7.0 Specifications of the Computational Optimization Processor

The COP assimilates the exposure and risk scenario as contained in the SSFs and establishes, based on specific “rules,” a modified scenario that is technically complete and computationally efficient. The COP gets its input from the SSFs. Output from the COP potentially modifies the SSFs.

7.1 Read and Write Requirements of the Computational Optimization Processor

The COP is required to read and write in the following manner:

Call Arguments	Description
SSF_Dir	Directory of site simulation Data Groups (string)
OuterLoopCounter	Current outer loop count (integer)
InnerLoopCounter	Current inner loop count (integer)
SourceType	Current source type (string)

Read expectations	Selected Data Groups in the Site Simulation Files (format discussed in Section 7.2)
Write expectations	Selected Data Groups in the Site Simulation Files (format discussed in Section 7.2)

7.2 Site Simulation and Global Results File Formats

The SSF and GRFs are in flat-ASCII format. However, the use of the name “File” is slightly misleading. This “File” is actually a directory of Data Group files. This directory of Data Group files will allow a component to quickly read just the Data Groups it is interested in, ignoring the rest.

The purpose of the SSF is to provide an optimized set of computations to be used in the MMSP. Thus, the COP merely changes variable values in the Data Groups without the need to copy all other unchanged files in the directory.

7.2.1 Pseudo Code Description

The file formats for the Site Definition Files, SSFs, and GRFs are standardized. The ASCII file formats used by these files are described in the form of pseudo code below. This pseudo code form allows a programmer of any language to understand how to implement an algorithm that reads or writes the data correctly. Choosing a single programming language for the FRAMES-HWIR Technology Software System would have made it difficult for individuals not versed in that language to understand the format. Because it is only reading and writing of data we are concerned with, a small pseudo code language is defined here to make it clear how to interpret the pseudo code algorithm below.

The *for loop* is analogous to the "DO" loop in FORTRAN and the "for" loop in many other programming languages. It symbolizes a loop of the internal statements for given initializations and conditions. For example:

For <initialization and condition statement>
<some other statements>
End Loop

The *if then* structure captures conditionality in the pseudo code. It is similar to the "IF...THEN" statement in nearly all programming languages. For example:

If <some condition>
<some statements>
Else If <some other condition>
<some other statements>
End If

The *end line* statement symbolizes the computer moving to the next line of data. Controlling whether to stay on the current line or move to the next is done with the backslash (\) in FORTRAN format statements; C++ and C use a format command that contains the (\n) characters to advance to the next line of data. For example:

End Line

Statements of the following form describe a datum that is available in the file at this point in the algorithm on the current line in the file. These statements are bolded to call attention to the fact that some data are expected to be read or written at that point in the algorithm.

Read/Write <Variable Description>(<type>)

A semicolon marks from that point to the end of line as a comment.

; Comments

A simple algorithm that reads a list of names with the number of names on the preceding line would look like this. With the understanding of these four types of pseudo code statements, the reader should be able to interpret the ASCII files used in the FRAMES-HWIR Technology Software System.

Example File	Example Algorithm
3	***Read/Write Number of Names (integer)***
"Bob","June","Joe"	*End Line*
	For each Name
	Read/Write Name (string) *; Just a Comment*
	End Line

7.2.2 Pseudo Code Algorithm for ASCII File Format

The details of the file formats are provided here so a tester or user of the FRAMES-HWIR Technology Software System can create, by hand, input and output files for the MMSP. The format below allows a program to quickly access data in a pseudo-random fashion without having arrays of data disassociated.

```
Read/Write Number of header lines (integer)
End Line
For each header line
  Read/Write Header Line
  End Line
End loop on header line
Read/Write Number of variables in this file (integer)
End Line
For each variable
  Read/Write Variable Name (string)
  Read/Write Number of Dimensions (integer)
  Read/Write Type (string)
  Read/Write Reference # (integer)
  Read/Write Units (string)
  End Line
; If Number of Items in x dimension is not present assume 1 element
; in the x dimension
If Number of Dimensions =6
  Read/Write Number of items in sixth dimension
End If
For each Item in sixth dimension
  If Number of Dimensions >= 5
  Read/Write Number of items in fifth dimension
  End If
  For each Item in fifth dimension
    If Number of Dimensions >= 4
    Read/Write Number of items in the fourth dimension
    End If
      For each Item in the fourth dimension
        If Number of Dimensions >= 3
        Read/Write Number of items in the third dimension
        End If
        For each Item in the third dimension
          If Number of Dimensions >= 2
         Read/Write Number of items in second dimension
         End Line
         For each Item in the second dimension
            If Number of Dimensions >= 1
            Read/Write Number of items in first dimension
            End If
```

```
            For each item first dimension
              Read/Write Value
            End loop on first dimension
            End Line
          End loop on second dimension
        End loop on third dimension
      End loop on fourth dimension
    End loop on fifth dimension
  End loop on sixth dimension
End loop on variable
```

The FRAMES-HWIR Technology Software System module developer is expected to use the subroutines provided in the HWIRIO.DLL to access input, modeled input, and output data.

For examples of information stored in this format, please see Appendix B.

8.0 Specifications of the Multimedia Multipathway Simulation Processor

The MMSP implements the release, transport, exposure, and risk/hazard assessment modeling protocol by choosing and linking the appropriate models to supply results to ELP I and II. The MMSP consists of a Module Execution Manager and a collection of individual software modules, each representing one of the fundamental elements of the risk assessment process. The MMSP gets its input from the SSFs. Output from the MMSP populates the GRFs.

The MMSP is expected to read and write in the following manner:

Read expectations	Header Data Group and Site Layout Data Group
Write expectations	Site Layout Data Group

Modules are components within the MMSP that, when collectively viewed and applied to a site, represent the modeling system for conducting exposure and risk assessment (Figure 8.1). A module comprises some combination or subset of model, and pre-processor/post-processor. For the HWIR Assessment Strategy, modules include source, fate and transport, foodchain, and exposure and risk modules. All modules receive input from the SSF; some modules also receive modeled input from other modules through the GRF. In addition, some modules receive input through the meterological database, which will be a flat-ASCII format designed and populated by EPA. These files are assumed to be located in a subdirectory of the input directory. The directory will be called MetData. Output from the modules populate the GRF.

Module input through the SSF is categorized into Data Groups. One of the key Data Groups is the Site Layout Data Group. Information on call arguments to this Data Group for each module is found in Section 8.3. Additional information on this Data Group can be found in Appendix C.

8.1 Specific Features of Modules

Because the modules form the core of the HWIR Assessment Strategy, they must meet specific requirements to ensure smooth running of the system. This section addresses the use of pre- and/or post-processors, error handling, and resource allocations for the modules within the MMSP.

8.1.1 Pre-Processors and Post-Processors

Some of the modules that will be used for the MMSP incorporate legacy models, that is, models that were developed for previous applications. Often, legacy models require some modification to work within the FRAMES-HWIR Technology Software System, at a minimum by the addition of pre- or post-processors. Legacy models that are currently planned for use in the MMSP include ISC-ST for the air module, EXAMS for the water body network module, and EPA-CMTP for vadose zone and aquifer modules.

