NUREG-XXXX



HABIT 2.0 User's Guide (Draft)

Version 1.0

July 2016

Office of the Regulatory Research Division of System Analysis/Radiation Protection Branch



HABIT 2.0 User's Guide (Draft)



Version 1.0

Manuscript Completed: July 2016 Date Published: TBD

Prepared by

United States Nuclear Regulatory Commission (NRC) Office of the Regulatory Research Division of System Analysis/Radiation Protection Branch Rockville, MD 20850



Leidos 30 W. Gude Drive, Suite 300 Rockville, MD 20850

Project Manager Dr. Casper Sun

Revision History

Date	Version	Description	Author
June 22, 2016	1.0	Final	Natalie Tran (Leidos)

Table of Contents

1	Introduction		7
	1.1 Purpo	ose	7
	1.2 Assu	mptions	7
	1.3 Appli	cable Documents	7
2	HABIT 2.0 I	nstallation	8
	2.1 Reco	ommended System Requirements	8
	2.2 Dowr	nload HABIT 2.0 Code	8
	2.3 Instal	llation of HABIT 2.0	8
3	Start to Usir	ng HABIT 2.0	13
	3.1 Exitin	ng the System	14
4	HABIT 2.0 F	Functions	15
	4.1 HABI	IT 2.0 Main Tab	15
5	System Sun	nmary	16
	5.1 Stand	dard Format	16
	5.2 HABI	IT 2.0 Design	17
	5.2.1	Information Bar	17
	5.2.2	Design Package Tabs	17
	5.2.3	Widget Use Guidelines	17
	5.2.4	Error Messages	18
	5.3 HABI	T 2.0 Design Function	20
	5.3.1	Create New Design	20
	5.3.2	Open Existing Design	21
	5.3.3	Save Design	22
	5.3.4	Copy Design	23
	5.3.5	Delete Design	25
	5.3.6	Import HABIT 1.1 Design	27
6	HABIT 2.0 N	Modules	32
	6.1 Chem	nical Modules	32
	6.1.1 EXTF	RAN	32
	6.1.2 CHEI	M	37
	6.1.3 DEG	ADIS	39
	6.1.4 SLAE	3	40
	6.2 Radio	ological Modules	41
	6.2.1 FPFF	p_2	41
	6.2.2 TAC1	Γ(5)	43
	6.2.3 CON	HAB	48

List of Figures

Figure 2-1: Windows Installer Warning Message	. 9
Figure 2-2: Installation Startup Window	. 9
Figure 2-3: Copyright and International Treaties Warning Window	10
Figure 2-4: Destination Folder Selection Window	10
Figure 2-5: Current Settings Summary Window	11
Figure 2-6: Installation in Progress Window	11
Figure 2-7: Installation Completed Message Window	12
Figure 2-8: Installed HABIT 2.0 Menu in Windows Start Menu	12
Figure 2-9: Installed HABIT 2.0 Shortcut on Desktop	12
Figure 2-10: HABIT 2.0 Program Maintenance	13
Figure 3-1: HABIT 2.0 Menu in Windows Start Menu	13
Figure 3-2: HABIT 2.0 Shortcut on Desktop	13
Figure 3-3: HABIT Main window	14
Figure 3-4: Exiting Application (Exit)	15
Figure 4-1: HABIT 2.0 Main window	16
Figure 5-1: Widget Use (Radio Button)	18
Figure 5-2: Widget Use (Check Box)	18
Figure 5-3: Validation Warning – input out of range	18
Figure 5-4: Error Message - invalid input	19
Figure 5-6: HABIT 2.0 Main Menu (Create New Design)	20
Figure 5-7: HABIT 2.0 New Design Name	20
Figure 5-8: HABIT 2.0 model (after module selection)	21
Figure 5-9: HABIT 2.0 Main Menu (Open Existing Design)	22
Figure 5-10: Select Design File	22
Figure 5-11: HABIT 2.0 Main Menu (Save Design)	23
Figure 5-12: Save Design message	23
Figure 5-13: HABIT 2.0 Main Menu (Copy Design)	24
Figure 5-14: Select Design to Copy	24
Figure 5-15: Name Design	24
Figure 5-16: Design Copied message	25
Figure 5-17: HABIT 2.0 Main Menu (Delete Design)	25
Figure 5-18: Select Design to Delete	26
Figure 5-19: Delete Design Confirmation	26
Figure 5-20: Delete Design Complete message	27
Figure 5-21: HABIT 2.0 Main Menu (Import HABIT 1.1 Design)	27
Figure 5-22: Select HABIT 1.1 Design File	28
Figure 5-23: Design Imported	28
Figure 5-24: DEGADIS Tab	29
Figure 5-25: Main Tab	30
Figure 5-26: Output Log Tab	31
Figure 5-27: Output Directory	32
Figure 6-1: EXTRAN Tab	32
Figure 6-2: Design Report (Required Parameters)	33
Figure 6-3: EXTRAN Graph	34
Figure 6-4: Design Report (All required entered)	34
Figure 6-5: EXTRAN Output Log	35
Figure 6-6: Example of graph using DEGADIS dense gas computation	36
Figure 6-7: CHEM Tab	37
Figure 6-8: CHEM Tab Error Message	38

Figure 6-9 Cl	HEM Graph (Concentration vs Time with Linear Toxic Limits)	.39
Figure 6-10:	DEGADIS Tab	.39
Figure 6-11:	SLAB Tab	.40
Figure 6-12:	FPFP_2 Tab (Spaces)	.41
Figure 6-13:	FPFP_2 Tab (Flow Rates)	.42
Figure 6-14:	TACT5 Tab (Nuclides)	.43
Figure 6-15:	TACT5 (Nuclides selections)	.44
Figure 6-16:	Select Using File warning message	.45
Figure 6-17:	Nuclide Selection File	.46
Figure 6-18:	TACT5 (Node Design)	.47
Figure 6-19:	CONHAB Tab (Plant Data)	.48
Figure 6-20:	CONHAB Tab (Meteorology or X/Q Data)	.49
Figure 6-21:	CONHAB Tab (Control Room Flow Data)	.50
Figure 6-22:	CONHAB Tab (Units)	.51

1 Introduction

HABIT V2.0 is a package of computer codes designed to assist in the evaluation of Light-Water Reactor (LWR) control room habitability in the event of accidental spills of toxic chemicals or the accidental release of radionuclides, including noble gas. It consists of a number of program modules and produces files containing tabular output that can be printed, viewed, or imported into spreadsheet programs for further applications. HABIT V2.0 also implements a heavy-gas dispersion model, unifies input screen of EXTRAN, DEGADIS and SLAB, and incorporates Bitter Mc-Quaid calculation to determine which model needs to run and provide plotting the concentration versus time outputs.

1.1 Purpose

This *User Guide* provides HABIT users with the information necessary to understand and use the application. This manual provides the HABIT user with information to create new, open existing, import, save or delete designs. Each of the HABIT V2.0 modules is documented, including screenshots of system windows (Figures) and explanatory notes.

