EPA/600/B-15/276

Quantitative Microbial Risk Assessment Tutorial

Installation of Software for Watershed Modeling in Support of QMRA

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11/25/15

Summary

This tutorial provides instructions for accessing, retrieving, and downloading the following software to install on a host computer in support of Quantitative Microbial Risk Assessment (QMRA) modeling:

- SDMProjectBuilder (which includes the Microbial Source Module as part of the installation)
- BASINS (including WinHSPF and WinHSPFIt)
- SARA Timeseries Utility
- HSPF_PEST_flow and HSPF_PEST_microbe
- FORTRAN Library
- PEST

Installation of Software for Watershed Modeling in Support of QMRA

PURPOSE

Consolidate information for gaining access to software used in support of Quantitative Microbial Risk Assessment (QMRA) modeling.

OBJECTIVE

Provide instructions for accessing, retrieving, and downloading software in support of Quantitative Microbial Risk Assessment modeling to install on a host computer.

DEMONSTRATION

This tutorial provides instructions on how to access, retrieve, download, and install the following software:

- SDMProjectBuilder (which includes the Microbial Source Module as part of the installation)
- BASINS (including WinHSPF and WinHSPFlt)
- SARA Timeseries Utility
- HSPF_PEST_flow and HSPF_PEST_microbe
- FORTRAN Library
- PEST

SOFTWARE ACCESS, RETRIEVAL, DOWNLOAD, AND INSTALLATION

Users should execute installation instructions on only those software products that

- have not been previously installed or
- have been previously installed, but require an updated version.

The software should be removed using the Microsoft Windows Add/Remove feature, except "HSPF_PEST_flow.exe", "Input_flow.in", "HSPF_PEST_microbe.exe", and "Input_microbe.in". "HSPF_PEST_flow.exe", "Input_flow.in", "HSPF_PEST_microbe.exe", and "Input_microbe.in" can be removed by simply deleting them. If software does NOT need to be installed again, skip to the appropriate point in the installation instructions.

SDMProjectBuilder

The SDMProjectBuilder installation also includes installation of the Microbial Source Module (MSM), even though they are separate software products. Documentation on the MSM is by Whelan et al., (2015a). If users have already downloaded SDMProjectBuilder, skip this step; otherwise, proceed with installation.

1. The SDMProjectBuilder software contained in the zip file and titled "SDMPB.zip" can be retrieved at:

O:\Public\QMRA\Software for Download\SDMPB

2. Download "SDMPB.zip".

The zip file contains Setup.exe and InstallSDMPB.msi. Setup.exe is the InstallShield installation executable and InstallSDMPB.msi is the SDMPB Windows installer package. Unzip the files to your computer. It is recommended to locate the files in a folder where you have administrative privileges such as your user's folder (C:\Users\<your name>).

- 3. After downloading, run Setup.exe, and follow the installation instructions.
- 4. A Setup window will appear.

j∰ SDMPB
Welcome to the SDMPB Setup Wizard
The installer will guide you through the steps required to install SDMPB on your computer.
WARNING: This computer program is protected by copyright law and international treaties. Unauthorized duplication or distribution of this program, or any portion of it, may result in severe civil or criminal penalties, and will be prosecuted to the maximum extent possible under the law.
Cancel < Back Next >

 Click "Next", and the "Select Installation Folder" window will appear. Select the folder path with administrative privileges where you will install SDMProjectBuilder, such as the user's folder (C:\Users\<your name>). In the example below, SDMProjectBuilder will be installed in "C:\SDMPB\".

