Paducah Data Warehouse And GIS Viewer

User's Guide

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Paducah Data Warehouse and GIS Viewer

Overview

The *Paducah Data Warehouse and GIS Viewer* application provides a systematic approach to retrieve, display, and download analytical, geotechnical, and hydrological data, maps, and geophysical information for the Paducah Gaseous Diffusion Plant using a web browser. The information includes analytical sample results from various environmental studies, restoration reports and supporting documents, maps, facility drawings, and photography managed by the United States Department of Energy and its contractors.

The *Paducah Data Warehouse and GIS Viewer* is a secure Internet website that allows project managers, US DOE, state and local officials, and scientists to have access to sampling data for hundreds of investigative wells and sampling events, Solid Waste Management Units (SWMUs), and site specific GIS features from all of the environmental studies at the site.

There are two basic types of user-interfaces available in the Paducah Data Warehouse and GIS Viewer; data-driven (analytical) web pages and a map-driven (GIS) interface. Each interface will provide essentially the same data but use different access methods to obtain the results.

The data-driven web pages is an easy way to see the results of sample analyses based on user-defined criterion such as area, SWMU, sample locations, sample dates, media, analytical parameter, qualifier (i.e., detect, non-detect, all) and depths. Output from these queries can be displayed in a web page or downloaded in either an Excel® Spreadsheet or as a comma-delimited text file. Some types of data (groundwater levels, for example) can be dynamically graphed.

The map-driven (or GIS) interface allows users to generate maps showing, for example, locations of features, buffers extents, or to show the spatial relationships between sample locations other features such as buildings, creeks, or storage facilities.

Analytical Data Viewer

Overview

The data-driven web pages option allow access to analytical data, well and borehole information and geoscience information. These options include:

- An option that allows the user to select environmental sample analytical data from multiple dynamic menus/lists. These menus allow the user to specify the area, SWMU, sample locations, media, analytical parameter, qualifier (i.e., detect, non-detect, all) and depths. These data are then displayed in a web page. For groundwater results, a temporal trend can be dynamically graphed or the data can be downloaded via an Excel® spreadsheet for further manipulation.
- An option that allows the user to select well and borehole information. This will allow the user to specify a well and retrieve well logs or well development information. This page will also allow the user to specify a well and retrieve groundwater level surface data. The groundwater level surface data can be displayed in a web page and the hydrograph dynamically graphed or the data can be downloaded via an Excel® spreadsheet for further manipulation.
- An option that allows the user to select geoscience data, geological data and geoscience logs from dynamic lists/menus. The geoscience page will allow the user to specify location, geoscience event, geoscience parameter and geoscience category. The data can be displayed in a web page or downloaded via an Excel® spreadsheet for further manipulation. The geological technical data (i.e., geologist well and borehole "picks") can be displayed and sorted dynamically in a web page or downloaded via an Excel® spreadsheet for further manipulation. The geoscience logs (i.e., geotechnical logs and hydrological logs) can be displayed and downloaded as well by selecting the well or borehole from a dynamic menu/list.

GIS Viewer

Overview

The map-driven (GIS) web pages provide an easy-to-use interface to help users visualize the spatial relationships among the variety of features and sampling locations associated with the Paducah Gaseous Diffusion Plant. In addition, analytical data can be queried and displayed in tables or downloaded for use in other software applications such as modeling or statistics.

The Site GIS Viewer includes basic map tools for zoom-in; zoom-out; zoom-extents; zoom-last; pan; hyperlink; identify feature; find; measure distance; set units; buffer; select by line/polygon; select by rectangle; and print. Additional tools include various types of analytical queries (by circle, rectangle, polygon, or buffer) and the ability to download features in a format suitable for most GIS applications.

Some of the options of the GIS Viewer include:

- A page that allows the user to select buildings or land areas, plume areas, named streams or water bodies from dynamic lists/menus. The GIS map page will dynamically zoom to the requested selection.
- A page that allows the user to select sample locations from a dynamic list/menu. The GIS map page will dynamically zoom to the requested selection.
- A page that allows the user to select environmental sample analytical data from a dynamic list/menu. The page will allow the user to specify which analytical parameter and a result criteria of all, detects or concentration to exceed. The analytical results for the query will be displayed in a web page and the locations matching the criteria will by dynamically displayed on the site map.

Paducah Data Warehouse and GIS

Sources of Data

The *Paducah Data Warehouse and GIS Viewer* provides a systematic approach to retrieve and display analytical data, maps, hydrological data, and geophysical information using a web browser. The information includes analytical sample results from various environmental media, restoration reports and supporting documents, maps, facility drawings and photography for environmental locations managed by DOE and the Paducah Gaseous Diffusion Plant contractors.

Analytical Data

The primary and most comprehensive source of the analytical data is from the Oak Ridge Environmental Information Management System (OREIS) supported in an ORACLE® database on a server located in Oak Ridge, TN.

Periodically, data downloads from OREIS are loaded into the Paducah Data Warehouse. These downloads are subsequently processed using a rule-based procedure to be reformatted for use within the Paducah Data Warehouse. This processing, however, requires much effort and time to ensure that the OREIS data is reformatted to include a defined standard for analytical parameter names, parameter units, depth units, sample dates, location types and redundant or missing data. Consequently, the Paducah Data Warehouse has the most up-to-date, accurate, and complete set of analytical data for the site.

