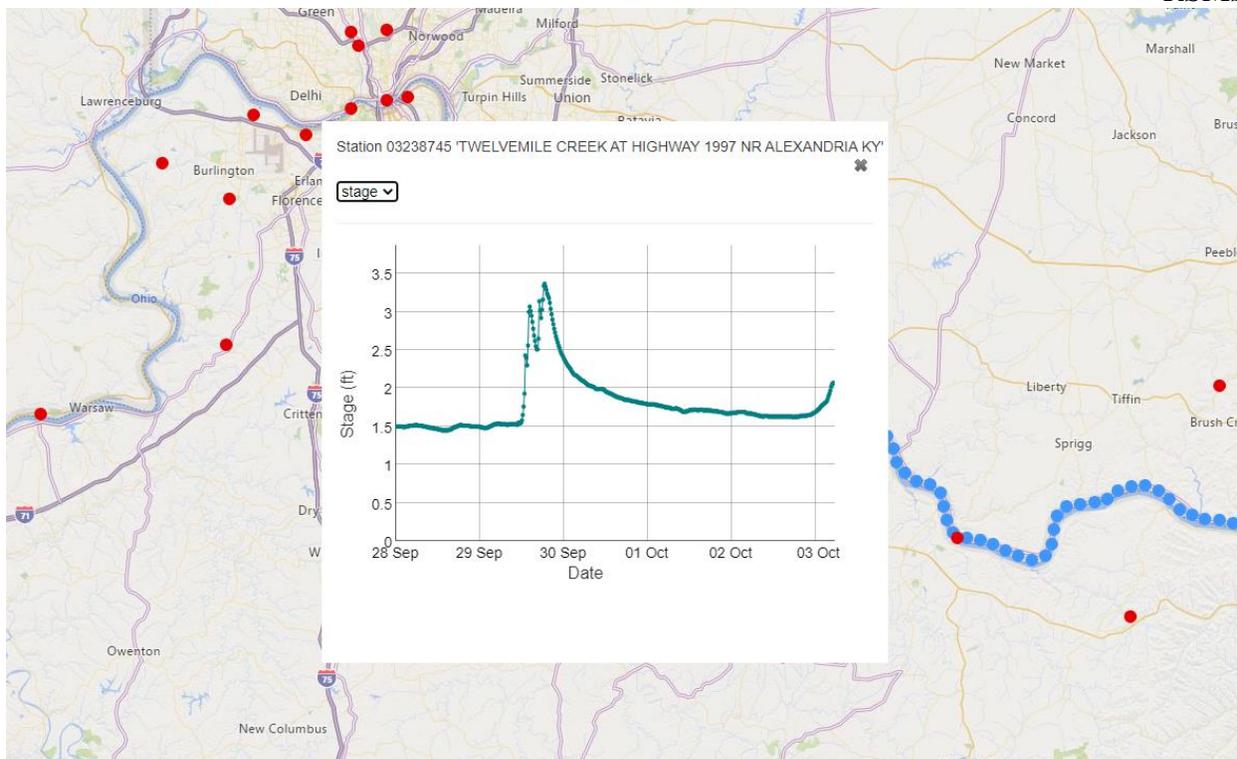


Figure 23

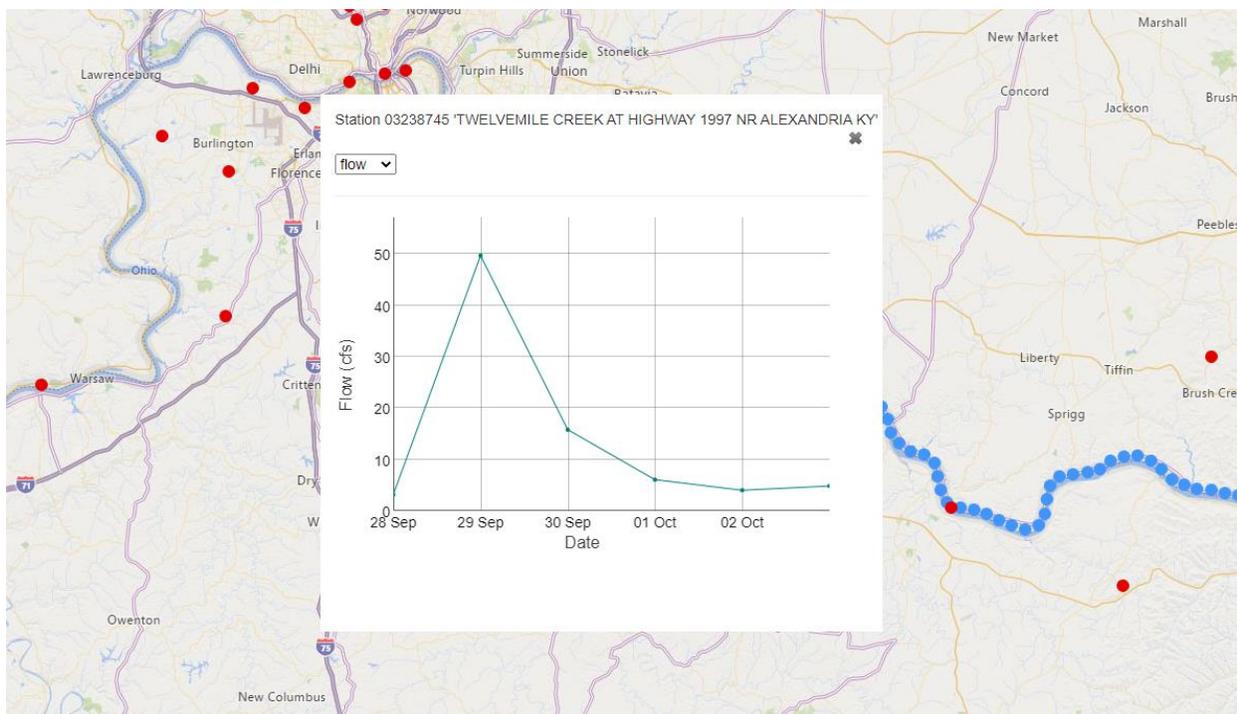


Figure 24

To download the results of a scenario in a concentration vs. distance view click on that row and then click on the **C vs X** action link for the excel file to download.

To download the results of a scenario in a concentration vs. time view click on that row and then click on the **C vs T** action link for the excel file to download.