🐻 SDMPB	_ 🗆 X
Select Installation Folder	
The installer will install SDMPB to the following folder.	
To install in this folder, click "Next". To install to a different folder, enter it belo	ow or click "Browse".
Eolder	
(C\SDMPB)	Browse
	Disk Cost
Install SDMPB for yourself, or for anyone who uses this computer:	
Everyone	
🔘 Just me	
Cancel < Back	Next >

6. Click "Next" and the "Confirm Installation" page will appear.

🐻 SDMPB			_ 🗆 X
Confirm Installation			
The installer is ready to install SDMPB or	your computer.		
Click "Next" to start the installation.			
	Cancel	< Back	Next >

7. Click "Next" and SDMProjectBuilder will be installed.

🕼 SDMPB			<u> </u>
Installing SDMPB			
SDMPB is being installed.			
Please wait			
	Cancel	< Back	Next >

8. Once installation is finished, the "Installation Complete" page will appear.

🛃 SDMPB
Installation Complete
SDMPB has been successfully installed. Click "Close" to exit.
Please use Windows Update to check for any critical updates to the .NET Framework.
Cancel < Back Close

9. Click "Close", and you will now find a shortcut icon for SDMProjectBuilder on your computer's Desktop.



10. If the shortcut icon cannot be found on the Desktop screen, locate the executables on the hard drive (i.e., SDMProjectBuilder.exe), typically in \SDMPB\bin\.

11. The user will need to have "Full control" on the folder where SDMProjectBuilder is installed. To confirm user control, right-click on the folder where SDMProjectBuilder was installed (in this example "C:\SDMPB\"), and select "Properties".



12. The "Properties" window will appear, and select the "Security" tab.

📜 SDMPB Prope	erties		X
General Sharin	g Security Previous Versions	Customize	
	SDMPB		
Туре:	File folder		
Location:	C:\		
Size:	438 MB (460.084.694 bytes)		
Size on disk:	440 MB (461,451,264 bytes)		
Contains:	626 Files, 52 Folders		
Created:	Today, October 19, 2015, 3 minu	ites ago	
Attributes:	🔲 Read-only (Only applies to fi	les in folder)	
	Hidden	Advanced	
	OK Car	ncel Ap	ply

13. Select "Users" in the "Group or user names" section, and click "Edit".

SDMPB Properties	X
General Sharing Security Previous Versions Customize	
Object name: C:\SDMPB	
Group or user names:	
& Authenticated Users	
Administrators (MERCEDES) Administrators)	
To change permissions, click Edit.	
Permissions for Users Allow Deny	
Full control	
Modify	
Read & execute 🗸	=
List folder contents 🗸	
Read 🗸	
Write	-
For special permissions or advanced settings. Advanced click Advanced.	
Learn about access control and permissions	
OK Cancel Ap	ply

14. The "Permissions" for SDMPB folder will appear. In the window, select "Users" in "Group or user names" section, and ensure "Allow" for "Full control" under the "Permissions for Users" section is checked. Then, click "OK".

Permissions for SDMPB		×
Security		
Object name: C:\SDMPB		
Group or user names:		
& Authenticated Users		
& SYSTEM		
& Administrators (MERCEDES A	dministrators)	
& Users (MERCEDES\Users)		
	Add	Remove
		5
Permissions for Users	Allow	Deny
Full control		
Modify	1	
Read & execute	\checkmark	
List folder contents	1	
Read	1	
Learn about access control and permissions		
OK	Cancel	Apply

BASINS, WinHSPF3.0, and WinHSPFIt

If BASINS, WinHSPF3.0, and WinHSPFIt have already been downloaded to the computer, skip this step; otherwise, proceed with the installation.

The BASINS installation package includes both forms of the HSPF model: WinHSPF3.0, the Windows version with a user-friendly, user interface and WinHSPFIt, the "lite" version associated with batch simulation for model calibration.

The version of BASINS being used with this workflow is one that has **NOT** been released through the BASINS download web site (i.e., <u>http://water.epa.gov/scitech/datait/models/basins/download.cfm</u>), as of yet. Hence, a beta version of the latest updates is available as an executable version, located at O:\Public\QMRA\Software for Download\BASINS-WinHSPF-HSPFIt.