1.2 Assumptions

This User Guide is directed toward individuals who have had some instructions and hands-on training with previous versions of HABIT and Microsoft Windows. It is assumed that users will have the following minimum skills and knowledge to use the HABIT 2.0:

- Familiar with Microsoft Windows 7.
- User allows changing measurement units from English to SI. Some selections will affect the values used in the Control Room Flow Data and Plant Data tabs as indicated in the manual. In addition, all dose, exposure rate, and radioactivity are displaced in English units, e.g., Rem, rem/hr., and Curie.

1.3 Applicable Documents

NUREG/CR-6210, "Computer code for Evaluation of Control Room Habitability (HABIT)," June 1996.

Maintenance, Operation, and Modernization (MOM) Functional Area 2 (FA2) Task Order 10: Integrate Dense-Gas Model(s) to HABIT Milestone 2 Report, March 2015.

2 HABIT 2.0 Installation

2.1 Recommended System Requirements

Windows:

- 1. Intel® Pentium® 4 or AMD Athlon® 64 processor (1.6 GHz or faster)
- Microsoft® Windows® 7 with Service Pack 1, Windows 8, or Windows 8.1
- 3. 2 GB of RAM (8 GB recommended)
- 4. 2 GB of available hard-disk space for installation; additional free space required during installation (cannot install on removable flash storage devices)
- 5. 1024 x 768 display (1280x800 recommended) with 16-bit color and 512 MB of VRAM (1 GB recommended)

2.2 Download HABIT 2.0 Code

HABIT 2.0 application code can be downloaded from United States Nuclear Regulatory Commission RAMP (Radiation Protection Computer Code Analysis and Maintenance Program) website (https://www.usnrc-ramp.com). HABIT 2.0 is only available for registered RAMP members with proper permissions.

2.3 Installation of HABIT 2.0

HABIT 2.0 application will be deployed through an installer. The installer will install the execution code, user interface, the available Nuclide Databases, and the Parameter Ranges files.

Downloaded file package HABIT20.zip include following contents:

- 1. HABIT 2.0 setup file: setup.exe
- 2. Demo test cases from HABIT 1.2
- 3. Dense Gas test cases developed for HABIT 2.0 by Dr. Tom Spicer
- 4. HABIT Quick Start Guide

If you have any earlier version of HABIT on your computer before you install the HABIT 2.0, YOU MUST UNINSTALL THE PREVIOUS VERSION OF THE HABIT. If you try to install HABIT 2.0 without uninstalling the program, the window will display following message.



Figure 2-1: Windows Installer Warning Message

Step 1 - Unzip and extract the contents of the HABIT20.zip file to your computer.

Step 2 - Once file been extracted, you will see the HABIT20 folder in extracted folder.

Step 3 - Open the HABIT20 folder and double click the setup.exe file and follow the onscreen prompts to install HABIT 2.0. When you do this, the below screens will appear:

Habit 2.0 - InstallShield Wizard	
2	Preparing to Install
	Habit 2.0 Setup is preparing the InstallShield Wizard, which will guide you through the program setup process. Please wait.
210	Extracting: Habit 2.0.msi
	Cancel

Figure 2-2: Installation Startup Window



Figure 2-3: Copyright and International Treaties Warning Window

Step 4 - When the above window appears... Click on "**Next**" button. When you do this, the below screens will appear:

🔂 Habit 2.0 - InstallShield Wizard	×
Destination Folder Click Next to install to this folder, or click Change to install to a different folder.	5
Install Habit 2.0 to: C:\Users\rea3\Documents\Habit\	<u>C</u> hange
InstallShield	Cancel

Figure 2-4: Destination Folder Selection Window

IMPORTANT – The destination folder will be slightly different form system to system, suggested to use default installation locations for easer use of HABIT 2.0.

Step 5 - When the above window appears... Click on "**Next**" button. When you do this, the below screen will appear:

🖟 Habit 2.0 - InstallShield Wizard	
Ready to Install the Program The wizard is ready to begin installation.	E
If you want to review or change any of your i the wizard.	nstallation settings, click Back. Click Cancel to exit
Current Settings:	
Setup Type:	
Typical	
Destination Folder:	
C:\Users\rea3\Documents\Habit\	
User Information:	
Name: Windows User	
Company: Nuclear Regulatory Commissi	n
InstallShield	
	< Back Install Cancel

Figure 2-5: Current Settings Summary Window

Step 6 - When the above window appears... Click on "**Install**" button. When you do this, the below screens will appear:

I	Habit 2.0	- InstallShield Wizard		
	Installing I The prog	Habit 2.0 ram features you selected are being	installed.	と
	17	Please wait while the InstallShield several minutes.	Nizard installs Habit 2.0. This may	take
T	nctallChiold			
	nstanoniela –		< <u>B</u> ack <u>N</u> ext >	Cancel

Figure 2-6: Installation in Progress Window

🕞 Habit 2.0 - InstallShield Wizar	d			
<u>ب</u>	InstallSh	ield Wizard C	Completed	
	The InstallSh Finish to exit	ield Wizard has suc the wizard.	ccessfully installed	l Habit 2.0. Click
		< <u>B</u> ack	Finish	Cancel

Figure 2-7: Installation Completed Message Window

Step 7 - When the above window appears... Click on "Finish" button.
Step 8 – Verify the HABIT 2.0 installation is successfully completed.
Click on "Start" button on Windows, You will see the HABIT 2.0 Menu as below:



Figure 2-8: Installed HABIT 2.0 Menu in Windows Start Menu

Also, you will see a HABIT 2.0 Shortcut on your computer Desktop as below.



Figure 2-9: Installed HABIT 2.0 Shortcut on Desktop

CONGRATULATIONS!!! HABIT 2.0 is successfully installed.

Note: You can re-run the setup.exe of HABIT 2.0 to modify, repair, or remove the program. See window below:

🖟 Habit 2.0 - Inst	allShield Wizard			
Program Mainte Modify, repair,	or remove the program.			
Modify	Change which program features are installed. This option displays the Custom Selection dialog in which you can change the way features are installed.			
 Repair Repair installation errors in the program. This option fixes missing or corrupt files, shortcuts, and registry entries. 				
<u>R</u> emove	Remove Habit 2.0 from your computer.			
InstallShield ———	< <u>Back</u> <u>Next</u> > Cancel			

Figure 2-10: HABIT 2.0 Program Maintenance

3 Start to Using HABIT 2.0

To run HABIT calculations, Click on "Start" button on Windows, click on "HABIT 2.0" Menu



Figure 3-1: HABIT 2.0 Menu in Windows Start Menu

Or double-click on the HABIT 2.0 icon, and the application will open



Figure 3-2: HABIT 2.0 Shortcut on Desktop

HABIT - Computer Codes for Evaluation of Contro Design Help Main EXTRAN CHEM FPFP_2 (1) FPFP_2 (2) Design Itle This is a blank design to get started.	I Room Habitability TACT5 (1) TACT5 (2) CONHAB DEGADIS S	LAB Output Log	2 ×
Model	nuclides	Chemicals	Included Codes <u>Chemicals</u> EXTRAN
Use same data for filtered paths 1 and 2	<u>A</u> FPFP_2 (1) <u>B</u> FPFP_2 (2) filt 1 Unfilt 2	EXTRAN	CHEM <u>Radionuclides</u> <u>EPFP_2 (1)</u> <u>FPEFP_2 (2)</u>
Fit 1 Fit 2 (recirc) TACT5 (2)	<u>C</u> ONHAB	CHEM	T <u>A</u> CT5 (1) TACT <u>5</u> (2) C <u>O</u> NHAB <u>Dispersion</u> DEGADIS
Key Code Included in Design	Code Not Included in Design	<u>Code Computations Ran</u> <u>in Session</u>	SLAB Only Show Codes Included
			DesignName ,;

Figure 3-3: HABIT Main window

The application will automatically load the last saved design and its associated modules (if exists). Otherwise, the application will load a blank design and the user will be able to choose which modules should be included in the design.