The MMSP design and implementation require the reading of a specified Data Group within the SSF and the reading and writing of a specified data group in the GRF, if appropriate. The module developers are expected to reformat and reorder data to meet the specific needs of their module. The HWIRIO.DLL subroutines are used to read and write all SSF and GRF Data Groups. The reformatting and reordering of data within a module may be done by one of three methods:

1) Use pre-processors and/or post-processors without modifying the legacy model.
2) Modify model to directly read specified files using shared subroutines.
3) Use a combination of processors and model modifications.

These options are shown in Figure 8.2. Note that if pre- or post-processors are created for a module, then a “batch” file will also be required as part of the module. This “batch” file will serve as the single entry point for execution of that module.

8.1.2 Module Error Handling

As described in Section 2.0, the modules will report errors and warnings to the MMSP via an output file that will be created by using the HWIRIO.DLL. The MMSP will echo modules warnings and errors to the SUI as well as any warnings and errors that occur within the MMSP itself. Because it may be difficult to change each module to correctly detect errors or abnormal termination of a program, the following technique should be used.

An error file is expected to be created using the format discussed in Section 2.1.4. An error file will be created at the start of execution and deleted at the end of execution, provided that no errors are produced. If an error is produced, then the system uses the HWIRIO.DLL to close the error file and terminate execution of the module. The opening/creation and closing/deletion of this file is handled automatically with the OpenGroup and CloseGroup Subroutines provided in the HWIRIO.DLL (see Section 2.1).

A warning file is expected to be created using the format discussed in Section 2.1.4. A warning file will be created at the start of execution and deleted at the end of execution, provided that no warnings are produced. If a warning is produced then the module should write the warning to the file and continue processing. The opening/creation and closing/deletion of this file is handled automatically with the OpenGroup and CloseGroup Subroutines provided in the HWIRIO.DLL.

8.1.3 Resource Allocations for Modules

The FRAMES-HWIR Technology Software System is a PC-based set of executables. Modules are expected not to consume all of the memory, disk space, and time resources available to the FRAMES-HWIR Technology Software System. The current resource assumptions for a module are 32 Mb of RAM, 250 Mb of disk space, and an execution time on the order of 1 second on a stand-alone PC (assuming a Pentium [586] 200 MHz PC-based machine).

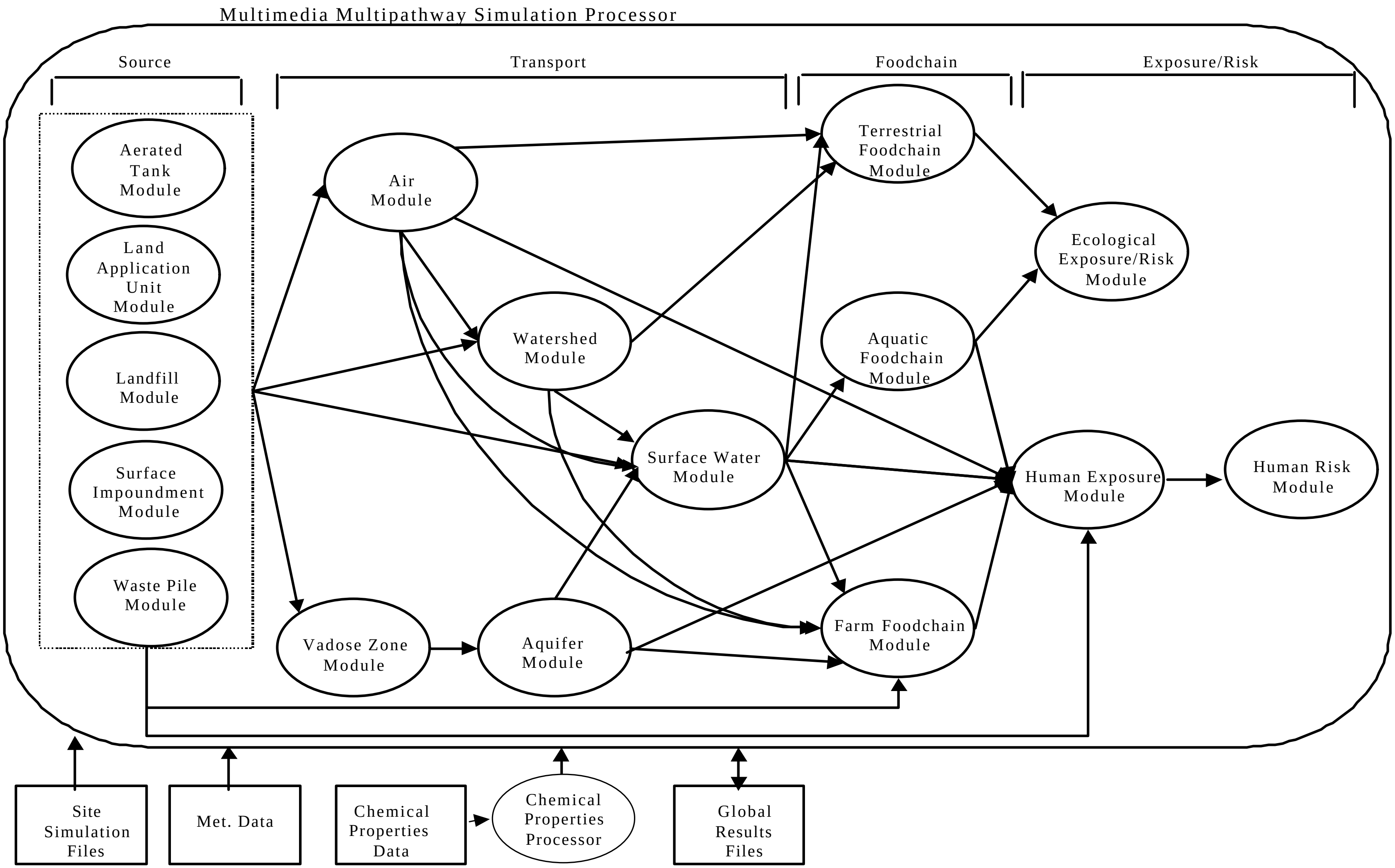

Figure 8.1 Data Flow in the Multimedia Multipathway Simulation Processor

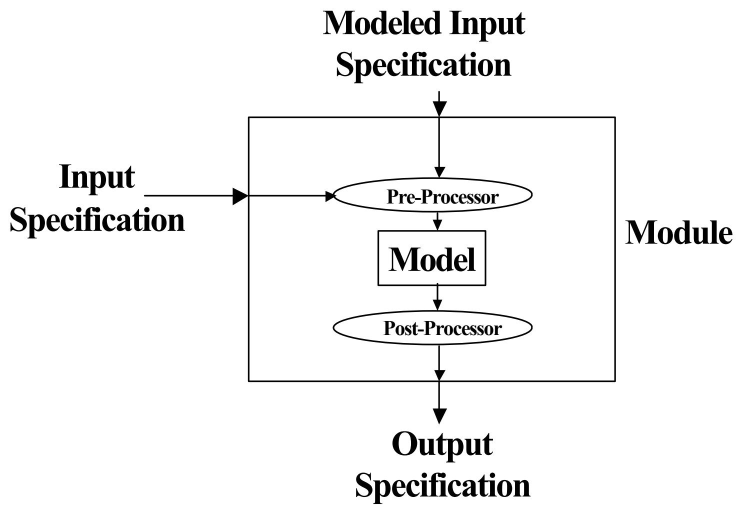

Figure 8.2 How Legacy Models Fit in the FRAMES-HWIR Technology Software System

The writing of temporary files (any file created by the module that is not an ".SSF" or ".GRF" file) is acceptable but the files should be deleted before exiting the module, such that the remaining files match the appropriate storage level given to the module in the call argument. There are currently two storage levels that the user can specify through the SUI. These are Minimum and Maximum. The Minimum storage level saves only the GRF, while the Maximum storage level saves the GRF and all module-specific files.

