

Overview

**“Knowledge is of two kinds.
We know a subject ourselves, or we know where we can find information upon it.”
- Samuel Johnson**

Internet Technology

The Internet is a large public network of linked computer sites which provide access to a variety of services, such as email and file transfer, and large quantities of diverse information. Many individuals, organizations, and businesses utilize the Internet to improve access to information, improve the efficiency of business transactions, and improve communications.

The World Wide Web (WWW or Web) is one of the easiest ways to access information over the Internet, therefore, the use of Web technology continues to evolve and the user audience continues to grow. Web pages provide a graphical presentation of information available over the Internet. Information on a Web page is especially useable if it is organized in a way that parallels the human thought processes. That is, we learn and remember new information by organizing pieces of related information and mapping the new information to existing knowledge. Therefore, Web pages that are logically organized and relate information in a meaningful way, facilitate user access and understanding. Each link on a Web page is a jumping off point to seemingly limitless information sources. When you browse the Web you often begin at the “home page,” this is the starting point of a web site. It acts as a sort of table of contents or index of the web site. A web site can have one or numerous pages.

Web technology utilizes a client-server structure. The individual user has a “client” piece of software on their computer that communicates over the Internet to locate the desired web “server” address, links to the desired web server, communicates between the client and the server, and displays information from the server on the client. Although many different browsers are available, Microsoft Internet Explorer and Netscape Navigator are the two most popular and can be downloaded for free from each company's website.

One common issue with Internet and Web usage is speed. Speed of access depends on a number of factors: your modem speed, your Internet service provider's modem speed, the size of the files you are downloading, how busy the server is, and the traffic on the Internet. Speed can also be a factor depending on the functionality of the Web site being accessed. The issues here include: size of database, relationships of data elements, complexity of query, and software package used to generate and display the Web Application.

Nearly 90% of Web users report that they use the Web as an information source for something specific. Thus, the information content of a site represents its “base” value. And anything and everything that makes the information on the site easier to find, or makes it more accessible, increases the base value. The basic details of reader-friendliness: compatibility, multi-mode navigational support (graphical versus text), multi-browser support, and well-structured content,

etc., provide incremental enhancements to overall site value. Content-rich, reader-friendly Web sites are inherently of high-value, because they strive to meet the information needs of their visitors in the simplest, most timely manner available.

It would be impossible to determine or predict all the motivations, goals, or priorities of all the anticipated users for the CID Web page. However, every effort to identify the target audience requirements for the web systems interface, hyperlinks, and data access and reporting capabilities will be made, in order to develop a broadly useful and accessible Web site that will satisfy multiple needs.

“Things should be made as simple as possible—but no simpler.” – A. Einstein

User Interface

Overview

A primary key to the success of the Central Internet Database web site is the design of its user interface. The term "user interface" refers to the general design of the overall database web site and the way the content of the site is highlighted and made accessible. The contents for the Central Internet Database include not only the database itself, but also may consist of links to other relevant sites, standard reports prepared from the database, help tips on finding specific information, or a glossary of technical terms.

Components to consider when designing the user interface of a web site include the:

- introductory page,
- navigation tools to help a user easily find site content,
- overall structure and content of the site, and
- on-line help to use the system.

Introductory Page

The opening page of the web site must serve several key purposes, to orient the user quickly and effectively to the web site's contents, and invite the user to access and search the site. This opening screen must provide users a clear and concise summary of the purpose and contents of the database web site. EPA's Envirofacts web site is generally considered a good example of user