GIS Data

The GIS Viewer was developed by creating the GIS datasets (also called Layers or Features) into ArcGIS® geodatabase format following the Spatial Data Standards for Facilities, Infrastructure, and the Environment (SDSFIE) standard. SDSFIE was developed for the Federal Government and its contractors and provides basic data standards for use with geographic information system (GIS) and similar computerized geospatial data systems. Geospatial data systems are computerized systems that employ information concerning the natural and constructed (man-made) “real-world" features (objects), referenced to their specific locations on the earth. The term SDSFIE now covers both the Graphic and Non-graphic portions of the standard. The non-graphic portions of the standard were formerly called FMSFIE (Facility Management Standards for Facilities, Infrastructure, and the Environment).

The GIS Viewer stores all geographic coordinate data using the Kentucky State Plane Coordinate System (South), based on the North American Datum of 1983. All measurements are in U.S. feet.

The datasets used to build the geodatabase came from a variety of sources including Paducah environmental department staff or contractors, Federal, State, and local agencies, and university researchers. These datasets were previously (or may still be) maintained in various electronic GIS and CAD formats and coordinate systems. Many of these datasets, therefore, were usually converted from the Paducah Gaseous Diffusion Plant coordinate system (NAD 27 in feet) into the geodatabase coordinate system.

Existing plant map layers generated by Paducah Environmental Department staff and contractors were collected and converted. The Paducah Plant GIS layers and regional 50-mile radius map layers (created and developed from the Risk Based End State project) were loaded into ESRI ArcGIS® geodatabase format via the ArcCatalog® tool which is a part of ESRI’s ArcGIS® software. The sample location features for investigative wells, soil samples, surface water, waste water and National Pollution

Discharge Elimination System (NPDES) were converted into ArcSDE® point features from the easting and northing coordinates currently maintained in OREIS.

The ArcGIS® geodatabase provides a lot of functionality for the Paducah Data Warehouse and GIS Viewer. Some of the functionality includes:

- ❖ Layer versioning;
- ❖ Raster data loading;
- ❖ Dynamic linking of features to the analytical data warehouse; and
- ❖ Multi-user access.

The last feature, multi-user access, is important, as all Paducah web users will see the most up to date map features.

Soil Borings and Well Log Data

Paducah geoscience reports were retrieved from Paducah environmental department staff or contractors. Pertinent geotechnical and hydrologic data from these reports were extracted, scanned, and placed into the geoscience data warehouse as Adobe Acrobat® PDF files. Each PDF document is associated (or hot-linked) to each boring and/or well location. By clicking on each point, individual log information is readily displayed in a Adobe Acrobat® PDF viewer window.

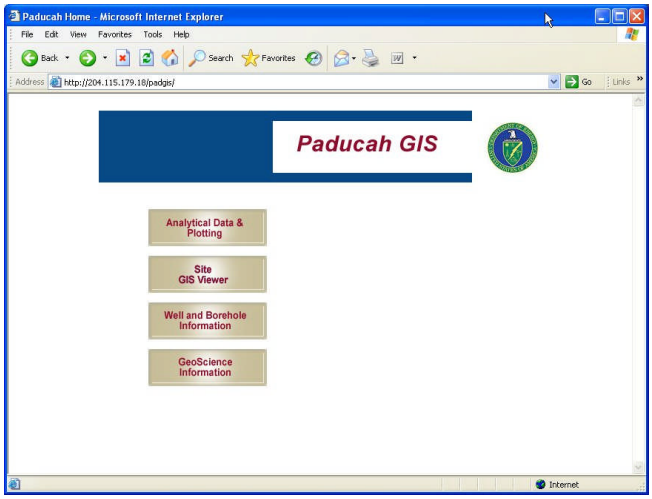
Geological Data

Geotechnical lithologic data were retrieved from Paducah environmental department staff or contractors, including researchers. Whenever possible, the geotechnical lithologic data was download electronically and stored in the appropriate geoscience data warehouse tables. These data include the borehole/well location, easting, northing, source, ground elevation, top and bottom lithologic unit elevations, and top and bottom lithologic unit depths.

Well Development Data

Well development data was retrieved from Paducah environmental department staff or contractors and stored in the appropriate geoscience data warehouse tables. These data include the borehole/well location name, alias name, easting, northing, land surface elevation, measuring point elevation, top and bottom well component elevations, and top and bottom well component depths, and miscellaneous well characteristics such as slot size, casing diameters and materials.