8.2 Read and Write Responsibilities of Multimedia Multipathway Simulation Processor Modules

The MMSP modules are required to read and write in the following manner:

Call Arguments	**Description**
SSF_Dir	Site Simulation Files Directory
GRF_Dir	Global Results Files Directory
Header File Name	Contains all information needed to run entire simulation

Read expectations	Selected Data Groups, depending on needs of modules, in the Site Simulation Files (format discussed in Section 7.2) and the Global Results Files (format discussed below)
Write expectations	Selected Data Groups, depending on outputs of modules, in the Global Results Files (format discussed below)

All MMSP modules are required to read and write data, which are collected into Data Groups. As the name implies, Data Groups are a collection of related variables within a database or data file. For example, the site layout data would be grouped into a Site Layout Data Group. A detailed listing of variables contained in each Data Group associated with each MMSP module is presented in Appendix A.

The FRAMES-HWIR Technology Software System module developer is expected to use the subroutines provided in the HWIRIO.DLL (Section 2.0) to access input, modeled input, and output data. Although the DLL is used to facilitate the reading and writing of data for the MMSP module, a module-specific call argument is used to communicate the names of the directories and data files for use in the read and write processes.

Module call arguments are set through a Windows® 95 environment variable. The variable is called "ARGUMENTS" and will be set by the MMSP at run time. The ARGUMENTS variable is changed by the MMSP for each separate module execution.

For call arguments, terms are defined as follows:

1) *Time* (string) is the creation time of the Site Simulation Files.
2) *Date* (string) is the creation date of the Site Simulation Files.
3) *SSF_Dir* (string) is the explicit path to the directory where all SSF Data Groups will be stored.
4) *GRF_Dir* (string) is the explicit path to the directory where all GRF Data Groups will be stored. There will exist a subdirectory called "*GRF_Dir*\TEMP" for temporary file space.
5) *StorageLevel* (integer) is the level of storage for the module.
6) Data Group names (string) are given in bold.

As noted previously, the SSF and GRF are made up of several files in separate directories. The SSF directory supplies only those inputs that are specific to the needs of that particular module. It **does not** contain any modeled outputs from other modules. Those outputs come strictly from the GRF Data Groups produced by each module. A file naming convention will be enforced for the SSF and GRF Data Groups. Path and file names will follow the file naming convention of DOS. Each file name will start with its specific two-letter designation as listed in Table 8.1. This naming convention facilitates the use of data dictionaries for each Data Group. The data dictionaries that describe these Data Groups are discussed in Appendix A. Additional detail on how the modules access site layout data is contained in Appendix C. Techniques for using module input data are described in detail in Appendix D.

The following provides the call arguments and the SSF and GRF Data Groups to read and write for all the modules within the MMSP. Each section covers a specific module associated with the MMSP, except Section 8.3.1, Source Modules, which represents all five of the different source term modules.

Tables 8.1 and 8.2 describe each file type and its general contents, the associated data dictionary file name, and the expected file name format for the SSF and GRF, respectively. The question marks in the file name format indicate that designations that are set during simulations. Typically it is the SiteID for the site waste management unit combination (for example if SiteID was "LF113401" then SLLF113401.ssf would be the site simulation file name. These designations will probably include things like concentration, source type, constituent, and setting identification.

Table 8.1 Site Simulation Files File Format Information

Site Simulation Files Type (SSF)	Description	Data Dictionary Path\File name	SSF Path\File name
Header_SSF	Contains information about the run. Time, date, title, model information.	*SSF_Dir*\HD.DIC	*SSF_Dir*\HD??????.SSF
Chemical_SSF	Contains all chemical constant data for the run.	*SSF_Dir*\CH.DIC	*SSF_Dir*\CP??????.SSF
Site_Layout_SSF	Contains the site layout information.	*SSF_Dir*\SL.DIC	*SSF_Dir*\SL??????.SSF
Source_SSF	Contains the source module inputs.	*SSF_Dir*\SR.DIC	*SSF_Dir*\SR??????.SSF
Air_SSF	Contains the air module inputs; meteorological (MET) data are not supplied through this file.	*SSF_Dir*\AR.DIC	*SSF_Dir*\AR??????.SSF
Vadose_Zone_SSF	Contains the vadose zone module inputs.	*SSF_Dir*\VZ.DIC	*SSF_Dir*\VZ??????.SSF
Saturated_Zone_SSF	Contains the saturated zone module inputs.	*SSF_Dir*\AQ.DIC	*SSF_Dir*\AQ??????.SSF
Watershed_SSF	Contains the watershed module inputs.	*SSF_Dir*\WS.DIC	*SSF_Dir*\WS??????.SSF
Surface_Water_SSF	Contains the surface water module inputs.	*SSF_Dir*\SW.DIC	*SSF_Dir*\SW??????.SSF
Aquatic_Foodchain_SSF	Contains the aquatic foodchain module inputs.	*SSF_Dir*\AF.DIC	*SSF_Dir*\AF??????.SSF
Farm_Foodchain_SSF	Contains the farm foodchain module inputs.	*SSF_Dir*\FF.DIC	*SSF_Dir*\FF??????.SSF
Terrestrial_Foodchain_SSF	Contains the terrestrial foodchain module inputs.	*SSF_Dir*\TF.DIC	*SSF_Dir*\TF??????.SSF
Ecological_Risk_SSF	Contains the ecological risk module inputs.	*SSF_Dir*\ER.DIC	*SSF_Dir*\ER??????.SSF
Human_Exposure_SSF	Contains the human exposure module inputs.	*SSF_Dir*\HE.DIC	*SSF_Dir*\HE??????.SSF
Human_Risk_SSF	Contains the human risk module inputs.	*SSF_Dir*\HR.DIC	*SSF_Dir*\HR??????.SSF