1. The BASINS, WinHSPF3.0, and WinHSPFIt software can be retrieved at:

O:\Public\QMRA\Software for Download\BASINS-WinHSPF-HSPFlt

- Download "BASINS4.1.Update1a.2015.01.exe" to your computer, locating the file in a folder where you have administrative privileges, such as your user's folder (C:\Users\<your name>). BASINS4.1.Update1a.2015.01.exe is the InstallShield installation executable.
- 3. After downloading, run "BASINS4.1.Update1a.2015.01.exe", and follow the installation instructions.
- 4. The following setup window will appear.



5. Click "Next" and the following information page will appear.

🖉 Setup - BASINS		• X
Information Please read the following important information before continuing.		2
When you are ready to continue with Setup, dick Next.		
3ASINS 4.1 Update 1 - 2015-01-12		*
Any previous version of BASINS 4.x should be uninstalled before proceed	eding.	
Major Changes for Update 1:		=
 Updates the BASINS HSPF installation to version 12.4, providing new o wave routing options in RCHRES and binary output options from BMPRA 	dynamic (C	
- Integrates the HSPF BMP Toolkit for representation of Low Impact Dev (LID) controls and a Sewer and Open Channel Design Tool, both of whic calculate FTABLES for the HSPF model, within WinHSPF 3.0.	/elopment :h	:
- Provides an advanced wetlands setup capability within the BASINS HSI tool, with which a user can choose to represent wetlands as separate R	PF setup CHRES	Ŧ
< <u>B</u> ack Next >		Cancel

- 6. Click "Next", and the "Select Destination Location" window will appear.
- 7. Choose the folder location where you would like BASINS to be installed. It is typically installed in in "C:\BASINS41", as illustrated in the example below. If you only have administrative privileges in special locations on your computer (e.g., C:\Users\<your name>), you may want to install the software there.

💘 Setup - BASINS	
Select Destination Location Where should BASINS be installed?	2
Setup will install BASINS into the following folder.	
To continue, click Next. If you would like to select a different folder, click B	rowse.
C:\BASINS41	Browse
At least 493.9 MB of free disk space is required.	
< <u>B</u> ack Next >	Cancel

8. Click "Next" and you can specify a Start menu folder where the program's shortcuts will be located.

Setup - BASINS	
Select Start Menu Folder Where should Setup place the program's shortcuts?	
Setup will create the program's shortcuts in the following Start N	1enu folder.
To continue, click Next. If you would like to select a different folder, click	Browse.
BASINS	Browse
Don't create a Start Menu folder	
< <u>B</u> ack Next >	Cancel

9. Click "Next", and the following "Ready to Install" screen will appear:

Setup - BASINS	
Ready to Install Setup is now ready to begin installing BASINS on your computer.	2
Click Install to continue with the installation, or click Back if you want to revier change any settings.	w or
Destination location: C: \BASINS41	^
Setup type: Full installation	=
Selected components: BASINS Core Components Tiles plug-in: View web map background layer from OpenStreetMap HSPF and Related Programs SWAT Databases GWLF-E Desktop Icons	
٠	4
< <u>B</u> ack Install	Cancel

10. Click "Next", and then "Install". BASINS will be installed with HSPF.

🖉 Setup - BASINS	
Installing Please wait while Setup installs BASINS on your computer.	2
Extracting files C:\BASINS41\bin\Styles\Icons\Hotels\restaurant_mexican.png	
	Cancel

11. Once the BASINS installation is finished, shortcut icons for BASINS 4.1, WinHSPF 3.0, and WinHSPFIt will appear on your computer's Desktop.



WinHSPFIt is a "lite" version of WinHSPF 3.0 and can runs HSPF on a Command window (e.g., batch runs). WinHSPF 3.0 can run HSPF only through a user interface. WinHSPFIt is frequently coupled with other software such as PEST, FRAMES, etc.