Logging into the Site



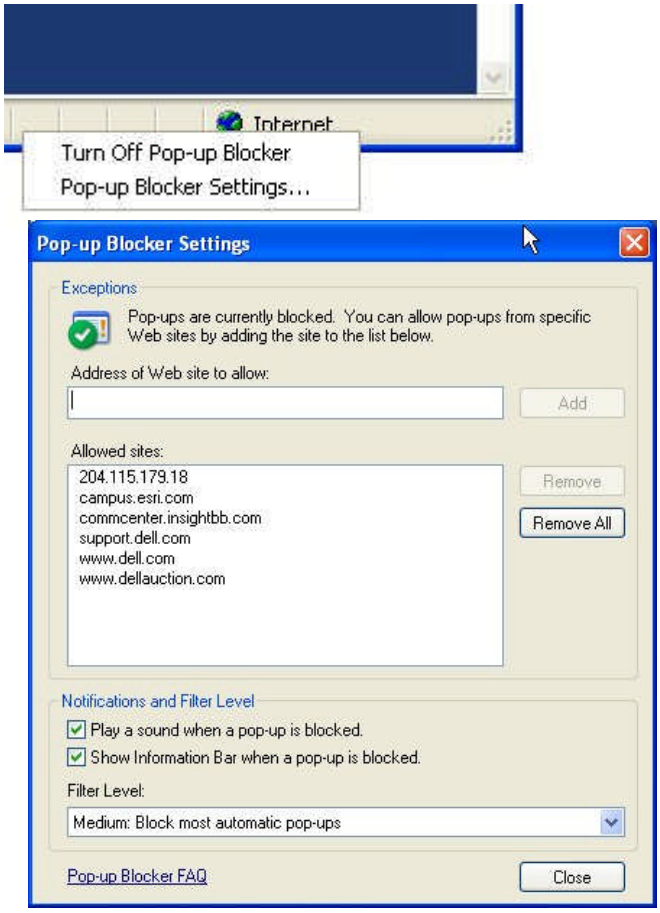
In your Web browser, type the following URL address:

http://204.115.179.18/padgis

The *Paducah Data Warehouse and GIS Viewer* Home Page is displayed.

***Note**: Internet Explorer must be configured properly to allow pop-up windows to be displayed. See the section: Configuring Internet Explorer for information on how to configure Internet Explorer to allow pop-ups.*

Configuring Internet Explorer

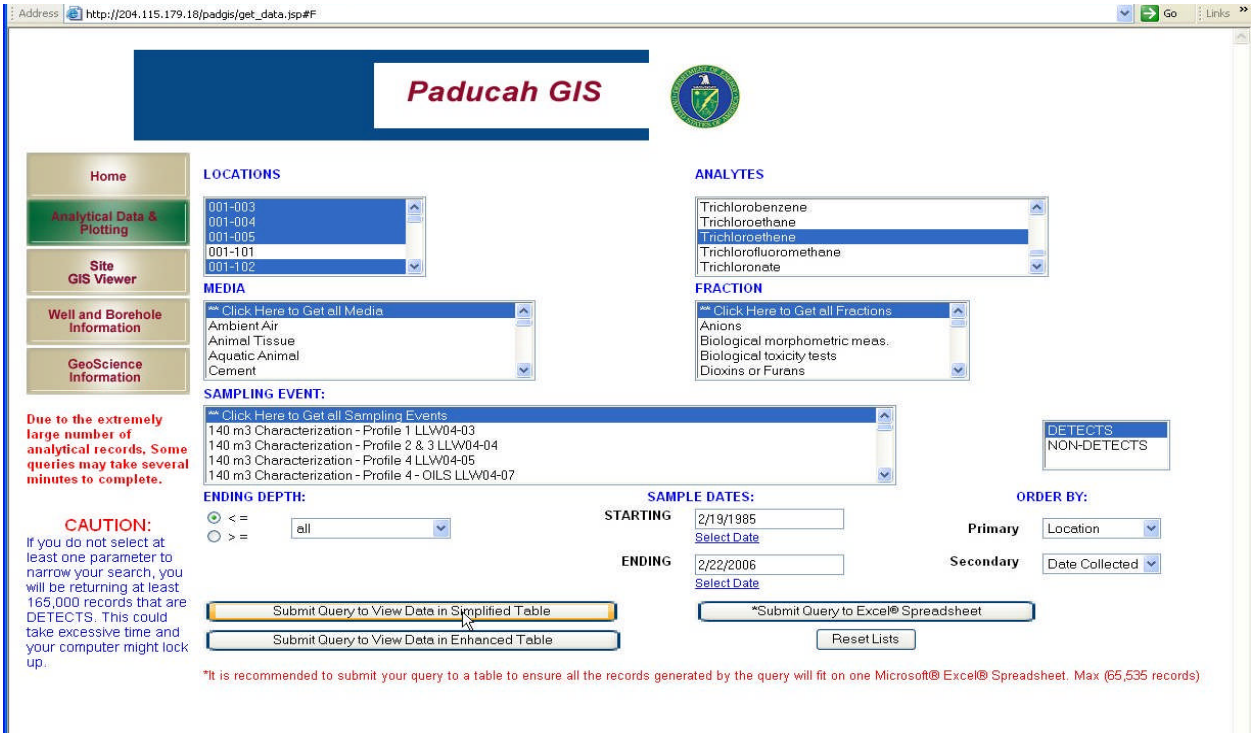


For the *Paducah Data Warehouse and GIS Viewer* to function properly, you must be sure that your Web Browser will allow pop-up windows to be displayed.

Assuming you are using Microsoft Internet Explorer® version 6.0 or higher, please make the following settings:

1. If you have 3rd party pop-up blockers such as Google® Bar, Yahoo® Bar, or similar applications, be sure to allow pop-ups for the site 204.115.179.18
2. Open Internet Explorer and look at the lower right of the window. There you will see 3 or 4 small boxes.
3. Move your mouse pointer of each box until a window similar to the image on the upper left. Left-click the *Pop-up Blocker Settings…* menu item.
4. A new window will open similar to the lower image on the left.
5. Enter the URL address: 204.115.179.18 in the space provided and click *ADD*. Close the Pop-up Blocker Settings Box.