Exhibit 1. Sample Introductory Page

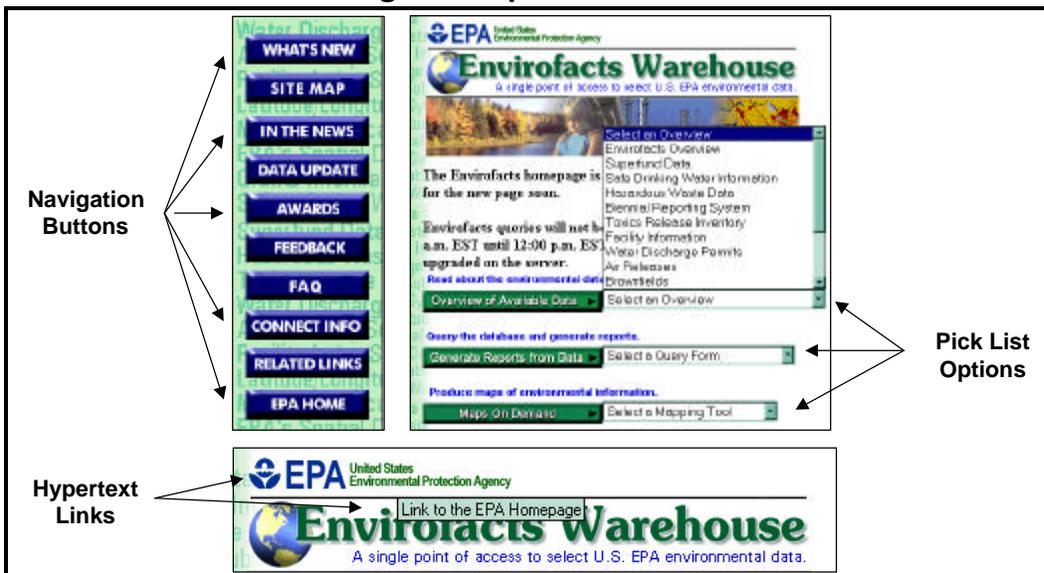


interface software. Pages from this web site are shown to illustrate examples of presentation and navigation options. Exhibit 1 shows the introductory page for EPA's Envirofacts web site.

Navigation Tools

Once users enter the web site they must be able to navigate within it easily and logically. There are many navigation systems to guide the users' search for information on the web site. Exhibit 2 shows navigation buttons, pick list options, and hypertext links to other web sites from EPA's Envirofacts web site.

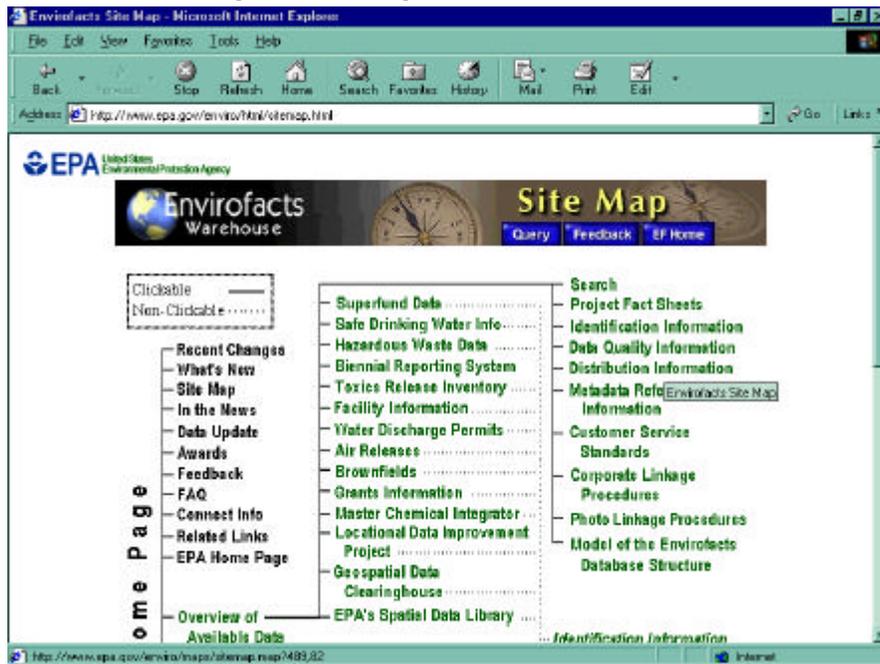
Exhibit 2. Common Navigation Options



The following are several of the most common navigational tools found on web sites:

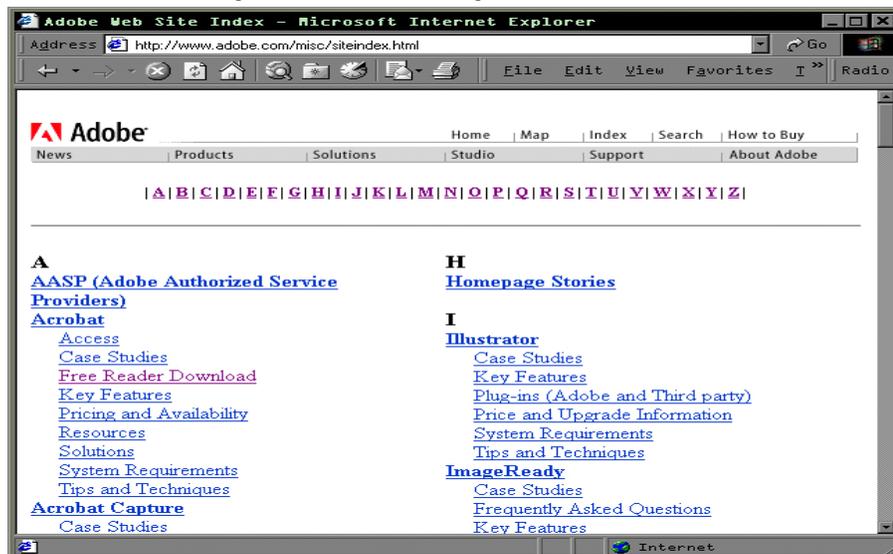
- Site Map. A site map can provide a means for viewing the major content categories of a site using text and images. Site maps generally do not provide a detailed overview of the site contents, but can quickly orient a user to what is available. Exhibit 3 shows the site map for EPA's Envirofacts web site.

Exhibit 3. Sample Site Map



- Site Index. A site index is similar to indices found at the back of books. Typically, it is fairly long and provides details about the contents of the site. Adobe's web site is generally considered a good example of user interface software. Pages from this web site are shown to illustrate examples of presentation and navigation options. Exhibit 4 shows the site index for Adobe's web site.

Exhibit 4. Sample Site Index Option



- Table of Contents. A table of contents provides users with a hierarchy of chapters of content within the site. Typically, users are presented with several levels of detail behind each chapter. Yahoo's web site is generally considered a good example of user interface software. Pages from this web site are shown to illustrate examples of presentation and navigation options. Exhibit 5 shows the table of contents for Yahoo's web site.

Exhibit 5. Sample Table of Contents Option

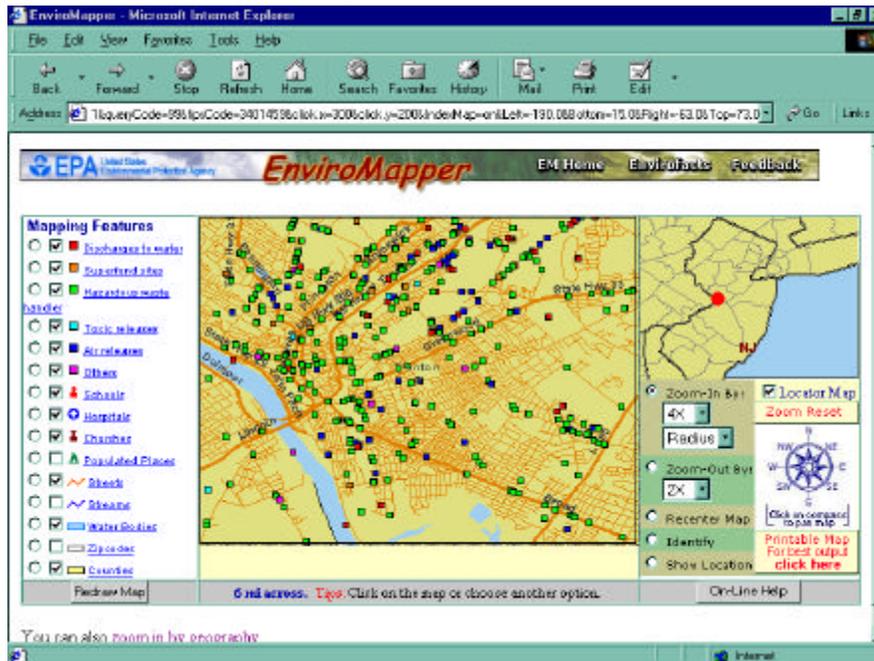


Structure and Content

The purpose of an effective user interface is to allow users to access the primary information contained on the web site intuitively and easily. One fundamental question users must help answer is what information contained in the web site should be highlighted through the user interface. For example, on the web site housing the Central Internet Database, there are several types of information that could be highlighted:

- The database itself, and the query tools that allow users to conduct their own searches of the data and generate their own reports;
- Reports that are pre-packaged and updated whenever the data are changed. This approach would allow users to access quickly the contents of the database without having to perform their own searches (access to the complete database would also be possible in this option); or
- Graphical interfaces that allow quicker access to portions of the data. For example, geographic maps, disposition maps, or pre-loaded spreadsheets with all of the data on specific

Exhibit 6. Sample Graphical Output



waste types could be provided that allowed users easy access to subsets of the data. Exhibit 6 shows a graphical output from EPA's Envirofacts web site.

Deciding how the content of the database will be organized and made available is a critical user interface decision.

On-Line Help

An on-line help function is another critical tool to facilitate the ease of use and navigation of the web site. The purpose of on-line help is to assist users in their search for specific information. The on-line help tool should focus on the user's task, list concrete steps to carry out, all while not being too large (i.e. multiple pages of narrative).

Ideally, on-line help should not only be a help button, but should be integrated throughout the web site through clear directions, an intuitive interface, and an easily accessible button for additional information. In other words, users should never feel like assistance is too far away. One way to accomplish this is to fully integrate help into every page of the web site. The components of each help section should be tailored to the contents and functionality of that specific page.

In addition to the self-help functionality of on-line help, the option of sending a question or request for help to the web site manager can also be provided. It must be assumed that questions may arise that are very technical and require a personalized response.

Report and Query

Overview

Technologies available today provide a variety of tools to query data sources through the Internet. Through viewing sample tools and reports and discussing requirements, this session at the National Stakeholder Forum will be designed to help DOE and stakeholders define the report, search, and query capabilities that will be most useful in the Central Internet Database.

Requirements for data output can be organized into four major areas:

- (1) *Standard Reports.* Where many users need similar reports, it can be appropriate to predetermine a set of standard reports from the database. A "standard report" is a formatted set of information that contains pre-defined data. These reports would be available from a listing or "menu" of options that the user would select by clicking on a report title. Standard reports are very effective when a large portion of the user community would require the same data and organization, because the query to produce the output has already been completed and does not need to be rebuilt.
- (2) *Searches.* As with many web sites today, keyword searches can be useful to retrieve resources on specific data or category of information. A "search" allows the user to type one or more key words into a data entry field to retrieve data, documents or linked web sites that contain the specified word(s). In addition to the database itself, the web site is expected to store linkages to other data sources and reports. Search capabilities provide easy mechanisms to sort through these data sources and identify information relevant to a user-specified topic.
- (3) *Queries.* A query is a tool that allows users to interactively define the organization and content of data to be retrieved from a database. On-line queries are a powerful tool, allowing the user to specify exact data items and sort orders and data groupings for the desired output. The flexibility offered by query tools also adds complexity, and therefore the query capabilities must be designed to ensure a user-friendly interface for building queries.
- (4) *User-Defined Output Formats.* Users may require different formats of the same data, such as charts, graphs, or tables. Data, or subsets of data can also be moved into a variety of formats such as Microsoft Excel, or comma delimited files suitable for download to a PC.

Sample Reports

Developing standard reports and query writing capabilities from the web site will require information from the user community on how data will most likely need to be organized and presented. To facilitate forum discussions on the organization and presentation of reports and

Report and Query

query results, three examples from existing reports on waste data are presented in this section. The samples reflect the data content and disposition activities available through the EM Corporate Database for different waste types (as described in Section D). Exhibit 1 shows planned life cycle disposition volumes (including disposition strategies) by site and waste type. Exhibit 2 shows life cycle disposition volumes for each Field/Operations Office for each waste type. Exhibit 3 shows a receiving report for a Field/Operations Office describing waste received (or scheduled to be received) by waste type and source site.