If the icons do not appear on the Desktop, locate the following executables – BASINS.exe, WinHSPF.exe, and WinHSPFIt.exe – on the hard drive, where they are typically found in \BASINS41\bin, \BASINS41\models\WinHSPF30\bin, and \BASINS41\models\HSPF\bin, respectively.

SARA Timeseries Utility

Prior to installation, un-install any prior version of SARA Timeseries Utility tool. If asked whether to remove shared components, answer Yes.

1. The SARA Timeseries Utility software product and an associated WDM file can be retrieved from:

O:\Public\QMRA\Software for Download\SARA Timeseries Utility

- 2. Download the following zip file to the folder of your choice:
 - SARA_Timeseries_Utility.zip.
 - The zip file contains two files:
 - The executable saves text output as UTF-8, omits the Byte Order Marker at the beginning of the file, skips the title line in the file if the title is blank, and skips the date column if all date and time components are hidden.
 - The WDM file, 040301010406.wdm, is used in the tutorial, which demonstrates how a concentration time series is converted to a txt file (Whelan et al., 2015b). Typically, the wdm is located in the HSPF folder within the working folder (e.g., <working folder>\HSPF\).
 - In this example, it was saved to:

C:\Users\gwhelan\iemTechnologies\SARATimeSeriesUtility



2. Open the SARA_Timeseries_Utility.zip file by double-clicking on it, and choose the Unzip button.

	dealars & TimesCarical Mility & CAR	A Timor Coving Halling		
Computer V OSDISK (C:) V Users V gw	neian 🖡 TimeseriesUtility 🖡 SAF	A_TIMES_Series_Otility		
<u>F</u> ile <u>E</u> dit <u>V</u> iew <u>T</u> ools <u>H</u> elp				
Organize 🔻 Include in library 👻 Share with 💌	Burn New folder			
🚺 Links	▲ Name	*	Date modified	Type Size
Maxstat Lite MicrobialPropertyDB MicrobialPropertyDB	☑ 040301010406 ☆ SARA_Timese	.wdm ries_Utility_2015-08-13.exe	10/6/2014 6:08 PM 8/13/2015 11:31 AM	WDM File 1,400 KB Application 2,768 KB
Wy Music	🕄 🖫 🗂 🔿 = WinZip - S	ARA Times Series Utility.zip		
My Videos Sametime Transcripts	Unzip Edit	ihare Backup Tools	Settings View	Help Upgrade @
Baved Games	Folder name: SARA_Time	_Series_Utility	p Dropbox Google Sky	VDrive Search Selected Files
鷆 Temp 🌗 TimeSeriesUtility	Un:	ip	Drive Unzip to Cloud	Files
SARA_Times_Series_Utility	Name	Туре	Modified	Size
 SARA_Times_Series_Utility.zip USEPA VAN Communication 	SARA_Timeseries_Utility_2015 B 040301010406.wdm	08-13.exe Application WDM File	8/13/2015 11:31 AM 2 10/6/2014 6:08 PM 1	2 <u>834,229</u> L,433,600
	Selected 0 files, 0 bytes	Total	2 files, 4,168KB	

3. Run the installer titled SARA Timeseries Utility2015-08-13.exe by double-clicking on it, either from the folder

ⓒ ◯ マ 🖳 ▸ Computer ▸ OSDisk (C:) ▸ Users ኑ gwhelan	F	iemTechnologies 🕨 SARATimeSeriesUtility 🕨 SA	RA_Timeseries_Utility_2015-08-1:
<u> </u>			
Organize 🔻 Extract all files			
Þ 🌗 pest13	*	Name	Туре
4 🎉 SARATimeSeriesUtility		SARA Timeseries Utility 2015-08-13 eve	Application
SARA_Timeseries_Utility_2015-08-13.zip		E SAIN INTESENES_UTINEY_2013-08-15.626	мррисацон
D 🎉 SDMPB			
DMProjectBuilder_100214			
DMProjectBuilder_101714			
DMProjectBuilder 111214			

or from within the zip file.