Table 8.2. Global Results Files File Format Information

Global Results Files Type (GRF)	**Description**	**Data Dictionary Path\File name**	**GRF Path\File name**
Source_GRF	Contains the source module results.	*GRF_Dir*\SR.DIC	*GRF_Dir*\SR??????.GRF
Air_GRF	Contains the air module results.	*GRF_Dir*\AR.DIC	*GRF_Dir*\AR??????.GRF
Vadose_Zone_GRF	Contains the vadose zone module results.	*GRF_Dir*\VZ.DIC	*GRF_Dir*\VZ??????.GRF
Saturated_Zone_GRF	Contains the saturated zone module results.	*GRF_Dir*\AQ.DIC	*GRF_Dir*\AQ??????.GRF
Watershed_GRF	Contains the watershed module results.	*GRF_Dir*\WS.DIC	*GRF_Dir*\WS??????.GRF
Surface_Water_GRF	Contains the surface water module results.	*GRF_Dir*\SW.DIC	*GRF_Dir*\SW??????.GRF
Aquatic_Foodchain_GRF	Contains the aquatic foodchain module results.	*GRF_Dir*\AF.DIC	*GRF_Dir*\AF??????.GRF
Farm_Foodchain_GRF	Contains the farm foodchain module results.	*GRF_Dir*\FF.DIC	*GRF_Dir*\FF??????.GRF
Terrestrial_Foodchain_GRF	Contains the terrestrial foodchain module results.	*GRF_Dir*\TF.DIC	*GRF_Dir*\TF??????.GRF
Ecological_Risk_GRF	Contains the ecological risk module results.	*GRF_Dir*\ER.DIC	*GRF_Dir*\ER??????.GRF
Human_Exposure_GRF	Contains the human exposure module results.	*GRF_Dir*\HE.DIC	*GRF_Dir*\HE??????.GRF
Human_Risk_GRF	Contains the human risk module results.	*GRF_Dir*\HR.DIC	*GRF_Dir*\HR??????.GRF

8.3 Modules

8.3.1 Source Modules

The source modules are aerated tank, landfill, land application unit, surface impoundment, and waste pile. Note that source modules do not communicate directly with each other (see Figure 8.1).

Call Arguments	**Expectations**
Time	
Date	
SSF_Dir	
GRF_Dir	
StorageLevel	
HD_SSF	Read
Site_Layout_SSF	Read
Source_SSF	Read
Chemical_SSF	Read
Source_GRF	Write
Errors and Warnings	Expected to write errors and warnings as required by module

8.3.2 Air Module

Call Arguments	**Expectations**
Time	
Date	
SSF_Dir	
GRF_Dir	
StorageLevel	
HD_SSF	Read
Site_Layout_SSF	Read
Air_SSF	Read
Chemical_SSF	Read
All_Source_GRF	Read
Air_GRF	Write
Errors and Warnings	Expected to write errors and warnings as required by module

8.3.3 Vadose Zone Module

Call Arguments	Expectations
Time	
Date	
SSF_Dir	
GRF_Dir	
StorageLevel	
HD_SSF	Read
Site_Layout_SSF	Read
Vadose_Zone_SSF	Read
Chemical_SSF	Read
All_Source_GRF	Read
Vadose_Zone_GRF	Write
Errors and Warnings	Expected to write errors and warnings as required by module

8.3.4 Saturated Zone Module

Call Arguments	Expectations
Time	
Date	
SSF_Dir	
GRF_Dir	
StorageLevel	
HD_SSF	Read
Site_Layout_SSF	Read
Saturated_Zone_SSF	Read
Chemical_SSF	Read
All_Vadose_GRF	Read
Saturated_Zone_GRF	Write
Errors and Warnings	Expected to write errors and warnings as required by module

8.3.5 Watershed Module

Call Arguments	**Expectations**
Time	
Date	
SSF_Dir	
GRF_Dir	
StorageLevel	
HD_SSF	Read
Site_Layout_SSF	Read
Watershed_SSF	Read
Chemical_SSF	Read
All_Air_GRF	Read
Watershed_GRF	Write
Errors and Warnings	Expected to write errors and warnings as required by module

8.3.6 Surface Water Module

Call Arguments	**Expectations**
Time	
Date	
SSF_Dir	
GRF_Dir	
StorageLevel	
HD_SSF	Read
Site_Layout_SSF	Read
Surface_Water_SSF	Read
Chemical_SSF (streams)	Read
Chemical_SSF (lakes)	Read
Chemical_SSF (wetlands)	Read

All_Source_GRF	Read
All_Air_GRF	Read
All_Saturated_Zone_GRF	Read
All_Watershed_GRF	Read
Surface_Water_GRF	Write
Errors and Warnings	Expected to write errors and warnings as required by module

8.3.7 Aquatic Foodchain Module

Call Arguments	**Expectations**
Time	
Date	
SSF_Dir	
GRF_Dir	
StorageLevel	
HD_SSF	Read
Site_Layout_SSF	Read
Aquatic_Foodchain _SSF	Read
Chemical_SSF	Read
All_Surface_Water_GRF	Read
Aquatic_Foodchain_GRF	Write
Errors and Warnings	Expected to write errors and warnings as required by module

8.3.8 Terrestrial Foodchain Module

Call Arguments	**Expectations**
Time	
Date	
SSF_Dir	
GRF_Dir	

StorageLevel	
HD_SSF	Read
Site_Layout_SSF	Read
Terrestrial_Foodchain_SSF	Read
Chemical_SSF	Read
All_Source_GRF	Read
All_Air_GRF	Read
All_Watershed_GRF	Read
All_Surface_Water_GRF	Read
Terrestrial_Foodchain_GRF	Write
Errors and Warnings	Expected to write errors and warnings as required by module

8.3.9 Farm Foodchain Module

Call Arguments	**Expectations**
Time	
Date	
SSF_Dir	
GRF_Dir	
StorageLevel	
HD_SSF	Read
Site_Layout_SSF	Read
Farm_Foodchain_SSF	Read
Chemical_SSF	Read
All_Source_GRF	Read
All_Air_GRF	Read
All_Saturated_Zone_GRF	Read
All_Watershed_GRF	Read
All_Surface_Water_GRF	Read

Farm_Foodchain_GRF	Write
Errors and Warnings	Expected to write errors and warnings as required by module

8.3.10 Ecological Exposure Module

Call Arguments	**Expectations**
Time	
Date	
SSF_Dir	
GRF_Dir	
StorageLevel	
HD_SSF	Read
Site_Layout_SSF	Read
Ecological_Exposure_SSF	Read
Chemical_SSF	Read
All_Terrestrial_Foodchain_GRF	Read
All_Aquatic_Foodchain_GRF	Read
Ecological_Exposure_GRF	Write
Errors and Warnings	Expected to write errors and warnings as required by module

8.3.11 Ecological Risk Module

Call Arguments	**Expectations**
Time	
Date	
SSF_Dir	
GRF_Dir	
StorageLevel	
HD_SSF	Read
Site_Layout_SSF	Read
Ecological_Risk_SSF	Read
Chemical_SSF	Read
All_Ecological_Exposure_GRF	Write
Errors and Warnings	Expected to write errors and warnings as required by module

8.3.12 Human Exposure Module

Call Arguments	**Expectations**
Time	
Date	
SSF_Dir	
GRF_Dir	
StorageLevel	
HD_SSF	Read
Site_Layout_SSF	Read
Human_Exposure_SSF	Read
Chemical_SSF	Read
All_Source_GRF	Read
All_Air_GRF	Read
All_Saturated_Zone_GRF	Read

All_Watershed_GRF	Read
All_Surface_Water_GRF	Read
All_Aquatic_Foodchain_GRF	Read
All_Farm_Foodchain_GRF	Read
Human_Exposure_GRF	Write
Errors and Warnings	Expected to write errors and warnings as required by module

8.3.13 Human Risk Module

Call Arguments	**Expectations**
Time	
Date	
SSF_Dir	
GRF_Dir	
StorageLevel	
HD_SSF	Read
Site_Layout_SSF	Read
Human_Risk_SSF	Read
Chemical_SSF	Read
All_Human_Exposure_GRF	Read
Human_Risk_GRF	Write
Errors and Warnings	Expected to write errors and warnings as required by module

9.0 Specifications of the Exit Level Processors I and II and the Risk Visualization Processor

There are two ELPs, Level I and Level II. These processors take the results of the MMSP individual site simulations and tabulate information to discern levels of protection for decisions on the exit criteria for contamination. ELP I produces the Risk Summary Output File (RSOF). ELP II takes the RSOF and generates the Protective Summary Output File (PSOF). This site-based exposure and risk information is used to establish a national distribution of risks. The national distribution of risks, and all related data, form the technical basis for EPA to select chemical-specific exit levels.