Exhibit 1: EM Planned Life-Cycle Disposition Volumes By Site and Waste Type								
Data Version: Spring Update 5/12/99 AVS Download								
Reporting Site	Waste Type	Disposition Strategy		Leave in Place (m3)	Dispose on Site		Ship to DOE Sites (m3)	Ship to Off-Site Commercial (m3)
		Site	Facility		On-Site Generation (m3)	Off-Site Receipts (m3)		
Ohio								
Battelle WJ	LLW	Commercial	Commercial-6					29
	LLW	Envirocare						8,383
	LLW	Hanford	200 Area Burial Grnd				1,613	
	MLLW	Commercial	Commercial-6					20
	MLLW	Commercial	Commercial-22					1
	MLLW	Envirocare	Macroencapsulate					10
Fernald	LLW	Commercial	Commercial-6					370,822
	LLW	Envirocare						27,759
	LLW	FEMP	On Site Disp Facility		2,224,516			
	LLW	Nevada Test Site	Area 3/Area 5 RWMS				44,724	
	MLLW	Commercial	Commercial-6					5,805
Mound Plant	HAZ	Commercial	Commercial-6					2,174
	LLW	Envirocare						28,739
	LLW	Envirocare						4,980
	LLW	Nevada Test Site					7,409	
	LLW	Nevada Test Site					1,243	
	MLLW	Nevada Test Site					1	
	SAN	Commercial	Commercial-6					36,139
	TRU	WIPP	WIPP				494	
West Valley	HLW	GRD	Geologic Repository					254
	LLW	Envirocare						5,817
Hanford Site	HAZ	Hanford	ERDF			11,300		
	LLW	Hanford	Geological Repository			12,245		
	LLW	Hanford	201 Area Burial Ground			241,924	360	
	LLW	Hanford	ERDF			4,428,712		
	LLW	Hanford	In-situ management	20,000,000				
	MLLW	Hanford	Near surface vault			593,979		
	MLLW	Hanford	RMW trenches			76,484	9,776	
	MLLW	Hanford	ERDF			382		
	SNF	GRD	Geological Repository					2,135
	TRU	WIPP	WIPP					18,222

Report and Query

Exhibit 2: EM Planned Life-Cycle Disposition Volumes

Data Version: Spring Update 5/12/99 AVS Download

Idaho

Waste Type Category	Leave In Place (m3)	Disposal On Site		Ship to DOE Site (m3)	Ship to OFF-Site Comercial (m3)	Disposition to be Determined (m3)	Total (m3)
		On-Site Generated (m3)	Off-Site Generated (m3)				
HAZ	-	-	-	-	-	-	-
HLW	-	-	-	520	-	-	520
LLW	250,000	58,000	1,800	-	-	30,000	339,800
MLLW	550,000	-	147	89	2,800	-	553,036
SNF*	-	-	-	-	250	-	250
TRU	-	-	-	-	32,000	-	32,000

Oak Ridge

Waste Type Category	Leave In Place (m3)	Disposal On Site		Ship to DOE Site (m3)	Ship to OFF-Site Comercial (m3)	Disposition to be Determined (m3)	Total (m3)
		On-Site Generated (m3)	Off-Site Generated (m3)				
HAZ	-	70,000	-	-	2,600	-	72,600
HLW	-	-	-	-	-	-	-
LLW	220,000	1,100,000	-	630,000	150,000	2,000	2,102,000
MLLW	7,700	890,000	-	550	150,000	-	1,048,250
SNF*	-	-	-	-	-	-	-
TRU	-	-	-	1,600	-	470	2,070

Richland

Waste Type Category	Leave In Place (m3)	Disposal On Site		Ship to DOE Site (m3)	Ship to OFF-Site Comercial (m3)	Disposition to be Determined (m3)	Total (m3)
		On-Site Generated (m3)	Off-Site Generated (m3)				
HAZ	-	11,000	-	-	-	-	11,000
HLW	-	-	-	-	-	-	-
LLW	20,000,000	5,300,000	360	-	-	-	25,300,360
MLLW	-	77,000	9,800	-	-	190	86,990
SNF*	-	-	-	2,100	-	-	2,100
TRU	-	120	-	18,000	-	-	18,120