💐 🔮 🚍 🗢 🖛	WinZip	- SARA_Tir	meseries_Utili	ty_2015-08-13	3.zip									x
Unzip	Edit	Share	Backup	Tools	Settings	View	Help	Upgrad	de					0
🚞 Folder name:	SARA_Tii	meseries_Ut	tility_2015-08-	13		-				All files				
뿝: Location:	C:\Users	\gwhelan\i	emTe\SARAT	ïmeSeriesUtili	ity Unzip	Dropbox	Google Drive	SkyDrive	Search	Selected F	iles			
		Unzij	p			Un	zip to Clo	ud		Files				
Ame Name					Туре			Modifie	ed		Size	Ratio	Packed	Path
SARA_Time	series_Uti	lity_2015-08	3-13.exe		Applicat	tion		8/13/20)15 11:31 /	AM	2,834,229	1%	2,811,	В
•														F
Selected 0 files, 0 byte	es					Total 1 f	ile, 2,768K	В					(

4. Running the installer as an Administrator may be required, depending on security settings and the chosen installation location. Place it in the file location you created earlier. A Shortcut icon for SARA Timeseries Utility should now be on your computer screen:



HSPF-PEST

If the user has already downloaded the correct version of "HSPF_PEST_flow.exe", "Input_flow.in", "HSPF_PEST_microbe.exe," and "Input_microbe.in" to the computer, skip this step; otherwise, proceed with the installation. "HSPF_PEST_flow.exe" and "HSPF_microbe.exe" are executables compiled with FORTRAN that prepares the inverse model PEST input files for HSPF flow and microbial parameter calibrations. "Input_flow.in" and "Input_microbe.in" are default input files that contain folder locations of HSPFIt [batch (or light) version of HSPF], observed data used in the calibration, and PEST. Users should place these files in a folder where they have administrative privileges.

1. "HSPF_PEST_flow.exe", "Input_flow.in", "HSPF_PEST_microbe.exe," and "Input_microbe.in" are located in a zip file, titled "HSPF-PEST.zip", which can be retrieved from:

O:\Public\QMRA\Software for Download\HSPF-PEST

- 2. Download "HSPF-PEST.zip" to any folder where the user has administrative privileges.
 - "HSPF_PEST_flow.exe" and "Input_flow.in" **MUST** be in the same folder.
 - "HSPF PEST microbe.exe," and "Input microbe.in" **MUST** be in the same folder.
 - In this example, the files were placed in "C:\Temp\SDMProject\Manitowoc\HSPF-PEST".



3. Unzip the file.

A REAL PROPERTY AND					_		x
SDMProject Manitowoc	• 1	HSPF_PEST + HSPF-PEST		✓ ⁴ → Search	n HSPF-PEST		٩
<u>F</u> ile <u>E</u> dit <u>V</u> iew <u>T</u> ools <u>H</u> elp							
Organize 👻 Include in library 👻 Sha	ire w	ith 🔻 Burn New folder				☷ ▾ 🔳	0
📕 Temp	*	Name	Ŧ	Date modified	Туре	Size	
J pb48sc B SDMProject		HSPF_PEST_flow.exe		9/16/2015 1:26 PM	Application	85 KB	
Manitowoc		Input_flow.in		11/25/2015 12:26	IN File	108 KB	
HSPF-PEST		Input_microbe.in		11/25/2015 12:26	IN File	1 KB	
KSPF-PEST.zip	Ŧ						
4 items							

FORTRAN Library

To properly execute PEST input files for HSPF parameter calibration which is an executable, the appropriate FORTRAN Library must be on the user's machine: "Intel® Visual Fortran Redistributables on IA-32". If this software already exists on the machine, skip this install; otherwise, proceed with this download to install.