9.1 Read and Write Requirements of Exit Level Processor I

Like all processors and modules, any errors that occur in the ELP I are expected to be written to the GRF directory. The variable definitions for the header SSF can be found in Appendix A, Table A.1.1. The ELP I uses the header file to read site and chemical information which is stored in the RSOFs. The ELP I is expected to read and write in the following manner:

Call Arguments	**Description**
SSF_Dir	Site Simulation Files Directory
GRF_Dir	Global Results Files Directory
Header File Name	Contains all information needed to run entire simulation

Read expectations	Selected Data Groups from the Global Results Files (format discussed in Section 7.2)
Write expectations	Modify the tables in the Risk Summary Output File (format discussed in Section 9.3)

9.2 Read and Write Requirements of Exit Level Processor II

The ELP II is expected to read and write in the following manner:

Call Arguments	**Description**
RiskSummaryDir	Directory of risk summary output (string)

Read expectations	Data tables in the Risk Summary Output File (format discussed in Section 9.3)
Write expectations	Data tables in the Protective Summary Output File (format discussed in Section 9.4)

9.3 Risk Summary Output File Format

The intent of the RSOF is to enable fast and efficient reading of data by the ELP II and RVPs. The size of the RSOF collection of files is estimated to take up about 1 Gb of disk storage. Because the decision of which exit level for the concentration of a chemical in a waste stream (C_w) is acceptable is determined for each Chemical and Source Type, it seems reasonable to break up the 200 Gb by those two indices.

Each Chemical (40) and Source Type Pair (5) will have its own database. The total number of databases will be 200 (5 Mb). This works well for implementing the FRAMES-HWIR Technology Software System because the exit C_ws for each chemical and source type will be determined separately from other C_ws for other chemicals and source types. The names of the databases will be <Source Identifier><CAS-ID>.mdb. For example, LAU for Benzene (71-43-2) will be la71-43-2.mdb.

Each of these 200 databases will have identical structure within them. The structure will consist of 13 description data tables, 528 human risk summary tables, and 129 ecological risk summary tables. The 13 description data tables with examples are shown in Tables 9.1 through 9.26.

Table 9.1 Chemical Description (ChemDes) Data Table

Field Name	Type	Number of Characters	Units	Description
CASID	Text	20		Chemical Abstract ID
ChemicalName	Text	32		Chemical Name
CarcInh	Logical			Flag indicating the chemical is carcinogenic for inhalation
CarcIng	Logical			Flag indicating the chemical is carcinogenic for ingestion
NonCarcInh	Logical			Flag indicating the chemical is a non-carcinogenic hazard for inhalation
NonCarcIng	Logical			Flag indicating the chemical is a non-carcinogenic hazard for ingestion
Eco	Logical			Flag indicating the chemical is a hazard to ecological species
Cw1	Double		mg/L or µg/g	Concentration in the waste 1

Field Name	Type	Number of Characters	Units	Description
Cw2	Double		mg/L or µg/g	Concentration in the waste 2
Cw3	Double		mg/L or µg/g	Concentration in the waste 3
Cw4	Double		mg/L or µg/g	Concentration in the waste 4
Cw5	Double		mg/L or µg/g	Concentration in the waste 5

Table 9.2 Chemical Description (ChemDes) Data Table Example Entries

Field Name	Example Record
CASID	71-43-2
ChemicalName	Benzene
CarcInh	True
CarcIng	True
NonCarcInh	False
NonCarcIng	False
Eco	True
Cw1	1e-9
Cw2	2.5e-9
Cw3	5e-9
Cw4	7.5e-9
Cw5	1e-8

Table 9.3 Site Iteration Index Description (SiteIterIndex) Data Table

Field Name	Type	Number of Characters	Units	Description
Site	Text	20		SiteID for site
Source	Text	3		Source type
Iteration	Integer			Number represents which iteration was run
SiteIterIndex	Integer			Unique number for each site, source, iteration combination

Table 9.4 Site Iteration Index Description (SiteIterIndex) Data Table Example Entries

Field Name	Example Record	Example Record
Site	0223104	0223104
Source	LF	LF
Iteration	1	2
SiteIterIndex	5	6

Table 9.5 Distance Description (DistDes) Data Table

Field Name	Type	Number of Characters	Units	Description
Distance	Text	80	m	Description of the distance
Prefix	Text	3		Prefix used in table naming (D0, D1, D2)

Table 9.6 Distance Description (DistDes) Data Table Example Entries

Field Name	Example Record	Example Record
Distance	100 m	500 m
Prefix	D0	D1

Table 9.7 Exposure Description (ExpDes) Data Table

Field Name	Type	Number of Characters	Units	Description
Exposure	Text	80		Description of exposure pathway
Ing	Logical			Flag indicating this is an ingestion pathway
Inh	Logical			Flag indicating this is an inhalation pathway
Prefix	Text	3		Prefix used in table naming (E0,E1,..E12)

Table 9.8 Exposure Description (ExpDes) Data Table Example Entries

Field Name	Example Record	Example Record
Exposure	Summation of all ingestion pathways	Summation of all ingestion and inhalation pathways
Ing	True	True
Inh	false	True
Prefix	E0	E1

Table 9.9 Receptor Description (RecDes) Data Table

Field Name	Type	Number of Characters	Units	Description
Receptor	Text	80		Description of the receptor
Prefix	Text	3		Prefix used in table naming (R0, R1,..,R4)

Table 9.10 Receptor Description (RecDes) Data Table Example Entries

Field Name	Example Record	Example Record
Receptor	Dairy Farmer	Resident
Prefix	R0	R1

Table 9.11 Cohort Description (CohDes) Data Table

Field Name	Type	Number of Characters	Units	Description
Cohort	Text	80		Description of the cohort
Prefix	Text	3		Prefix used in table naming (C0,C1,..,C3)

Table 9.12 Cohort Description (CohDes) Data Table Example Entries

Field Name	Example Record	Example Record
Cohort	Infant	Child 1-12
Prefix	C0	C1

Table 9.13 Critical Year Percentile (CritDes) Data Table

Field Name	Type	Number of Characters	Units	Description
CritPer	Text	80		Description of percentage used to determine critical year
Prefix	Text	3		Prefix used in table naming (P0)

Table 9.14 Critical Year Percentile (CritDes) Data Table Example Entries

Field Name	Example Record
CritPer	Maximum
Prefix	P0

Table 9.15 Risk/HQ/Ecological Hazard Quotient (HQ) Bins Description (BinDes) Data Table