Using Selection Options



The *Paducah Data Warehouse and GIS Viewer* uses standard Microsoft Windows® keys to select and deselect items from menus and drop-down lists

To select contiguous items,

- Left-click on the 1st item,
- Hold down the SHIFT key,
- Then left-click on the last item to be selected.

All of the items between the 2 clicks will be select. To select non-contiguous items,

- Left-click on the 1st item to be selected,
- Then hold down the *CONTROL* (Ctrl) key as you left-click subsequent selections.

Only the items that were clicked will be selected.

To de-select items which were selected from either of the 2 selection methods,

- Hold down the *CTRL* key as you left-click each item to be de-selected.

To help speed through a long list of items, type the first letter of the item of interest. The drop-down list will jump to the first item that starts with the typed letter.

Home Page

The *Paducah Data Warehouse and GIS Viewer* Home page offers four options to choose from:

1. Analytical Data and Plotting
2. GIS Viewer
3. Well and Borehole Information
4. GeoScience Information

By hovering the mouse pointer over each button will give a brief explanation of that option.

Analytical Data Viewer

The *Paducah Data Warehouse and GIS Viewer* provides a data-driven interface called the **Analytical Data Viewer** for users to search the data warehouse for analytical data from sampling events at the Paducah site. Data may be searched by any combination of the following criteria:

♦ location(s)	♦ media, fraction(s)
♦ analyte(s)	♦ sampling event(s)
♦ ending depth	♦ Project
♦ Sampling starting date	♦ Sampling ending date
♦ analyte was detected	♦ analyte was not detected

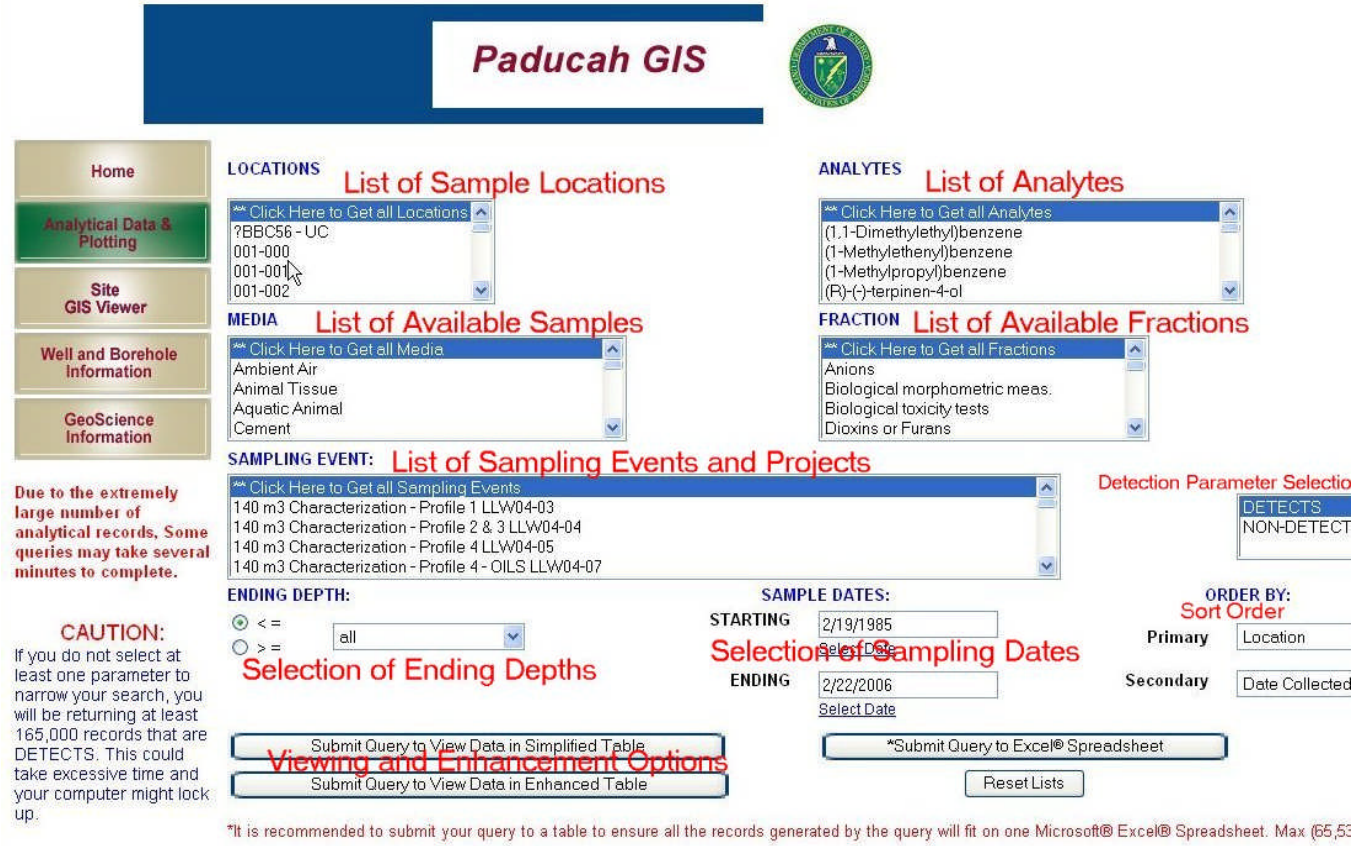
To use the **Analytical Data & Plotting** option of the *Paducah Data Warehouse and GIS Viewer*;

- Click on the **Analytical Data & Plotting** button on the home page.