- 1. Go to <u>https://software.intel.com/en-us/articles/redistributable-libraries-of-the-intel-c-and-fortran-compiler-for-windows</u>.
- Under "Links to the redistribution packages", download "Intel Visual Fortran Compiler for Windows 11.1 update 9 Redistribution library package for IA32" by clicking on "Redistribution library package for IA32".

11.1.060 update 5	11.1.060 update 5	
Redistributable library package for IA32 Redistributable library package for Intel 64 Redistributable library package for IA-64	Redistributable library package for IA32 Redistributable library package for Intel 64 Redistributable library package for IA-64	
Intel C++ Compiler for Windows 11.1.065 update 6	Intel Visual Fortran Compiler for Windows 11.1.065 update 6	
Redistributable library package for IA32 Redistributable library package for Intel 64 Redistributable library package for IA-64	Redistributable library package for IA32 Redistributable library package for Intel 64 Redistributable library package for IA-64	
Intel C++ Compiler for Windows 11.1.067 update 7	Intel Visual Fortran Compiler for Windows 11.1.067 update 7	
Redistributable library package for IA32 Redistributable library package for Intel 64 Redistributable library package for IA-64	Redistributable library package for IA32 Redistributable library package for Intel 64 Redistributable library package for IA-64	
Intel C++ Compiler for Windows 11.1.070 update 8	Intel Visual Fortran Compiler for Windows 11.1.070 update 8	
Redistributable library package for IA32 Redistributable library package for Intel 64 Redistributable library package for IA-64	Redistributable library package for IA32 Redistributable library package for Intel 64 Redistributable library package for IA-64	
Intel C++ Compiler for Windows 11.1 update 9	Intel Visual Fortran Compiler for Windows 11.1 update 9	
Redistributable library package for IA32 Redistributable library package for Intel 64 Redistributable library package for IA-64	Redistributable library package for IA3 Redistributable library package for Intel 64 Redistributable library package for IA-64	

3. Select a folder where you have administrative privileges. In this example, the folder was

C:\Users\gwhelan\DLL download\Library Package IA32\

- 4. Execute "w_cprof_p_11.1.072_redist_ia32.exe".
- 5. An "Open File Security Warning" window may appear. If so, click "Run", and a screen similar to the following may appear.



6. The "Preparing to Install..." window will appear, then disappear.



7. The InstallShield window will appear.



8. Click "Next" and accept the license agreement.

🕞 Intel(R) Visual Fortran Redistributables for Windows* on IA-32 - InstallShield Wiz
License Agreement
Please read the following license agreement carefully.
IMPORTANT - READ BEFORE COPYING, DISTRIBUTING, INSTALLING OR USING. Do not copy, distribute, install, or use the Materials provided under this license agreement ("Agreement"), until you have carefully read the following terms and conditions. By copying, distributing, installing, or otherwise using the Materials, you agree to be bound by the terms of this Agreement. If you do not agree to the terms of this Agreement, do not copy, distribute, install, or use the Materials.
End User License Agreement for the Intel(R) Visual Fortran Compiler 👻
I accept the terms in the license agreement Print I do not accept the terms in the license agreement
InstallShield < Back Next > Cancel

9. Click "Next", and the "Ready to Install the Program" screen will appear.

15 Intel(R) Visual Fortran Redistributables for Windows* on IA-32 - Installs	sniela wiz
Ready to Install the Program The wizard is ready to begin installation.	と
Click Install to begin the installation. If you want to review or change any of your installation settings, click Back. Cli the wizard.	ck Cancel to exit
InstallShield ————————————————————————————————————	Cancel

10. Click "Install".



11. If "User Account Control" window appears during the installation, click "OK".

🕞 Intel(R) Visual Fortran Redistr	ibutables for Windows* on IA-32 - InstallShield Wiz
	InstallShield Wizard Completed The InstallShield Wizard has successfully installed Intel(R) Visual Fortran Redistributables for Windows* on IA-32. Click Finish to exit the wizard.
	< Back <u>F</u>inish Cancel

12. When the installation is complete, click "Finish".

13. The FORTRAN Library is now on your machine.

PEST

If the user has already downloaded PEST to the computer, skip this step; otherwise, proceed with the installation.