3.1 Exiting the System

To exit HABIT 2.0, select **Design** > **Exit** from the Main Menu Bar or click on the **X** (upper right corner of application window) to close the window.

HABIT - Compute	er Codes for Evaluation of Co	ntrol Room Habitabilit	у			?	x
Design Help							
Create New D	esign Design to get start	(2) TACT5 (1) TACT5 ((2) CONHAB DEGADIS	SLAB Output Log			
Save Design							
Import HABIT	1.1 Design						-1
Exit	Ra	dionuclides		Cherr	nicals	Included Codes	
	Use same data for filtered paths 1 and 2	<u>A</u> FPFP_2 (1) Unfilt 1	<u>₿</u> FPFP_2 (2) Unfilt 2	EXT	RAN	Chemicals EXTRAN CHEM Radionuclides EPFP_2 (1) FPEP_2 (2)	

Figure 3-4: Exiting Application (Exit)

The application will provide a prompt to give the user the ability to save the design before exiting.

4 HABIT 2.0 Functions

Starting from the HABIT 2.0 Main Menu, the user can perform many functions, including:

- 1. Create New Design
- 2. Open Existing Design
- 3. Save Design
- 4. Copy Design
- 5. Delete Design
- 6. Import HABIT 1.1 Design
- 7. Configuration
- 8. Exit

4.1 HABIT 2.0 Main Tab

The Main tab provides a visualization of the design package (See Figure 4-1: HABIT 2.0 Main window) and controls the execution of the other components. This tab includes a flow diagram which shows the dependencies amongst all the HABIT modules. The visual styling of this flow diagram allows the user to see what modules are included in the design package as well as which modules have been run in the current session (since last program restart). The user can use the flow diagram boxes to navigate to their respective tab page. Additionally, users have the option to change what modules should be included in the design and whether to show only the included modules in the flow diagram.



Figure 4-1: HABIT 2.0 Main window

5 System Summary

5.1 Standard Format

The new user interface for HABIT 2.0 uses a Tabbed Document Interface (TDI) which allows all the major functions to be contained within tabs in a single window. Each instance of a module (EXTRAN, CHEM, FPFP_2, TACT5, CONHAB, DEGADIS, and SLAB)¹ is contained within its own tab document. The single window containing the TDI is the Design Package window. This window coordinates the display and execution of the individual modules and well as performing functions which are design-centric (e.g. saving all the files which are part of the design package). The Design window contains a main menu bar on the top and an information bar at

¹ The meaning of the acronyms are: EXTRAN is external transport; CHEM is chemical; FPFP is flow path and filter path; TACT is transport of radioactivity; CONHAB is control room habitability, DEGADIS is dense gas dispersion model and SLAB is an atmospheric dispersion model for denser than air releases.

the bottom. The application has been designed for optimal display at a resolution of 1024x768 pixels, but is adaptable to support other resolutions.

The colors for the application are changed in order to increase consistency across the application. All modules in HABIT 2.0 have similar color schemes. The Control Room Flow Diagrams use high contrast colors and share the same color scheme as flow diagrams in other modules.

5.2 HABIT 2.0 Design

Main Menu Bar

The main menu bar is on the top of the window and allows the user to perform general file actions against the Design package and access to the Help. These actions against the Design package include:

- 1. Creating a New Design Package,
- 2. Opening an Existing Design Package
- 3. Saving the Design Package
- 4. Copying the Design Package
- 5. Deleting the Design Package
- 6. Importing in an HABIT 1.1 Design Package (.i.e., dsg file)

The main menu bar uses Windows standard dropdown menus. Additionally, this menu bar allows the user to access options and settings for the design and modules.

5.2.1 Information Bar

The information bar is at the bottom of the window and displays information about the currently loaded design. The bottom right corner displays the name of the loaded design while the bottom left corner displays the loaded filename (design file name or input file).

5.2.2 Design Package Tabs

The Main tab and the Output Log tab are tabs which are required by the application to manage the design package and to direct MS-DOS output from the FORTRAN formulations and computations so they are visible from within the application.

5.2.3 Widget Use Guidelines

• **Radio buttons** are used when there is a list of two or more options that are mutually exclusive, and the user must select exactly one choice. There is a default selection.

Release Type	Conc Units	Input Selection
Liquid Tank Burst		I Spill Parameters
Liquid Tank Leak	O ppm	O 2 Meteorological Parameters
Gas Tank Burst	O mCi/m3	O 3 Chemical Parameters
🔘 Gas Tank Leak		

Figure 5-1: Widget Use (Radio Button)

- **Check boxes** are used when there are lists of options, and the user may select any number of choices, including zero, one, or several.
- A stand-alone check box is used for a single option that the user can either select or clear.



Figure 5-2: Widget Use (Check Box)

5.2.4 Error Messages

There are several ways which HABIT 2.0 displays validation messages to users.

1. Field validation warnings (see Figure 5-3: Validation Warning – input out of range).

Main EXTRAN CHEM Output Log		
Run <u>T</u> itle	Load Inc	out Clear Values
		Run
Control Room Volume (ft³)	No Times Defined	
Control Room Flow	The value 0 is out of range. The valid range is between	3531.467 and 706293.4.
Step # : 1 • + Time (<u>h</u> rs) :	0 Delete Time	Convert numerical values ?

Figure 5-3: Validation Warning – input out of range

These validation warnings alert the user that the value in the field is out of range or the value is required. While it is recommended these validation warnings be fixed before the codes are run, the application does allow attempts to run the FORTRAN code despite the warnings.



2. Field validation errors (see Figure 5-4: Error Message - invalid input)

Figure 5-4: Error Message - invalid input

These validation errors occur when trying to enter alphabetic characters in a numeric field. These errors must be fixed before data entry can continue.

3. Module specific validation (see Figure 5-5: Error Messages – input missing)



Figure 5-5: Error Messages – input missing

This type of validation is specific to the EXTRAN module. It checks for all required parameters required by the EXTRAN FORTRAN code. A summary of the validation is provided to the user. The application allows the user to attempt to run the FORTRAN code even if data is missing.