Field Name	**Type**	**Number of Characters**	**Units**	**Description**
RBin1	Double			Bin for Human Carcinogenic Risk
RBin2	Double			Bin for Human Carcinogenic Risk
RBin3	Double			Bin for Human Carcinogenic Risk
RBin4	Double			Bin for Human Carcinogenic Risk
RBin5	Double			Bin for Human Carcinogenic Risk
RBin6	Double			Bin for Human Carcinogenic Risk
RBin7	Double			Bin for Human Carcinogenic Risk
HBin1	Double			Bin for Human Hazard Impacts
HBin2	Double			Bin for Human Hazard Impacts
HBin3	Double			Bin for Human Hazard Impacts
HBin4	Double			Bin for Human Hazard Impacts
EBin1	Double			Bin for Ecological Hazard Impacts
EBin2	Double			Bin for Ecological Hazard Impacts
EBin3	Double			Bin for Ecological Hazard Impacts
EBin4	Double			Bin for Ecological Hazard Impacts
EBin5	Double			Bin for Ecological Hazard Impacts
EBin6	Double			Bin for Ecological Hazard Impacts

Table 9.16 Risk/HQ/Ecological HQ Bins Description (BinDes) Data Table Example Entries

Field Name	**Example Record**
RBin1	1e-9
RBin2	1e-8
RBin3	1e-7
RBin4	1e-6
RBin5	1e-5
RBin6	1e-4
RBin7	1e-3
HBin1	1e-4
HBin2	1e-3
HBin3	1e-2
HBin4	1e-1
EBin1	1e-4
EBin2	1e-3
EBin3	1e-2
EBin4	1e-1
EBin5	1e1
EBin6	1e2

Table 9.17 Ecological Distance Description (EDistDes) Data Table

Field Name	**Type**	**Number of Characters**	**Units**	**Description**
Ring	Text	80		Description of the distance
Prefix	Text	3		Prefix used in table naming (D0, D1,D2)

Table 9.18 Ecological Distance Description (EDistDes) Data Table Example Entries

Field Name	Example Record	Example Record
Distance	Ring 1	Ring 2
Prefix	D0	D1

Table 9.19 Ecological Habitat Group Description (EHabGDes) Data Table

Field Name	Type	Number of Characters	Units	Description
HabitatGroup	Text	80		Description of the habitat group
Prefix	Text	3		Prefix used in table naming (HG0, HG1,HG2)

Table 9.20 Ecological Habitat Group Description (EHabGDes) Data Table Example Entries

Field Name	Example Record	Example Record
HabitatGroup	Aquatic	Shrub/Scrub
Prefix	HG1	HG2

Table 9.21 Ecological Habitat Type Description (EHabTDes) Data Table

Field Name	Type	Number of Characters	Units	Description
HabitatType	Text	80		Description of the habitat type
Prefix	Text	3		Prefix used in table naming (HT0, HT1,HT2)

Table 9.22 Ecological Habitat Type Description (EHabTDes) Data Table Example Entries

Field Name	Example Record	Example Record
HabitatType	Raparian	Meadow
Prefix	HT1	HT2

Table 9.23 Ecological Receptor Group Description (ERecGDes) Data Table

Field Name	Type	Number of Characters	Units	Description
ReceptorGroup	Text	80		Description of the receptor group
Prefix	Text	3		Prefix used in table naming (RG0, RG1,RG2)

Table 9.24 Ecological Receptor Group Description (ERecGDes) Data Table Example Entries

Field Name	Example Record	Example Record
ReceptorGroup	Herbiverts	Soil Community
Prefix	RG1	RG2

Table 9.25 Ecological Trophic Level Description (ETrophicDes) Data Table

Field Name	Type	Number of Characters	Units	Description
TrophicLevel	Text	80		Description of the trophic level
Prefix	Text	3		Prefix used in table naming (TL0, TL1,..,TL5)

Table 9.26 Ecological Trophic Level Description (ETrophicDes) Data Table Example Entries

Field Name	Example Record	Example Record
TrophicLevel	Herbiverts	Trophic Level 1
Prefix	TL1	TL2

The 528 human risk/HQ summary data tables will contain the results of the simulation. The names of the 528 data tables will be constructed out of information from the description data tables. Specifically it will be "H"or "R" +DistDes(Prefix) +ExpDes(Prefix) +RecDes(Prefix) +CohDes(Prefix)+CritDes(Prefix). The "H" or "R" is determined by whether reading of HQ or Risks is being performed. Using the example entries in these tables, there will be a data table named "RD1E10R1C1P1." The format of all 264 risk tables is shown in Table 9.27 with an example in Table 9.28. For brevity the "..." represents a number of columns that have a similar meaning and names. Table 9.28 only contains example entries for C_w1.

Table 9.27 Human Risk Summary Data Table

Field Name	Type	Number of Characters	Units	Description
Percentile	Double		%	Percetage of population protected for the counted sites
Bin1Cw1	Double		# of sites	Number of sites that protect at the given percentile for the given risk bin and Concentration in the waste
Bin2Cw1	Double		# of sites	Number of sites that protect at the given percentile for the given risk bin and Concentration in the waste
Bin3Cw1	Double		# of sites	Number of sites that protect at the given percentile for the given risk bin and Concentration in the waste
Bin4Cw1	Double		# of sites	Number of sites that protect at the given percentile for the given risk bin and Concentration in the waste
Bin5Cw1	Double		# of sites	Number of sites that protect at the given percentile for the given risk bin and Concentration in the waste
Bin6Cw1	Double		# of sites	Number of sites that protect at the given percentile for the given risk bin and Concentration in the waste
Bin7Cw1	Double		# of sites	Number of sites that protect at the given percentile for the given risk bin and Concentration in the waste
Bin1Cw2	Double		# of sites	Number of sites that protect at the given percentile for the given risk bin and Concentration in the waste
...	...		...	...
Bin7Cw5	Double		# of sites	Number of sites that protect at the given percentile for the given risk bin and Concentration in the waste

Table 9.28 Human Risk Summary Data Table Example Entries

Field Name	Example Record	Example Record	Example Record	Example Record
Percentile	0	25	75	95
Bin1Cw1	57	56	25	0
Bin2Cw1	57	57	40	3
Bin3Cw1	57	57	50	10
Bin4Cw1	57	57	57	20
Bin5Cw1	57	57	57	30
Bin6Cw1	57	57	57	43
Bin7Cw1	57	57	57	57

The format of all 264 HQ tables is shown in Table 9.29 with an example in Table 9.30. For brevity, the "..." represents a number of columns that have a similar meaning and names. Table 9.30 only contains example entries for C_w1.