To download the .nfq flow file of a scenario click on that row and then click on the **Flow** action link for the .nfq file to download.

Click on the **Flow** Page

Choose your river to view the flow charts (Figure 25 and 26).

The user can use the slider bar below the graph to change what River mile or day the graphs represent.

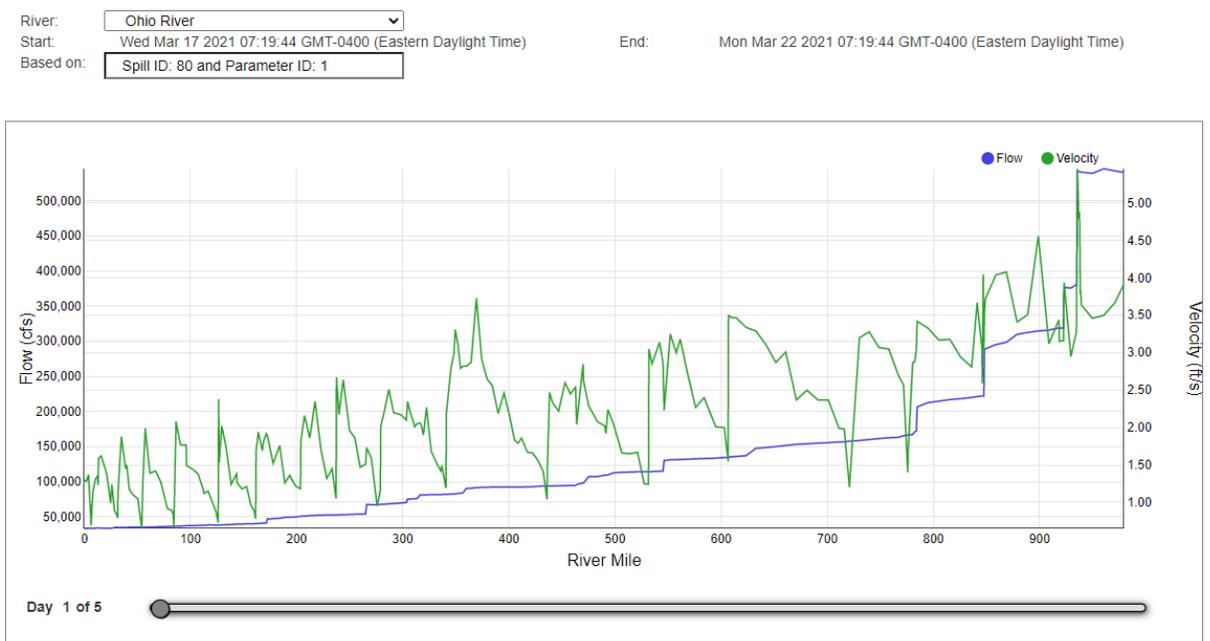
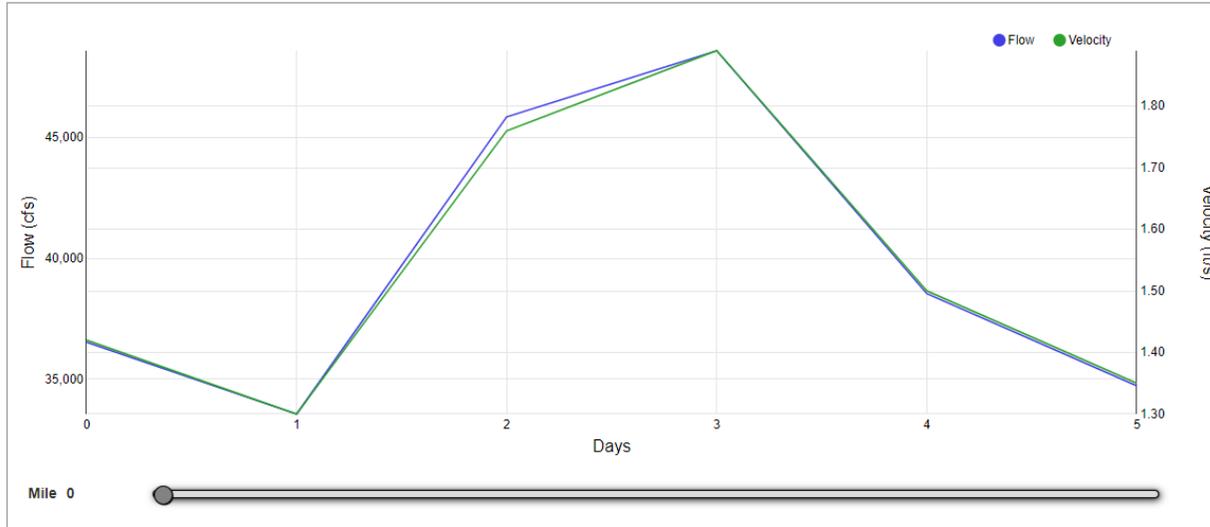