5.3 HABIT 2.0 Design Function

5.3.1 Create New Design

To create a new design, select **Design > Create New Design** from the Main Menu Bar

<u>ы</u> н	ABIT - Computer C	odes for Evaluation of (Control Room H	labitability					? 🗙
Des	ign Help								
6	Create New Desig	n							
	Open Existing Des	ign 📃							
	Save Design								
P	Copy Design								
	Delete Design								
	Import HABIT 1.1	Design							
0	Configuration								
×	Exit	R	adionuclio	des		Cl	emicals		
								Included Codes	
			A FPFP	2(1)	B FPFP 2 (2)		EXTRAN		
				- 17				CHEM	
			Unfilt 1	Unfilt	2			Radionuclides	
	Use filter	esame data for red paths 1 and 2						FPFP_2 (1)	
					V			FPFP_2 (2)	

Figure 5-6: HABIT 2.0 Main Menu (Create New Design)

A prompt will appear to enter a name for the design. The design name can be up to 50 ASCII characters. The entered design name is used for the name of the storage directory for the design package as well as the prefix for the design and module input file names.

New Design Name	x T
Enter a name for the design (up to 50 characters)	ОК
	Cancel

Figure 5-7: HABIT 2.0 New Design Name

Enter title in Design Title, and select the desired modules to include in the design by clicking on the checkbox (es) in the Included Codes group box. As modules are included, note the tab on the top will display the tab page for included modules and will remove the tab page for any modules not included. Additionally, note that included modules are now represented by a different visual style in the model tab page.



Figure 5-8: HABIT 2.0 model (after module selection)

Navigate through the tabs and input the appropriate values. Refer to HABIT Modules section for more details on each individual module.

5.3.2 Open Existing Design

To load an existing design, select **Design > Open** Existing Design.

<u>ы</u> ни	ABIT - Computer Codes for Evalua	tion of Control Room I	Habitability					? x
Des	sign Help							
0	Create New Design							
	Open Existing Design							
	Save Design							
P	Copy Design							
	Delete Design							
4	Import HABIT 1.1 Design							
۲	Configuration							
×	Exit	Radionucli	ides		С	hemicals	Included Codes	
							Chemicals	
		A FPFP	2(1)	B FPFP_2 (2)		EXTRAN	CHEM	
	Use same data for filtered paths 1 and 2	Unfilt 1	Unfil	12			Radionuclides	

Figure 5-9: HABIT 2.0 Main Menu (Open Existing Design)

Select the design XML file to load and click Open. By default, design XML files are stored in the user's Documents folder, under the HABIT/Designs/<Design Name> subdirectory.

Select Design File			x
COO- 📕 « HAB	IT 🕨 Designs 🕨 TestcaseAll	✓ 4→ Search	TestcaseAll
Organize 🔻 New	folder		:= • 🔟 🔞
★ Favorites ■ Desktop	Documents library		Arrange by: Folder -
🐌 Downloads	Name	Date modified	Type Size
™ Recent Place ■	TestcaseAll.xml	05/11/2016 3:44 PM	XML Docu 10 KB
Eibraries	TestcaseAll_EXTRAN.XML	05/11/2016 3:44 PM	XML Docu 2 KB
J Music			
Pictures			
Videos			
🖳 Computer			
🚢 (C:) OS 🛛 👻	•	III	Þ
F	ile name:	▼ XML Fil	e (*.xml) n Cancel

Figure 5-10: Select Design File

The loaded design will display on the Model tab. The modules included in the design will be loaded. The tabs for the included modules will be available for editing with previously saved values already loaded.

5.3.3 Save Design

To save a design, select **Design > Save Design**

HABIT - Computer Codes for Evalu	uation of Control Room Habitability		?
Design Help	_		
Create New Design) FPFP_2 (2) TACT5 (1) TACT5 (2) CONHAB DEGADIS S	SLAB Output Log	
Save Design			
🗊 Copy Design			
🐻 Delete Design			
📄 Import HABIT 1.1 Design			
Configuration			
X Exit	Radionuclides	Chemicals	Included Codes
	A FPFP_2 (1) B FPFP_2 (2)	EXTRAN	Chemicals V EXTRAN V CHEM

Figure 5-11: HABIT 2.0 Main Menu (Save Design)

Saving the design will save the design XML file as well as the input files for each module included in the design (inp files, nuc files, etc.). If the application does not encounter any problems writing the design package to disk, the system will display a pop-up message indicating success.

If saving the design for the first time, the application will prompt the user to create the directory for which the design package will be saved under. It will also prompt the user to enter a name for the design XML file (if user wants it to be different from the design name).



Figure 5-12: Save Design message

5.3.4 Copy Design

To copy a design from another file, select **Design > Copy Design**

🛄 HABIT - Compu	ter Codes for Evaluation of Control Room Habitability		? <mark>×</mark>
Design Help			
Create New	Design) FPFP_2 (2) TACT5 (1) TACT5 (2) CONHAB DEG/	ADIS SLAB Output Log	
Save Design			
👘 Copy Design	1		
🛛 🐻 Delete Desig	n		
🔒 Import HABI	IT 1.1 Design		
Configuration	n		
X Exit	Radionuclides	Chemicals	Included Codes
	A FPFP_2 (1) B FPFP_2 (2)	EXTRAN	<u>Chemicals</u> ✓ EXTRAN ✓ CHEM

Figure 5-13: HABIT 2.0 Main Menu (Copy Design)

Once the Select Design to Copy window opens, select the file to copy

🧾 Select Design To Cop	ру			×	
💮 🕞 – 🚺 « HAB	8IT ► Designs ► TestcaseAll	▼ ⁴ 7	Search TestcaseAll	۶	>
Organize 🔻 New	folder		:= •		
★ Favorites ► Desktop	Documents library TestcaseAll		Arrange by:	Folder 🔻	
Downloads	Name				
Kecent Place =	TestcaseAll.xml				
📜 Libraries	TestcaseAll_EXTRAN.XML				
Documents					
J Music					
Pictures					
Videos					
🖳 Computer					
🚢 (C:) OS 🛛 🗸	•				Þ
	File <u>n</u> ame:	•	XML File (*.xml)	•	
			Open	Cancel	H

Figure 5-14: Select Design to Copy

Enter a new name for the copied design and click OK

×
ОК
Cancel

Figure 5-15: Name Design



Figure 5-16: Design Copied message

When copying a design, the application will copy the input files from the source design package into the copy design package. All files in the copy design will use be prefixed with the design name. After the design is copied, the copy will be loaded as the currently edited design.

5.3.5 Delete Design

To delete a design, select **Design > Delete Design**

U	HA	ABIT - Computer Codes for Evalua	ation of Control Room Habitability		? ×			
	Desi	Jesign Help						
		Create New Design Open Existing Design Save Design) FPFP_2 (2) TACT5 (1) TACT5 (2) CONHAB DEGADIS S to get started.	ILAB Output Log				
	0 0	Copy Design Delete Design						
ľ	+	Import HABIT 1.1 Design						
ľ	<u></u>	Configuration						
ŀ	×	Exit	Radionuclides	Chemicals	Included Codes			
			A FPFP_2 (1) B FPFP_2 (2)	EXTRAN	V EXTRAN			

Figure 5-17: HABIT 2.0 Main Menu (Delete Design)

Once the Select Design to Delete window opens, select the file to delete and click > Open



Figure 5-18: Select Design to Delete

A confirmation of the Design Delete will display. Click on "**Yes**" button to continue with the delete. The delete function will delete all files associated with a particular design.