Table 9.29 Human HQ Summary Data Table

Field Name	Type	Number of Characters	Units	Description
Percentile	Double		%	Percetage of population protected for the counted sites
Bin1Cw1	Double		# of sites	Number of sites that protect at the given percentile for the given HQ bin and Concentration in the waste
Bin2Cw1	Double		# of sites	Number of sites that protect at the given percentile for the given HQ bin and Concentration in the waste
Bin3Cw1	Double		# of sites	Number of sites that protect at the given percentile for the given HQ bin and Concentration in the waste
Bin4Cw1	Double		# of sites	Number of sites that protect at the given percentile for the given HQ bin and Concentration in the waste
Bin1Cw2	Double		# of sites	Number of sites that protect at the given percentile for the given HQ bin and Concentration in the waste

Field Name	Type	Number of Characters	Units	Description
...	...		...	...
Bin4Cw5	Double		# of sites	Number of sites that protect at the given percentile for the given HQ bin and Concentration in the waste

Table 9.30 Human HQ Summary Data Table Example Entries

Field Name	Example Record	Example Record	Example Record	Example Record
Percentile	0	25	75	95
Bin1Cw1	57	56	25	0
Bin2Cw1	57	57	40	3
Bin3Cw1	57	57	50	10
Bin4Cw1	57	57	57	20

The 129 ecological HQ summary data tables will contain the results of the simulation. The names of the 129 data tables will be constructed out of information from the description data tables, depending on the output summary the user wants. A summary is made up of two choices of indices for an ecological HQ result. The following 5 indices indicate the ecological HQ summaries:

1) Ecological Ring (Maximum of 3 unique values)
2) Habitat Group (Maximum of 3 unique values)
3) Habitat Type (Maximum of 12 unique values)
4) Receptor Group (Maximum of 9 unique values)
5) Trophic Level (Maximum of 5 unique values)

These five indices are combined into six different summaries of ecological HQ. Each of the ecological HQ summaries is stored in a table identified by its indices. The six summaries are as follows:

1) Ecological Ring and Habitat Group (Maximum of 9 tables)
2) Ecological Ring and Habitat Type (Maximum of 36 tables)
3) Ecological Ring and Receptor Group (Maximum of 27 tables)
4) Ecological Ring and Trophic Level (Maximum of 15 tables)
5) Habitat Group and Receptor Group (Maximum of 9 tables)
6) Habitat Group and Trophic Level (Maximum of 5 tables)

Each summary table will have the following name created from the indices it represents:

1) “E”+ EDistDes(Prefix) +EHabGDes(Prefix)
2) “E” + EDistDes(Prefix) + EHabTDes(Prefix)
3) “E” + EDistDes(Prefix) + ERecGDes(Prefix)
4) “E” + EDistDes(Prefix) + ETrophic(Prefix)
5) “E” + EHabGDes(Prefix) + ERecGDes(Prefix)
6) “E” + EHabGDes(Prefix) + ETrophic(Prefix)

Using the example entries in these tables, there will be a data table named “EED1HG2,” which would contain the Ecological Ring and Habitat Group summary, for example, data in the description tables. The format of all 129 ecological HQ tables is in Table 9.31 with an example in Table 9.32.

Table 9.31 Ecological Hazard Summary Data Table

Field Name	**Type**	**Number of Characters**	**Units**	**Description**
Percentile	Double		%	Percetage of population protected for the counted sites
Bin1Cw1	Double		# of sites	Number of sites that protect at the given percentile for the given risk bin and Concentration in the waste
Bin2Cw1	Double		# of sites	Number of sites that protect at the given percentile for the given risk bin and Concentration in the waste
Bin3Cw1	Double		# of sites	Number of sites that protect at the given percentile for the given risk bin and Concentration in the waste
Bin4Cw1	Double		# of sites	Number of sites that protect at the given percentile for the given risk bin and Concentration in the waste
Bin5Cw1	Double		# of sites	Number of sites that protect at the given percentile for the given risk bin and Concentration in the waste
Bin6Cw1	Double		# of sites	Number of sites that protect at the given percentile for the given risk bin and Concentration in the waste
Bin1Cw2	Double		# of sites	Number of sites that protect at the given percentile for the given risk bin and Concentration in the waste
...	...		...	...

Field Name	Type	Number of Characters	Units	Description
Bin6Cw5	Double		# of sites	Number of sites that protect at the given percentile for the given risk bin and Concentration in the waste

Table 9.32 Ecological Hazard Summary Data Table Example Entries

Field Name	Example Record	Example Record	Example Record	Example Record
Percentile	0	25	75	95
Bin1Cw1	57	56	25	0
Bin2Cw1	57	57	40	3
Bin3Cw1	57	57	50	10
Bin4Cw1	57	57	57	20
Bin5Cw1	57	57	57	30
Bin6Cw1	57	57	57	43

9.4 Protective Summary Output File Format

There are seven types of tables created by the ELP II and RVP. All tables will be in comma-separated format. This format facilitates the viewing and formatting of these tables in Excel or Lotus. Many of the tables are repeated for each scenario and chemicals. The following sections describe the format of each table that will be output by the ELP II and RVP. There are eight source types reported by the ELP II/RVP: Landfills, Liquid Sources, Semi-Solid Sources, Solid Sources, Land Application Units, Waste Piles, Surface Impoundments, and Aerated Tanks.

The columns in the tables in the PSOF directory are defined, and examples are shown in Tables 9.3 through 9.14. There are 16 separate files with the format of Table 9.3. The "Target Exit Level" tables use the user-specified probability of protection to determine exit level for each source type. The "50th percentile" tables always use the 50th percentile probability of protection. So there are 16 tables (8 for user defined and 8 for 50th percentile probabilities) with the format of Tables 9.5, 9.7 and 9.9—one file for each of the five user-defined scenarios. Table 9.11 has eight tables that make use of the format—one for each of the eight source types. Table 9.13 is the format of five files—one for each user-defined scenario.

Table 9.33 Target Exit Levels by Scenario Output File Format

Column	Name	Description	Units	Type
A	Chemical Name	Chemical Name	--	String(32)
B	CASID	Chemical Abstract ID	--	String(32)
C	Scenario 1	Exit Level for Scenario 1	µg/g or mg/L	Real
D	Max Used	Indication whether maximum Concentration in the waste was used	--	String(4)
E	Scenario 2	Exit Level for Scenario 2	µg/g or mg/L	Real
F	Max Used	Indication whether maximum Concentration in the waste was used	--	String(4)
G	Scenario 3	Exit Level for Scenario 3	µg/g or mg/L	Real
H	Max Used	Indication whether maximum Concentration in the waste was used	--	String(4)
I	Scenario 4	Exit Level for Scenario 4	µg/g or mg/L	Real
J	Max Used	Indication whether maximum Concentration in the waste was used	--	String(4)
K	Scenario 5	Exit Level for Scenario 5	µg/g or mg/L	Real
L	Max Used	Indication whether maximum Concentration in the waste was used	--	String(4)

Table 9.34 Example of Target Exit Levels by Scenario Output File

Chemical Name	CasId	Scenario1	Max Used	Scenario2	Max Used	...
Benzene	71-43-2	1.00E+02	"no"	1.00E+02	"no"	...
Lead	7439-92-1	1.00E-04	"no"	1.00E-04	"no"	...
...	...	...	...	...	...	...

Table 9.35 Cohort Human Risk/HQ Output File Format

Column	Name	Units	Type
A	Chemical Name	--	String(32)
B	CASID	--	String(32)
C	Landfill Infants Risk Trigger Level	--	Real
D	Landfill Infants HQ Trigger Level	--	Real
E	Landfill 1-12 years old Risk Trigger Level	--	Real
F	Landfill 1-12 years old HQ Trigger Level	--	Real
G	Landfill 13 years and older Risk Trigger Level	--	Real
H	Landfill 13 years and older HQ Trigger Level	--	Real
I-AX	Columns C-H repeated for other 7 source types	--	Real

Table 9.36 Example of Cohort Human/Risk Output File

Chemical Name	CasId	Landfill						...
		Infants		1-12 years old		13 years old and older		...
		Risk	HQ	Risk	HQ	Risk	HQ	...
Benzene	71-43-2	> 1E-04	NA	8E-07	NA	0.000005	NA	...
Lead	7439-92-1	> 1E-04	NA	0.0001	NA	0.0001	NA	...
...	...	...	...	...	...	...	...	...