The **Analytical Data Viewer** user interface will open providing multiple drop-down lists, menus, options, and user input boxes.

From this screen, a user can generate simple to sophisticated queries to meet their needs and return the results in either web browser tables or download Excel® spreadsheet and comma-delimited text files.

Layout of the Analytical Data Viewer



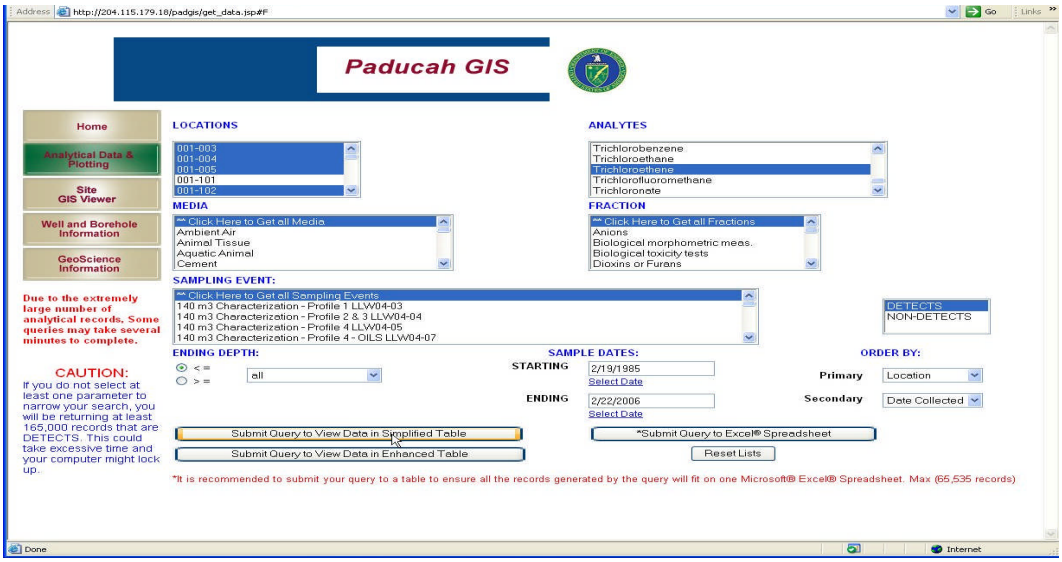
The **Analytical Data Viewer** provides a series of drop-down lists, user input boxes, and options to help users create simple or more sophisticated queries to find analytical data from sampling events at the Paducah site.

The drop-down lists are created dynamically from all of the analytical data stored in the data warehouse. These lists include *Named Sample Locations*, *Sampling Events and Projects, Available Samples (media), Analytes*, *Fractions,* and *Depths.* Options include *Starting and Ending Sampling dates*, *Detects* or *Non-detects*, *Simple* or *Enhanced Tables,* and *Excel® Spreadsheet downloads.*

***Note**: As the data warehouse is periodically updated, these lists will change to reflect those updates.*

The **Analytical Data Viewer** is used as both a stand-alone query builder or in conjunction with certain query functions of the **GIS Viewer**. When used with the **GIS Viewer**, the major difference is that the drop-down List of *Sample Locations*, *List of Analytes,* and the *List of Available Fractions* will only contain values that correspond to the currently select features in the GIS Viewer. For example, if three monitoring wells are selected in the **GIS Viewer**, the **Analytical Data Viewer** will only have those three wells available in the *List of Sample Locations* drop-down list.

Creating an Analytical Data Query



The **Analytical Data Viewer** provides multiple drop-down lists and input boxes to help users create simple or sophisticated queries to search for analytical data.

To build a query,

- Select as many locations, analytes, media, fractions, sampling events, detects or non-detects as necessary. *Defaults are **all** analytes, media, fractions, and sampling events.*
- *Optionally,* chose a value for ending depth and either the greater than or equal radial button or less than or equal radial button.
- *Optionally,* select starting and ending dates.
- *Optionally,* select what fields you would like to sort the data in the Order By pull-down lists.
- Click on the appropriate button to either Submit query to View Data in Simplified Table or Submit query to View Data in Enhanced Table or Submit Query to Excel® Spreadsheet.

Use the *Reset Lists* button to clear the last query.