Delete Design	<
Pattern: C:\Users\NHT1\Documents\HABIT\TestCases\TestCase1\TestCase1** Files: C:\Users\NHT1\Documents\HABIT\TestCases\TestCase1\TestCase1.xml C:\Users\NHT1\Documents\HABIT\TestCases\TestCase1\TestCase1CB.INP C:\Users\NHT1\Documents\HABIT\TestCases\TestCase1\TestCase1CG.INP C:\Users\NHT1\Documents\HABIT\TestCases\TestCase1\TestCase1CG.INP C:\Users\NHT1\Documents\HABIT\TestCases\TestCase1\TestCase1DG.INP C:\Users\NHT1\Documents\HABIT\TestCases\TestCase1\TestCase1FPA.INP C:\Users\NHT1\Documents\HABIT\TestCases\TestCase1\TestCase1FPA.INP C:\Users\NHT1\Documents\HABIT\TestCases\TestCase1\TestCase1FPA.INP C:\Users\NHT1\Documents\HABIT\TestCases\TestCase1\TestCase1FA.INP C:\Users\NHT1\Documents\HABIT\TestCases\TestCase1\TestCase1TSA.INP C:\Users\NHT1\Documents\HABIT\TestCases\TestCase1\TestCase1TSA.INP C:\Users\NHT1\Documents\HABIT\TestCases\TestCase1\TestCase1TSA.NUC C:\Users\NHT1\Documents\HABIT\TestCases\TestCase1\TestCase1TSA.NUC C:\Users\NHT1\Documents\HABIT\TestCases\TestCase1\TestCase1TSB.NVC C:\Users\NHT1\Documents\HABIT\TestCases\TestCase1\TestCase1TSB.NUC C:\Users\NHT1\Documents\HABIT\TestCases\TestCase1\TestCase1TSB.NUC C:\Users\NHT1\Documents\HABIT\TestCases\TestCase1\TestCase1TSB.NUC C:\Users\NHT1\Documents\HABIT\TestCases\TestCase1\TestCase1TSB.NUC C:\Users\NHT1\Documents\HABIT\TestCases\TestCase1\TestCase1TSB.NUC C:\Users\NHT1\Documents\HABIT\TestCases\TestCase1\TestCase1TSB.NUC C:\Users\NHT1\Documents\HABIT\TestCases\TestCase1\TestCase1TSB.NUC	
Yes <u>N</u> o	

Figure 5-19: Delete Design Confirmation



Figure 5-20: Delete Design Complete message

5.3.6 Import HABIT 1.1 Design

When a user selects **Design > Import HABIT 1.1 Design** from the Main Menu Bar, the user can select to import previously created design examples from version 1.1.



Figure 5-21: HABIT 2.0 Main Menu (Import HABIT 1.1 Design)

Select HABIT 1.1 Design File will be displayed. Navigate to the appropriate HABIT Design (.dsg) File, select the file, and click Open.

Select HABIT 1.1 Design File					
💮 🗸 – 🕌 « My E)ocun	nents 🕨 Habit 🕨 DEFAULT	▼ 47	Search DEFAULT	Q
Organize 🔻 New	folder				· 🔳 🔞
ጵ Favorites 📃 Desktop		Documents library		Arrange by:	Folder 🔻
\rm Downloads 🖳 Recent Places		Name		Date modified	Туре
		Noi	tems match yo	ur search.	
🥃 Libraries	=				
Documents					
J Music					
Pictures					
Mideos 💾					
👰 Computer					
🏭 System (C:)					
	Ŧ	•	111		÷.
F	ile na	me:	-	DSG File (*.DSG)	•
				Open	Cancel

Figure 5-22: Select HABIT 1.1 Design File

If successful, the Design Import informational message will display with the imported directory.



Figure 5-23: Design Imported

Navigate through the available tabs to make any desired update and click on Run button.

Figure 5-24: DEGADIS Tab

Once the design computation ran, the Design Model will indicate its completion on the models tab (in green).



Figure 5-25: Main Tab

The Output Log will display the MS-DOS output of the running designed packages. The Output is appended to this log (for the session), but can be cleared by clicking on Clear Log button.

Li HABIT - Computer Codes for Evaluation of Control Room Habitability
Design Help
Main EXTRAN CHEM FFFP_2 (1) FFFP_2 (2) TACT5 (1) TACT5 (2) CONHAB DEGADIS SLAB Output Log
Entry Defined (Electrining) (Initiger) (Initiger) (Exists) (ESC) (EXE Enter name of mass balance output file: C-Users/WHT/Documents/WABIT/Designa/TESTNT/TESTNTEX.MB Enter name of output file for use is spreadthet: C-Users/WHT/Documents/WABIT/Designa/TESTNT/TESTNTEX.SPD COMPUTING MODEL RUN PARAMETERS Now dang computations: The find = -6 r to 0000 +b 0000 +b 0000 +b 0000 +b 0000 +b 0003 +b
Cancel Running Computations Clear Log View Output Directory

Figure 5-26: Output Log Tab

To view the Output Directory and the files created from the FORTRAN code, click on View Output Directory button.

<u>F</u> ile <u>E</u> dit <u>V</u> iew <u>T</u> ools <u>H</u> elp						
Organize 🔻 🛛 In	clude in library Share with Burn	New folder			•	0
쑦 Favorites	Name	Date modified	Туре	Size		
🧮 Desktop	UTOPT.DAT	05/31/2016 5:13 PM	DAT File	1 KB		
鷆 Downloads	TESTNT.xml	05/31/2016 5:13 PM	XML Document	10 KB		
🔚 Recent Pla	TESTNT_EXTRAN.XML	05/31/2016 5:13 PM	XML Document	2 KB		
	TESTNTCB.INP	05/31/2016 5:13 PM	INP File	3 KB		
🥃 Libraries	TESTNTCH.INP	05/31/2016 5:13 PM	INP File	3 KB		
📄 Document	TESTNTDG.BAT	05/31/2016 5:10 PM	Windows Batch File	1 KB		
🁌 Music	TESTNTDG.INP	05/31/2016 5:13 PM	INP File	1 KB		
Pictures	TESTNTDG.lis	05/31/2016 5:10 PM	LIS File	70 KB		
🛃 Videos	TESTNTDG.tr2	05/31/2016 5:10 PM	TR2 File	5 KB		
	TESTNTEX.CNX	05/31/2016 5:13 PM	CNX File	14 KB		
👰 Computer	TESTNTEX.INP	05/31/2016 5:13 PM	INP File	2 KB		
ڏ (C:) OS	TESTNTEX.MB	05/31/2016 5:13 PM	MB File	1 KB		

Figure 5-27: Output Directory

6 HABIT 2.0 Modules

6.1 Chemical Modules

6.1.1 EXTRAN

EXTRAN determines the release rate of a chemical in the event of release due to leaks or ruptures of liquid or gas tanks. The EXTRAN tab displays the design of the EXTRAN module with required fields indicated by a red 'R' label. The values for the parameters will be prepopulated when importing from previous design; else the user can enter in the appropriate values. When hovering the mouse over the field, the system will display the valid range for that field.