Rocky Flats

Waste Type Category	Leave In Place (m3)	Disposal On Site		Ship to DOE Site (m3)	Ship to OFF-Site Comercial (m3)	Disposition to be Determined (m3)	Total (m3)
		On-Site Generated (m3)	Off-Site Generated (m3)				
HAZ	-	-	-	-	-	-	-
HLW	-	-	-	-	-	-	-
LLW	-	-	-	170,000	-	-	170,000
MLLW	-	-	-	-	5,000	-	5,000
SNF*	-	-	-	-	-	-	-
TRU	-	-	-	15,000	-	-	15,000

Savannah River

Waste Type Category	Leave In Place (m3)	Disposal On Site		Ship to DOE Site (m3)	Ship to OFF-Site Comercial (m3)	Disposition to be Determined (m3)	Total (m3)
		On-Site Generated (m3)	Off-Site Generated (m3)				
HAZ	-	-	-	-	-	-	-
HLW	-	-	-	-	5,700	-	5,700
LLW	1,400,000	96,000	3,600	-	15,000	-	1,514,600
MLLW	25,000	-	-	-	-	4,100	29,100
SNF*	-	-	-	-	-	-	-
TRU	32	-	-	20,000	-	-	20,032

*SNF information is in Metric Tons of Heavy Metal (MTHM)

Exhibit 3: Receiving Report		Idaho National Engineering and Environmental Laboratory			
Data Set: FY98 Baseline		Report generated: Tuesday, May 18, 1999 07:14			
Material stream quantities not reported in m3 have been excluded from this report					
Mat/Waste Type	Source Site	Planned Quantity (m3)	Map	Stream Name	Disposition Activity
MLLW	Savannah River Site	1.00	LLW	Sludge/Liquids (C)	Treatment
		1.30	MLLW	Debris (E)	Treatment
	Total	2.30			
MLLW	Mound Plant	9.05	MLLW	Debris from Offsite	Other Processing
		Total	9.05		
MLLW	Paducah Gaseous Diffusion Plant	138.00	MLLW	Sludge/Liquids from offsite(C)	Other Processing
		Total	138.00		
MLLW	Oak Ridge Reservation	3.43	MLLW	TSCA Incinerator Ash	Treatment
		0.53	MLLW	MLLW Ash	Disposal
	Total	3.96			
MLLW	Energy Technology Engineering Center	1.58	MLLW	Debris from Offsite	Treatment
		16.80	MLLW	Sludge/Liquids	Other Processing
		-	MLLW	Debris	Treatment
	Total	18.38			
MLLW	Portsmouth Gaseous Diffusion Plant	336.31	MLLW	Sludge/Liquids from offsite	Other Processing
		11.00	MLLW	Y-12 CH DD LLW	Treatment
	Total	377.31			
MLLW	Hanford Site	16.65	MLLW	Sludge/Liquids from offsite	Other Processing
		Total	16.65		
MLLW	Los Alamos National Laboratory	13.35	MLLW	Elemental Lead from Offsite	Other Processing
		183.90	MLLW	Sludge/Liquids	Treatment
	Total	197.25			
MLLW	Kessel Ring	0.52	MLLW	Debris from offsite	Treatment
		35.10	MLLW	Debris from offsite	Other Processing
		1.85	MLLW	Debris from offsite	Other Processing
	Total	37.47			
MLLW	General Atomics	0.29	MLLW	Debris from Offsite	Disposal
		5.97	MLLW	Sludge/Liquids from offsite	Disposal
	Total	6.26			
MLLW	Shiprock	1.14	MLLW	Debris from Offsite	Disposal
		3.71	MLLW	Debris from Offsite	Treatment
		42.70	MLLW	Sludge/Liquids from offsite	Disposal
	Total	47.55			

Prior to National Stakeholder Forum

To make the most of this session, participants are encouraged to complete the following activities prior to attending:

- Develop a list of desired capabilities for the web-tool for standard reports, search, query, and user-defined outputs.
- Review the sample reports in Exhibits 1, 2, and 3 to facilitate discussion on data organization and presentation.
- Visit the sample web sites listed in Exhibit 4 to view different report/query capabilities. (If there are other sites that you find particularly useful for report and query functions, please bring the web site address with you to the session.)
- Consider the questions listed in Exhibit 5 and develop some preliminary responses for use in the discussion.