Table 9.37 Receptor Human Risk/HQ Output File Format

Column	Name	Units	Type
A	Chemical Name	--	String(32)
B	CASID	--	String(32)
C	Landfill Beef/Dairy Farmer Risk Trigger Level	--	Real
D	Landfill Beef/Dairy Farmer HQ Trigger Level	--	Real
E	Landfill Gardener Risk Trigger Level	--	Real
F	Landfill Gardener HQ Trigger Level	--	Real
G	Landfill Fisher Risk Trigger Level	--	Real
H	Landfill Fisher HQ Trigger Level	--	Real
I	Landfill Resident Risk Trigger Level	--	Real
J	Landfill Resident HQ Trigger Level	--	Real
K-BN	Columns C-J repeated for other 7 source types	--	Real

Table 9.38 Example of Receptor Human Risk/HQ Output File

Chemical Name	CasId	Landfill								...
		Beef/Dairy Farmer		Gardener		Fisher		Resident		...
		Risk	HQ	Risk	HQ	Risk	HQ	Risk	HQ	..
Benzene	71-43-2	4E-08	NA	0.000003	NA	0.000006	NA	8E-07	NA	..
Lead	7439-92-1	0.0001	NA	0.0001	NA	0.0001	NA	0.0001	NA	...
...	...	...	...	..	...	...	...	...	...	...

Table 9.39 Exposure Human Risk/HQ Output File Format

Column	Name	Units	Type
A	Chemical Name	--	String(32)
B	CASID	--	String(32)
C	Landfill Air Inhalation Risk Trigger Level	--	Real
D	Landfill Air Inhalation HQ Trigger Level	--	Real
E	Landfill Soil Ingestion RiskTrigger Level	--	Real
F	Landfill Soil Ingestion HQ Trigger Level	--	Real
G	Landfill Water Ingestion Risk Trigger Level	--	Real
H	Landfill Water Ingestion HQ Trigger Level	--	Real
I	Landfill Crop Ingestion Risk Trigger Level	--	Real
K	Landfill Crop Ingestion HQ Trigger Level	--	Real
L	Landfill Beef Ingestion Risk Trigger Level	--	Real
M	Landfill Beef Ingestion HQ Trigger Level	--	Real
N	Landfill Milk Ingestion Risk Trigger Level	--	Real
O	Landfill Milk Ingestion HQ Trigger Level	--	Real
P	Landfill Fish Ingestion Risk Trigger Level	--	Real
Q	Landfill Fish Ingestion HQ Trigger Level	--	Real
R	Landfill Shower Inhalation Risk Trigger Level	--	Real
S	Landfill Shower Inhalation HQ Trigger Level	--	Real
T	Landfill Breast Milk Risk Trigger Level	--	Real
U	Landfill Breast Milk HQ Trigger Level	--	Real
V	Landfill Summation of all Inhalation Pathways Risk Trigger Level	--	Real
W	Landfill Summation of all Inhalation PathwaysHQ Trigger Level	--	Real
X	Landfill Summation of all Ingestion PathwaysRisk Trigger Level	--	Real
Y	Landfill Summation of all Ingestion PathwaysHQ Trigger Level	--	Real
Z	Landfill Summation of all Ingestion and Inhalation Pathways Risk Trigger Level	--	Real
AA	Landfill Summation of all Ingestion and Inhalation Pathways HQ Trigger Level	--	Real

Column	Name	Units	Type
AB	Landfill Groundwater Total all Pathways Risk Trigger Level	--	Real
AC	Landfill Groundwater Total all Pathways HQ Trigger Level	--	Real
AC-HB	Columns C-AC repeated for other 7 source types	--	Real

Table 9.40 Example of Exposure Human Risk/HQ Output File

Chemical Name	CasId	Landfill								
		Air Inhalation		Soil Ingestion		Water Ingestion		Crop Ingestion		...
		Risk	HQ	Risk	HQ	Risk	HQ	Risk	HQ	...
Benzene	71-43-2	0.000006	NA	2E-09	NA	> 1E-04	NA	0.00002	NA	...
Lead	53-70-3	> 1E-04	NA	0.0001	NA	> 1E-04	NA	0.0001	NA	...
...	...	...	...	...	...	...	...	...	...	...

Table 9.41 Relative Target Exit Levels Output File Format

Column	Name	Units	Type
A	Chemical Name	--	String(32)
B	CASID	--	String(32)
C	Relative change in Exit Level for Scenario 1	--	Real
D	Relative change in Exit Level for Scenario 2 vs 1	--	Real
E	Relative change in Exit Level for Scenario 3 vs 2	--	Real
F	Relative change in Exit Level for Scenario 4 vs 3	--	Real
G	Relative change in Exit Level for Scenario 5 vs 4	--	Real

Table 9.42 Example of Relative Target Exit Levels Output File

Chemical Name	CasId	Scenario1	Scenario2	Scenario3	Scenario4	Scenario5
Benzene	71-43-2	1	2.00E+00	-3.00E-02	3.00E+00	3.00E+00
Lead	7439-92-1	1	1.00E+00	1.00E+00	1.00E+00	1.00E+00

Table 9.43 Lowest Target Exit Level Output File Format

Column	Name	Units	Type
A	Chemical Name	--	String(32)
B	CASID	--	String(32)
C	Exit level determined by Human Heath (HH)	--	Real
D	Exit level determined by Ecological (Eco) impact	--	Real
E	Lowest of HH and Eco exit levels	--	Real
F-	Columns F-Z repeated for other 7 source types	--	Real

Table 9.44 Example of Lowest Target Exit Level Output File

Chemical Name	CasId	Liquid			...
		HH	Eco	Lowest	...
Benzene	71-43-2	4.00E-01	3.00E+01	4.00E-01	...
...	...	...	...	...	...

10.0 Specifications of the System User Interface

The SUI coordinates the execution of the individual processors through information provided from the site-based database and the user. Output from the SUI populates the header portion of the SSFs and creates the WARNING.ALL and ERROR.ALL files.

10.1 Read and Write Requirements

The SUI is expected to read and write in the following manner:

Read expectations	Site-Based Database (format described in Section 5.2). Error and Warning files (format described in Section 2.1.4)
Write expectations	Header portion of the SSF (format described in Appendix A). Messages.ALL files (format described in Section 10.2)

10.2 Messages.ALL File Formats

The .ALL file format will consist of all errors and warnings produced during a given run. The errors and warnings will be placed in their respective files after the following information describing the state of execution:

1) Realization counter
2) Site Id
3) Source Type
4) Chemical Id
5) CW (Chemical waste level)

An example Messages.ALL file is shown below:

Error for Realization: 1, SiteId: 0733404
Source: Surface Imp., Chemical: Acetamide, CW Level: 2
Failed to call closegroups
Parameter qwerty not found!
Error for Realization: 1, SiteId: 0733404
Source: Surface Imp., Chemical: Acetamide, CW Level: 3
Failed to call closegroups
Parameter qwerty not found!

11.0 References

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