HABIT - Computer Codes for Evaluation	of Control Room Habitability			? ×
<u>D</u> esign <u>H</u> elp				
Main EXTRAN CHEM Output Log				
Run <u>T</u> itle EXTRAN-DEGADIS Integra	ation Case 1a. Liquid Tank Leak -	Two Phase Flashing		
			Load Inp	out <u>C</u> lear Values
				Run EXTRAN
Release Type	Conc Units	Input Selection	Dense Gas Variables	
 Liquid Tank Burst 	• g/m3	<u>1</u> Spill Parameters	Britter-McQuaid	
Liquid Tank Leak	⊙ ppm	O <u>2</u> Meteorological Parameters		
🔿 Gas Tank Burst	⊙ mCi/m3	O <u>3</u> Chemical Parameters	Relative Humidity (%)	55
🔿 Gas Tank Leak			Surface Roughness (m)	.03
Legend EXTRAN Spill I	Parameters		Vapor Phase Heat	
R = Required			Capacity (J/kg/K)	478.3
O = Optional R 907	Initial Mass (kg	or Ci)	(Gauge) Storage	
N = Not Used R 10	Release Rate (Release Rate (kg/s or Ci/s)		
0 0	Release Height	t (m) 🔪		
Check Inputs R 20	Storage Temps	ature (°C)		
Plot Results	-40 <= value <= 50	is (m)		
D 200	Distance to inte			
R 200	Distance to inta	ake (m)		
O 15	Intake height (r	n)		
0	Building Area (r	n2)		
N	Vent flow rate ((m3/s)		

Figure 6-1: EXTRAN Tab

- The Load Input button allows the user to load EXTRAN input variables from a valid EXTRAN input file (inp). This function is generally not necessary since the input variables are automatically loaded for any previously saved design.
- The Clear Values button will clear the EXTRAN input variables.

- The Run button will execute the EXTRAN FORTRAN code against the variables inputted in this tab.
- The Check Inputs button will perform required field validation on the input variables and provide a report to the user of required fields (Figure 6-2: Design Report (Required Parameters)).
- The Plot Results button will create a graph plotted with the concentration output. Time scale and Toxic Limit can be adjusted by using the slider (Figure 6-3: EXTRAN).
- Clicking on Release Type will change the fields which are required for proper EXTRAN FORTRAN code computations.
- Clicking on Input Selection radio button to enter the EXTRAN values for Spill Parameters, Meteorological Parameters and Chemical Parameters.



Figure 6-2: Design Report (Required Parameters)



Figure 6-3: EXTRAN Graph

Once all required values are entered, click on Run EXTRAN button to save the design and module input variables and run the EXTRAN FORTRAN code with the entered input variables. A popup indicating all required fields have been entered will display.



Figure 6-4: Design Report (All required entered)

Click OK and user will be taken to the Output Log tab where a popup will display with the option to run the DEGADIS dense gas computation code.



Figure 6-5: EXTRAN Output Log

An appropriately plotted graph will display based on user's preference to run the dense gas calculations (Figure 6-6: Example of graph using DEGADIS dense gas).



Figure 6-6: Example of graph using DEGADIS dense gas computation

6.1.2 CHEM

CHEM is used for estimating chemical exposures, models the dilution of the chemical by flows in the control room, and determines the chemical exposure to control room personnel. The CHEM tab displays the design of the CHEM module. The values for the parameters will be prepopulated when importing from previous design; else the user can enter in the appropriate values.



Figure 6-7: CHEM Tab

- The Load Input button allows the user to load a CHEM input variables from a valid CHEM input file (inp). This function is generally not necessary since the input variables are automatically loaded for any previously saved design.
- The Clear Values button will clear the CHEM input variables and reset the number of CHEM Steps.
- The Run CHEM button will execute the CHEM Fortran code against the variables inputted in this tab.

- The Step "+" and "-" buttons allows the user to add and navigate through the variables for each time step of the CHEM simulation. In order to enter add a time step, a time value must be entered in the Time (hrs.) textbox, then the + will be clickable.
- The Delete Time button allows the user to delete the currently displayed time step
- The Units radio buttons allows the user to change measurement units from English units to SI units. Selections here will affect the display of the Control Room Flow.

The CHEM module uses the results of EXTRAN so EXTRAN needs to be run as a prerequisite. An error message will display if attempting to run CHEM module without EXTRAN.



Figure 6-8: CHEM Tab Error Message

As with EXTRAN module, a Concentration versus Time graph will be plotted and displayed based on input entered or loaded.



Figure 6-9 CHEM Graph (Concentration vs Time with Linear Toxic Limits)

6.1.3 DEGADIS

The DEGADIS tab provides the functionality of the DEGADIS (Dense Gas Dispersion Model) modules and contains four tabs: Atmospheric Parameters, Material Specifics, Release Specifics, and Graph. The values for the parameters will be pre-populated when importing from previous design; from running EXTRAN module, else the user can enter in the appropriate values.

HABIT - Computer Codes for Evaluation of Control Room Habitability	? ×
Design Help	
Main DEGADIS Output Log	
Run Title : Load Input Quer Values	
Atmospheric Parameters Material Specifics Release Specifics Graph	
Windspeed (m/s): 6.000000000000 Evation (m): 10.000000000000 Surface Roughness (m): 1.00000000000000 Stability Class: D<	
	Natalie 💥

Figure 6-10: DEGADIS Tab

- The Load Input button allows the user to load DEGADIS input variables from a valid DEGADIS input file (inp). This function is generally not necessary since the input variables are automatically loaded for any previously saved design or from the EXTRAN module's run.
- The Clear Values button will clear the DEGADIS input variables

• The Run DEGADIS button will execute the DEGADIS FORTRAN code against the variables entered in this tab.

6.1.4 SLAB

The SLAB tab provides the functionality of the SLAB (Dense Gas Model) modules that simulates the atmospheric dispersion of denser-than-air releases.

La HABIT - Computer Codes for Evaluation of Control Room Habitability	?
Design Help	
Main DEGADIS SLAB Output Lon	
Colput bog	
	Load Input Clear Values
	Run SLAB
-Source Properties	Source Type and Numerical Step Parameters
Source :	Spill Source Type :
Molecular Weight of source material (kg) : 0.	Substep Multiplier : 0
Vapor heat capacity at constant pressure (/kg-K): 0.	
Boiling Point Temperature (K): 0.	
Initial Liquid Mass Fraction : 0,	- Spill Parameters
Heat of vaporization (j/kg): 0.	Temperature of source material (K): 0,
Liquid heat capacity ()/kg-K) : 0.	Mass source rate (kg/s): 0.
Liquid density of source material (kg/m**3) : 0.	Source area (m**2): 0.
Saturation pressure constant : 0.	Continuous source duration (s) : 0
Saturation pressure constant : 0.	Instantaneous source mass (kg): 0.
	Source height (m): 0.
Field Parameters	Meteorological Parameters
Concentration averaging time (s): 0.	Surface roughness height (m): 0.
Maximum downwind distance (m) : 0.	Ambient measurement height (m): 0.
Height of concentration (1) (m) : 0.	Ambient wind speed (m/s): 0.
Height of concentration (2) (m) : 0.	Ambient Temperature (K): 0.
Height of concentration (3) (m) : 0.	Relative humidity (%): 0.
Height of concentration (4) (m) : 0.	Stability Class :
	Inverse Monin-Obukhov length (1/m): 0.
C:\Users\NHT1\Documents\HABIT\Designs\Natalie\NatalieSLAB.INPUT	Natalie



- The Load Input button allows the user to load SLAB input variables from a valid SLAB input file (inp). This function is generally not necessary since the input variables are automatically loaded for any previously saved design or from the EXTRAN module's run.
- The Clear Values button will clear the SLAB input variables
- The Run SLAB button will execute the SLAB FORTRAN code against the variables entered in this tab.