1. Go to <u>http://www.pesthomepage.org/Downloads.php</u>, and under "PEST version 13.3", download the zip file titled "pest13.zip" by clicking "PC version of PEST".

PEST version 13.3

Download the lates OC version of PEST.

Unzip the contents to a directory cited in the PATH environment variable. (This is very important as, when undertaking SVD-assisted parameter estimation, PEST runs the *parcalc.exe* and *picalc.exe* utility programs. It is essential that the operating system knows where to find these).

Make sure that directories holding older versions of PEST are no longer in the PATH string, as old versions of *parcalc.exe* and *picalc.exe* are not compatible with the new PEST.

Download 64bit versions of certain programs of the PEST suite compiled using the Intel(R) 64 bit compiler.

Download BEOPEST for Windows.

Download the latest Unix version of PEST.

Unzip the contents to find a tar file with PEST source code, makefile and examples. Copy the tar file to a suitable directory on your machine, for example a directory named /pest. Then extract its contents using the "-xvf" switch. Follow the instructions provided in the documentation for Unix PEST (see the link in the "Documentation" section above).

- 2. Unzip "pest13.zip" to a folder where you have administrative privileges, such as your user's folder (C:\Users\<your name>).
 - In the example below, a folder named "PEST" was created on the C: drive, so the full folder extension is "C:\PEST", to indicate where "pest13.zip" was unzipped.

Organize ▼ Include in library ▼ Sh	are with Burn New folder			• • • •
Organize Include in library Sh Image: Computer Image: Computer Image: Computer Image: Computer Image: Computer Image: Computer Image:	are with Bun New folder Name doc Name doc edpestex papestex papestex pestex pestex addreg1exe assespar.exe beopest64.exe comaes_p.exe comfilmme.exe cov2cor.exe cov2cor.exe dercomb1.exe eigproc.exe	Date modified 3/11/2015 3:23 PM 3/12/2015 5:52 AM 1/3/2015 5:53 AM 1/3/2015 5:52 AM	Type File folder File folder File folder File folder File folder Application Application Application Application Application Application Application	E Contemporary Con
Geers Windows Windows Work Work Work	genlin.exe genlin.pred.exe identpar.exe identpar.exe infstat.exe infstat.exe identpar.exe infstat.exe infstat.exe identpar.exe identpa	1/3/2015 5:51 AM 1/3/2015 5:53 AM 1/3/2015 5:47 AM 1/3/2015 5:46 AM 1/3/2015 5:47 AM	Application Application Application Application	105 KB 257 KB 509 KB 529 KB 529 KB

There is no required installation process for PEST. The user can copy "pest.exe" from the folder where "pest13.zip" was unzipped and place it in a folder where the user can run "pest.exe" in a Windows Command Window. The PEST manual ("postman.pdf") can be found in the "doc" folder (see above figure). Running PEST separately will not be necessary, as an executable has been developed (HSPF_PEST_flow.exe) to automatically run PEST to calibrate flow parameters associated with an HSPF simulation.

DISCLAIMER

This document has been reviewed in accordance with U.S. Environmental Protection Agency policy and approved for publication.

REFERENCES

Whelan, G., R. Parmar, G.F. Laniak. 2015a. Microbial Source Module (MSM): Documenting the Science and Software for Discovery, Evaluation, and Integration. EPA/600/B-15/315. U.S. Environmental Protection Agency, Athens, GA.

Whelan, G., M. Gray, P. Duda, K. Wolfe, R. Parmar, M. Galvin, M. Molina. 2015b. Quantitative Microbial Risk Assessment Tutorial: Publishing a Microbial Density Time Series as a Txt File. EPA/600/B-15/274. U.S. Environmental Protection Agency, Athens, GA.