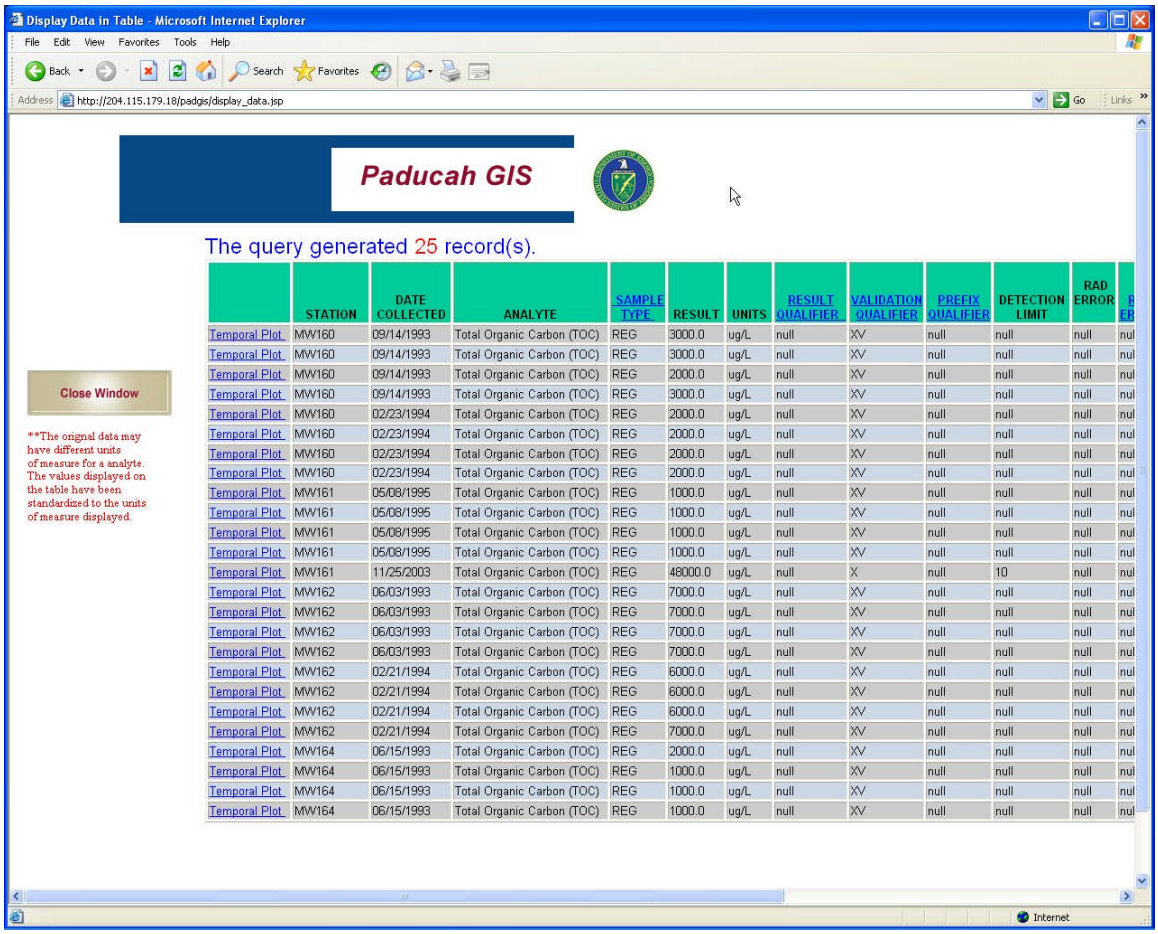
(continued)

Creating an Analytical Data Query (continued)

As an example, to query all detectable trichloroethene for all media, fractions, and sampling events for multiple locations:

- Select multiple id numbers in the LOCATIONS drop-down box.
- Select "Trichloroethene in the ANALYTES drop-down box.
- Click the Submit Query to View Data in Table button.

A new window will open showing the results of the query.