6.2 Radiological Modules

6.2.1 FPFP_2

The FPFP_2 is used to model radioactive flow through the plant and determine doses in the control room associated with the accidental releases of radionuclides. The design allows for two separate instances of FPFP_2; each of these instances has its own tab. Within each FPFP modules are Spaces and Flow Rates tab. The values for the parameters will be pre-populated when importing from previous design; else the user can enter in the appropriate values.

HABIT - Computer Codes for Evaluation of Cor	ntrol Room Habitability			? <mark>×</mark>
<u>D</u> esign <u>H</u> elp				
Main EXTRAN CHEM FPFP_2 (1) Output L	og			
Run Itie				Load Input Gear Values
Particle Diameter <u>M</u> ultiplier :				
Spaces How Rates				
Spaces (Space 2 is END)	Dimensions (feet)		Puff Release at Time = 0	
Space # 1 +	Height Width	Length	 Yes No Core Fractions / ft ³ Noble Gases Halogens 	Solids
- Space Туре				
<u> </u>				
⊙ <u>D</u> uct	L			
◯ <u>F</u> ilter	Active Sprays	@ N-	Natural Disposition	Lambdas
○ Registance	Time ON (min)	Time OFF (min)	Dispessition Lambdas (14m)	Landuas
○ <u>E</u> nd			Halogens Solids	
	Spray Height (ft)	Flow Rate (GPM)		
C:\Users\NHT1\Documents\HABIT\TestCases\cas	e2a\case2aFPA.INP			case2a:

Figure 6-12: FPFP_2 Tab (Spaces)

Li HABIT - Computer Codes for Evaluation of Control Room Habitability	? 🗙
Design Help	
Main EXTRAN CHEM FPFP_2 (1) Output Log	
Run Itile	Load Input Qear Values <u>B</u> un FPFP_2
Spaces Row Bates	
Node : 1 - + Step : 1 - + Time (min) : 0	Delete Time
Continuous Source Inflow Conc. (Core Fraction / ft?) Space #1 (Room) Noble Gas Balance Downstream Temp (C) End of Flow Path Solids Downstream Press PSIG	
Show Previous Use Previous	*All flow rates are ACFM
C:\Users\NHT1\Documents\HABIT\TestCases\case2a\case2aFPA.INP	case2a ,;;

Figure 6-13: FPFP_2 Tab (Flow Rates)

- The Load Input button allows the user to load an FPFP_2 input variables from a valid FPFP_2 input file (inp). This function is generally not necessary since the input variables are automatically loaded for any previously saved design.
- The Clear Values button will clear the FPFP_2 input variables and reset the number of Spaces and Flow Rate Steps.
- The Run FPFP_2 button will execute the FPFP_2 Fortran code against the variables inputted in this tab.
- The Spaces + and buttons allows the user to add Spaces to the FPFP_2 simulation and allows navigation of the entered space data. Each space is selected through the Space Type radiobutton. The last space is always the "End Space"
- The Flow Rates tab is dependent on the Spaces entered. Each space creates a Node on the Flow Rates tab.
- The Node + and buttons allows the user to navigate the Flow Rate variables for each node (space) of the FPFP_2 simulation.

- The Step + and buttons allows the user to add and navigate the Flow Rate variables for each time step of the current node. In order to enter add a time step, a time value must be entered in the Time (hrs.) textbox, then the "+" will be clickable.
- Delete time allows the user to delete the current time step from the Flow Rate variables.

6.2.2 TACT(5)

The TACT5 code is used to model situations in which contamination is released to the atmosphere and subsequently enters the control room. The TACT5 tab provides the functionality of the TACT5 module and allows for two separate instances of TACT5; each of these instances receives its own tab. TACT5 contains two tabs, Nuclides and Time steps. Nuclides must be selected to open the Node Design and Plant Parameters tabs.

HABIT - Computer Codes for Evaluation of Control Room	n Habitability	? ×				
<u>D</u> esign <u>H</u> elp						
Main TACT5 (1) TACT5 (2) Output Log						
Run <u>T</u> itle						
		Load Input Qlear Values				
		Run TACT5				
Nuclides Time steps						
Select Using File	Nuclides (0 of 122 selected)					
Alpha Sort	NobleGas (0 of 13 Selected)					
Nuclide Data File	Halogens (0 of 11 Selected)					
MLWR_TID.30	Solids (0 of 91 Selected)					
	Sodiums (0 of 2 Selected)					
Organ	Plutonms (0 of 5 Selected)					
Select All Select None						
WHOLEBDY						
THYROID						
BONE						
C:\Users\NHT1\Documents\HABIT\TestCases\case2a\case2a	aTSA.INP	case2a _;;				

Figure 6-14: TACT5 Tab (Nuclides)

HABIT - Computer Codes for Evaluation of Control Roo	m Habitability	? ×
<u>D</u> esign <u>H</u> elp		
Main TACT5 (1) TACT5 (2) Output Log		
Run Iitle	neters	Load Input Qear Values <u>R</u> un TACT5
Select Using File	Nuclides (110 of 122 selected)	
Alpha Sort	NobleGas (13 of 13 Selected)	
Nuclide Data File	Halogens (11 of 11 Selected)	
MLWR_TID.30	Solids (79 of 91 Selected)	
	Sodiums (2 of 2 Selected)	
Organ	▼ Plutonms (5 of 5 Selected)	
Select All Select None	Select All Select None	
V WHOLEBDY Skin V THYROID LUNG BONE LIVER	▼ Pu-238 ▼ Pu-239 ♥ Pu-240 ♥ Pu-241 ♥ Pu-242	
C:\Users\NHT1\Documents\HABIT\TestCases\case2a\case	2aT5A.INP	case2a:

Figure 6-15: TACT5 (Nuclides selections)

- The Load Input button allows the user to load TACT5 input variables from a valid TACT5 input file (inp). This function is generally not necessary since the input variables are automatically loaded for any previously saved design.
- The Clear Values button will clear the TACT5 input variables
- The Run TACT5 button will execute the TACT5 Fortran code against the variables inputted in this tab.
- The Select Using File button allow the user to load the nuclide selections based from a valid nuclide selection file (.nuc file). The selected nuclide database for the design must be the same as the one from the inputted nuclide selection file.
- The Alpha Sort button sorts the Nuclides items alphabetically
- The Nuclides selection area contains the Nuclide Groups and their related nuclides. To select individual nuclides, click on the Nuclide group. The group will expand and display the nuclides in that group. Each nuclide group contains a Select All and Select None button which allows the user to choose all the nuclides in the group or none of the

nuclides in the group.