Exhibit 4. On-Line Database Examples

The following databases provide examples of different report/query capabilities:

- *Energy Information Association*
<http://tonto.eia.doe.gov/iq2/>
- *Envirofacts*
http://www.epa.gov/enviro/index_java.html
- *Washington State Department of Ecology's Facility/Site Identification System*
<http://www.wa.gov/ecology/iss/fsweb/fshome.html>
- *Cleveland Area Network for Data and Organizing (CAN DO)**
http://129.22.45.115/cd_cuy.htm
- *Annual Report of Waste Generation and Pollution Prevention Progress*
<http://twilight.saic.com/WasteMin/MainReports.htm>

At the National Stakeholder Forum

During this session, DOE and the user community will participate in an open discussion using the framing subject areas and questions provided. However, any topic or question relative to report and query capabilities for the web tool is welcome. Participants are encouraged to bring sample web site addresses, specific examples of output, or any other resource material that would contribute to this discussion.

Exhibit 5. Questions to Help Frame National Stakeholder Forum Discussions

- Which of the three options (reports, searches, and queries) are you most interested in and will you use most often?
- How do you want data presentation organized (e.g., by site, waste type, program)?
- What do you want to be able to use the information for (e.g., track waste at a site, track waste transfers, compare year 1 to year 2)?
- What types of information will you access most?
- What formats would you like the output in (e.g., Microsoft Excel spreadsheet, comma-delimited, html table, PDF, charts, graphs)?
- Do you want to be able to do a comparative analysis (e.g., compare year 1 to year 2, compare DP to SC, cradle-to-grave tracking for specific waste groups)?
- What capabilities would you like to see in a keyword Search feature?
- What types of interactive calculations are you interested in (i.e., subtotals, variances, percent change)?

Accessibility

Overview

In order to design a client/server system that gives the greatest number of users access to the maximum amount of information in the shortest amount of time, DOE needs to determine the typical resources (e.g., hardware, software, existing Internet and computer knowledge) retained by the user community. DOE also needs to determine what resources it needs to support the Central Internet Database. To accomplish this, DOE needs to predict how often the Database will be accessed (especially simultaneously) and any patterns of future use. All of these issues should be addressed in order to develop the most effective system.

DOE will rely on discussion and feedback at the National Stakeholder Forum to collect and document this information. Exhibit 1 provides a list of questions to help frame the discussion at the National Stakeholder Forum.

DOE also needs to determine how to effectively distribute reports to organizations who work on issues relating to DOE's environmental management activities and do not have computer access to the database. In addition, DOE needs to determine an effective method to process written requests for information from the database.

At the National Stakeholder Forum, DOE will sponsor an open session to determine the needs of the stakeholders, answer any questions, and obtain the necessary information to optimize hard copy distribution of reports and requested information. Exhibit 2 provides a list of questions to help frame the discussion at the National Stakeholder Forum.

Exhibit 1. Discussion Questions for Electronic Accessibility

1. What are the minimum client/server technical requirements for:
 - Computer/processor,
 - Operating environment,
 - Memory (RAM),
 - Hard disk space,
 - Internet browser,
 - Network protocols/connections,
 - CD-ROM drive,
 - Floppy drive, and
 - Other (e.g., hard disk space for loading data to disks).
2. What is the expected number of total users? Of concurrent users?
3. Are there any patterns of known use, i.e., are there any peak periods of use during the year (e.g., after an update)?
4. What level of computer and Internet experience must users possess to be able to successfully utilize the Database?

Exhibit 2. Discussion Questions for Hard Copy Distribution

1. Which organizations do not have computer access to the Database?
2. What constitutes a "reasonable" request?
3. What is the expected turnaround time to fulfill written requests?
4. If there are questions regarding a written request, who will be responsible for contacting the requestor, and what are those procedures?