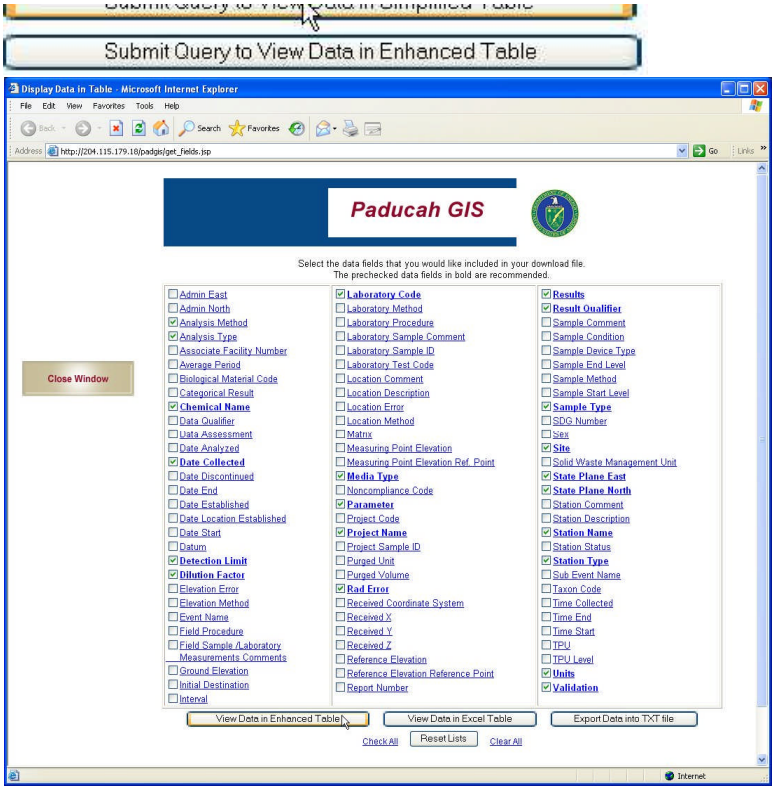
	STATION	DATE COLLECTED	ANALYTE	SAMPLE TYPE	RESULT	UNITS	RESULT QUALIFIER	VALIDATION QUALIFIER	PREFIX QUALIFIER	DETECTION LIMIT	RAD ERROR
Temporal Plot	MW160	09/14/1993	Total Organic Carbon (TOC)	REG	3000.0	ug/L	null	XV	null	null	null
Temporal Plot	MW160	09/14/1993	Total Organic Carbon (TOC)	REG	3000.0	ug/L	null	XV	null	null	null
Temporal Plot	MW160	09/14/1993	Total Organic Carbon (TOC)	REG	2000.0	ug/L	null	XV	null	null	null
Temporal Plot	MW160	09/14/1993	Total Organic Carbon (TOC)	REG	3000.0	ug/L	null	XV	null	null	null
Temporal Plot	MW160	02/23/1994	Total Organic Carbon (TOC)	REG	2000.0	ug/L	null	XV	null	null	null
Temporal Plot	MW160	02/23/1994	Total Organic Carbon (TOC)	REG	2000.0	ug/L	null	XV	null	null	null
Temporal Plot	MW160	02/23/1994	Total Organic Carbon (TOC)	REG	2000.0	ug/L	null	XV	null	null	null
Temporal Plot	MW160	02/23/1994	Total Organic Carbon (TOC)	REG	2000.0	ug/L	null	XV	null	null	null
Temporal Plot	MW161	05/08/1995	Total Organic Carbon (TOC)	REG	1000.0	ug/L	null	XV	null	null	null
Temporal Plot	MW161	05/08/1995	Total Organic Carbon (TOC)	REG	1000.0	ug/L	null	XV	null	null	null
Temporal Plot	MW161	05/08/1995	Total Organic Carbon (TOC)	REG	1000.0	ug/L	null	XV	null	null	null
Temporal Plot	MW161	05/08/1995	Total Organic Carbon (TOC)	REG	1000.0	ug/L	null	XV	null	null	null
Temporal Plot	MW161	11/25/2003	Total Organic Carbon (TOC)	REG	48000.0	ug/L	null	X	null	10	null
Temporal Plot	MW162	06/03/1993	Total Organic Carbon (TOC)	REG	7000.0	ug/L	null	XV	null	null	null
Temporal Plot	MW162	06/03/1993	Total Organic Carbon (TOC)	REG	7000.0	ug/L	null	XV	null	null	null
Temporal Plot	MW162	06/03/1993	Total Organic Carbon (TOC)	REG	7000.0	ug/L	null	XV	null	null	null
Temporal Plot	MW162	06/03/1993	Total Organic Carbon (TOC)	REG	7000.0	ug/L	null	XV	null	null	null
Temporal Plot	MW162	02/21/1994	Total Organic Carbon (TOC)	REG	6000.0	ug/L	null	XV	null	null	null
Temporal Plot	MW162	02/21/1994	Total Organic Carbon (TOC)	REG	6000.0	ug/L	null	XV	null	null	null
Temporal Plot	MW162	02/21/1994	Total Organic Carbon (TOC)	REG	6000.0	ug/L	null	XV	null	null	null
Temporal Plot	MW162	02/21/1994	Total Organic Carbon (TOC)	REG	7000.0	ug/L	null	XV	null	null	null
Temporal Plot	MW164	06/15/1993	Total Organic Carbon (TOC)	REG	2000.0	ug/L	null	XV	null	null	null
Temporal Plot	MW164	06/15/1993	Total Organic Carbon (TOC)	REG	1000.0	ug/L	null	XV	null	null	null
Temporal Plot	MW164	06/15/1993	Total Organic Carbon (TOC)	REG	1000.0	ug/L	null	XV	null	null	null
Temporal Plot	MW164	06/15/1993	Total Organic Carbon (TOC)	REG	1000.0	ug/L	null	XV	null	null	null

The result of this example query shows all detectable trichloroethene for all media and sampling events for in order of date collected for the selected sample locations.

***Note 1**: This screen capture only shows about two-thirds of the columns of available information. Use the scroll bar at the bottom of the web page to see the remaining items.*

***Note 2**: Any text that is underlined includes a hyperlink to additional information. In this example, Results Qualifier, Fraction, and Media were clicked on. For each, a window pops up with a description.*