- At least one organ and one nuclide must be selected before the Node Design and Plant Parameter tabs are available for data entry. At least one node must be entered before the Time Dependent Data tab is available for data entry.
- The Plant Parameters data entry is based on the selected element groups from the Nuclides tab.
- On the Time Dependent Data tab, the Insert Time button allows the user to instantiate a new time value for the simulation. After the time is entered, the time dependent variables can be entered (Initial Activity Distribution, Removal Rate Coefficients, Filtered Transfer Rates, etc.). The Delete Time button allows the user to delete the variables for the current time step. The Delete All button allows the user to delete all the time variables entered. The checkboxes on each time variable group is used to include or exclude the variable group from the simulation. The First, Previous, Next, Last buttons allows the user to navigate through each set of entered time variable group. The variable group currently displayed is highlighted on the user interface.

To populate fields from a file, click on Select Using File button.



Figure 6-16: Select Using File warning message

Click "Yes" to remove the pop-up message and to bring up TACT5 Nuclide Selection File window.



Figure 6-17: Nuclide Selection File

Select a file and click Open. Data from the selected file will be processed and displayed on the window.

Enter data in Node Design tab in order to open Time Dependent Data tab



Figure 6-18: TACT5 (Node Design)

6.2.3 CONHAB

The CONHAB tab provides the functionality of the CONHAB modules and contains four tabs, each for Plant Data, Meteorology or X/Q Data, Control Room Flow Data, and Units. The values for the parameters will be pre-populated when importing from previous design; else the user can enter in the appropriate values. When hovering the mouse over the field, the system will display the valid range for that field. Before running CONHAB, TACT5 and FPFP_2 must be run.

HABIT - Computer Codes for Evaluation of Control Room Habitability	? ×
Design Help	
Main FPFP_2 (1) TACT5 (1) CONHAB Output Log	
Run <u>I</u> tle	
	Load Input Qear Values
	<u>R</u> un CONHAB
Plant Data Meteorology or X/Q Data Control Room Row Data Units	
Control Room Volume (m ³) Nuclide Database : MLWR.	R_TID.30 ▼
*This information is only needed when unfiltered (PPFP_2) input is used	
Reactor Power Level (MWt)	
Group Fractions	
NobleGas Halogens Solids Sodiums Plutonms	
ELEM.:	
ORG. :	
PART.:	
· · · · · · · · · · · · · · · · · · ·	
C:\Users\NHT1\Documents\HABIT\TestCases\case2a\case2aCB.INP	case2a;

Figure 6-19: CONHAB Tab (Plant Data)

HABIT - Computer Codes for Evaluation of Control Room Habitability	? 💌
<u>D</u> esign <u>H</u> elp	
Main FPFP_2 (1) TACT5 (1) CONHAB Output Log	
Run Itle	Load Input Qear Values Bun CONHAB
Plant Data Meteorology or X/Q Data Control Room Row Data Units	
Step #: 1 - + Time (hrs): 0 Delete Time No Times Defined	
Compute X/Q from Manual Entry Meteorology O of X/Q	
Effluent Vertical Vertical Stability Class : D	
Effluent flow rate (ft ² /m) : Horizontal Stability Class : D	
Release Height (ft) :	
Building Height (ft) :	
Building Area (t?) :	
Horizontal Distance to receptor (t) :	
Receptor Height (ft) :	
Wind Speed (m/s) : "Information on this for when filtered (TACT5)	m is only needed inflow is used
::\Users\NHT1\Documents\HABIT\TestCases\case2a\case2aCB.INP	case2a _;;

Figure 6-20: CONHAB Tab (Meteorology or X/Q Data)

HABIT - Computer Codes for Evaluation of Control Room Habitability	? X
Design Help	
Main FPFP_2 (1) TACT5 (1) CONHAB Output Log	
Run <u>T</u> itle	
	<u>R</u> un CONHAB
Plant Data Weteorology of X/Q Data Control Room How Data Units	
Step #: 1 - + lime (hrs): 0 Delete Time No Imes Defined	
Unfiltered Unfiltered Bottled air source 1 air source 2 air release	
Filtered outside air intake Flow Rate (m ² /s) Flow Rate (m ² /s) Flow Rate (m ² /s)	
Row Rate (m ³ /s) :	
Filter eff. (percent)	
Elemental : Control Room	Lastras (-34)
Organic : Occupancy Eactor :	
Particulate :	
Filtered outside air	
Recirculating Row Rate (m ³ /s) Recirculating filter	T
Filter eff. (percent)	
Elemental :	
Elemental : Organic :	
Organic : Particulate :	
Particulate :	
C:\Users\NHT1\Documents\HABIT\TestCases\case2a\case2aCB.INP	case2a:

Figure 6-21: CONHAB Tab (Control Room Flow Data)

HABIT - Computer Codes for Evaluation of Control Room Habitability		?
Design Help		
Main FPFP_2 (1) TACT5 (1) CONHAB Output Log		
Run <u>T</u> itle		
	Load Input	Clear Values
	<u>R</u> un CO	DNHAB
Plant Data Meteorology or X/Q Data Control Room Flow Data Units		
Units		
Convert numerical values ?		
Yes		
○ №		
Distance and Volume Units		
Mgters and m ² Craterad M ²		
Creet and it		
Priore Prate Units		
○ <u> </u>		
○ ft³/s		
◯ ft³/min		
C:\Users\NHT1\Documents\HABIT\TestCases\case2a\case2aCB.INP		case2a 💥

Figure 6-22: CONHAB Tab (Units)

- The Load Input button allows the user to load CONHAB input variables from a valid CONHAB input file (inp). This function is generally not necessary since the input variables are automatically loaded for any previously saved design.
- The Clear Values button will clear the CONHAB input variables
- The Run CONHAB button will execute the CONHAB FORTRAN code against the variables inputted in this tab.
- The Plant Data tab contains a nuclide database selection dropdown. The selected nuclide database will change the Group Fractions data entry to the element groups contained in the database.
- The Meteorology or X/Q Data tab is used to enter meteorological variables which affect the simulation. The Step "+" and "-" buttons are used to add and navigate the meteorological variables for each time step of the simulation. In order to enter add a time step, a time value must be entered in the Time (hrs.) textbox, then the "+" will be clickable. The Delete Time button is used to delete a time step. The user has the option

to enter meteorological variables to compute the X/Q value or enter the X/Q value directly.

- The Control Room Flow Data tab is used to enter control room inflows and concentration values as part of the simulation. The Step + and buttons are used to add and navigate the control room flow variables for each time step of the simulation. The Delete Time button is used to delete a time step from the simulation.
- The Units tab allows the user to change measurement units from English units to SI units. Selections here will affect the values used in the Control Room Flow Data and Plant Data tabs.