Figure 25



Upload Flow File

No file chosen

Last HEC\_RAS file processed on Mon Apr 05 2021 16:30:54 GMT-0400 (Eastern Daylight Time)

Figure 26

7. Click on the **About** tab (on mobile devices activate the dropdown first) (Figures 27, 28 and 29).

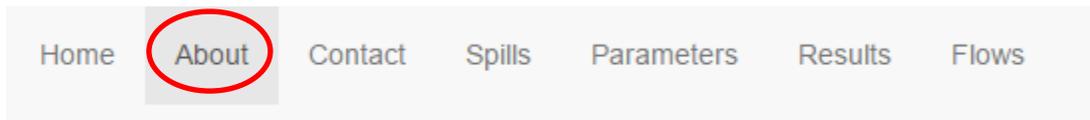


Figure 27

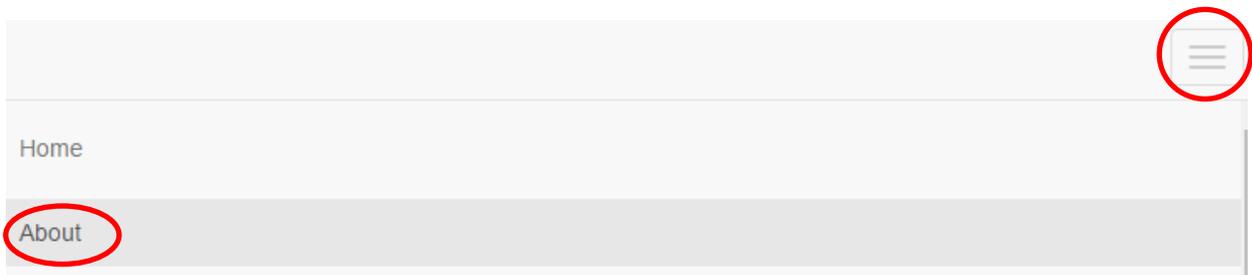


Figure 28

## About RSMS

- Main stem spills only (now can model tributaries)
- Spill location as river mile and can view results as river miles (with the mile markers ascending downstream)
- "Initialization" option to set concentration at different river miles
- Uses the USGS developed Branched Lagrangian Transport Model (BLTM) for Simulations (<http://water.usgs.gov/software/BLTM/>)
- Result Plots for Time, Location, Edge, Peak, and Mass
- Exportable results

Figure 29

8. Click on the **Contact** tab (Figure 30).

## Contacts

**ORSANCO: Sam Dinkins** [sdinkins@orsanco.org](mailto:sdinkins@orsanco.org)  
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Figure 30