Enhanced Queries

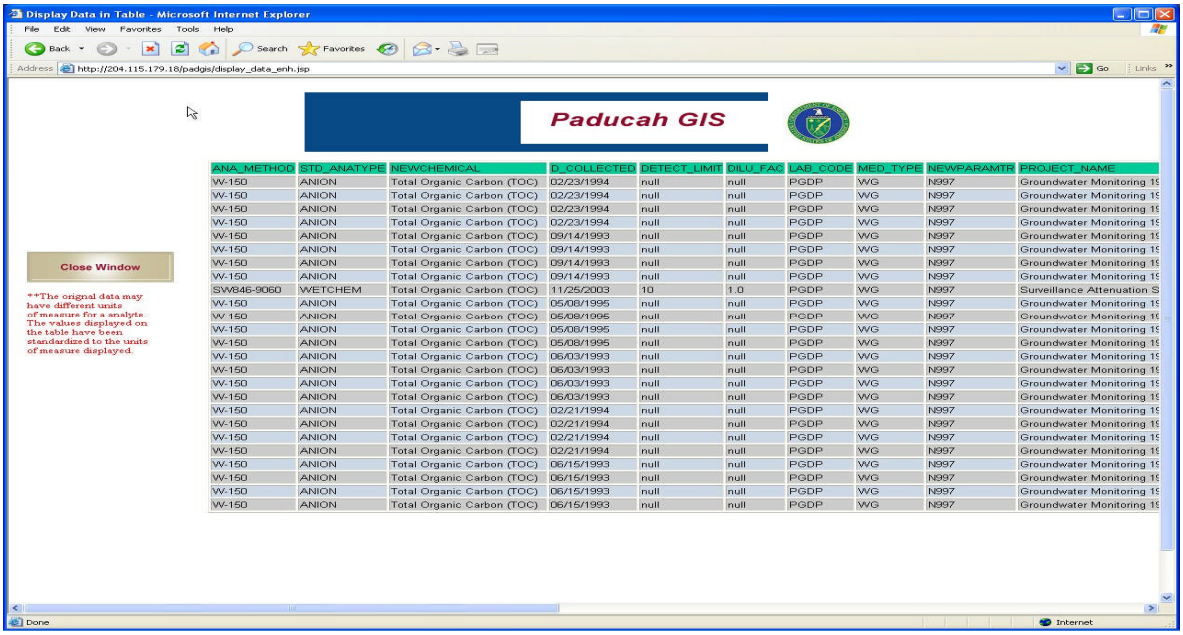


Another option on the **Analytical Data Viewer** is to *Submit Query to View Data in Enhanced Table* button. Clicking this option will present another window similar to the middle left image.

On this screen, select different columns of data than what is usually given as the default. Default data columns are in **bold** and pre-checked.

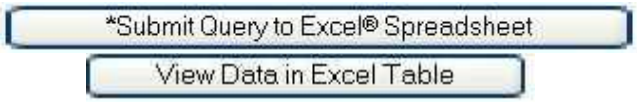
You can check all columns or clear all columns using the appropriate buttons on the bottom of the window.

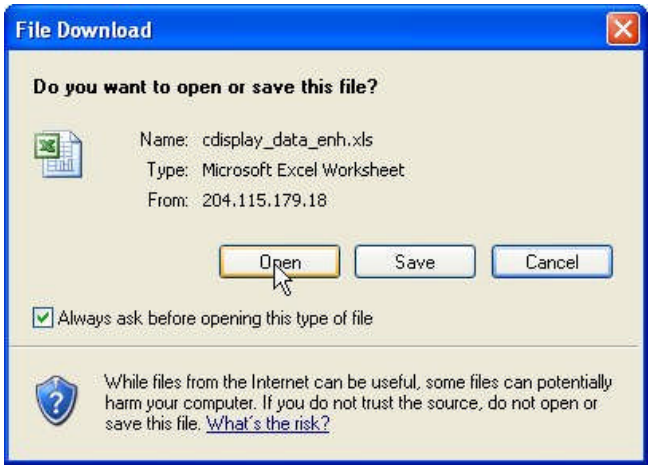
Click on the *View Data in Enhanced Table* button in this second window to see the results of the query. The lower image illustrates the results of this query in an enhanced table.

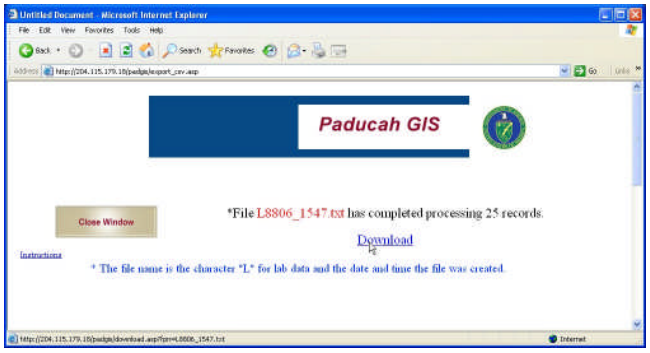


ANA_METHOD	STD_ANATYPE	NEWCHEMICAL	D_COLLECTED	DETECT_LIMIT	DILU_FAC	LAB_CODE	MED_TYPE	NEWPARAMTR	PROJECT_NAME
W-150	ANION	Total Organic Carbon (TOC)	02/23/1994	null	null	PGDP	WG	N997	Groundwater Monitoring 19
W-150	ANION	Total Organic Carbon (TOC)	02/23/1994	null	null	PGDP	WG	N997	Groundwater Monitoring 19
W-150	ANION	Total Organic Carbon (TOC)	02/23/1994	null	null	PGDP	WG	N997	Groundwater Monitoring 19
W-150	ANION	Total Organic Carbon (TOC)	02/23/1994	null	null	PGDP	WG	N997	Groundwater Monitoring 19
W-150	ANION	Total Organic Carbon (TOC)	09/14/1993	null	null	PGDP	WG	N997	Groundwater Monitoring 19
W-150	ANION	Total Organic Carbon (TOC)	09/14/1993	null	null	PGDP	WG	N997	Groundwater Monitoring 19
W-150	ANION	Total Organic Carbon (TOC)	09/14/1993	null	null	PGDP	WG	N997	Groundwater Monitoring 19
W-150	ANION	Total Organic Carbon (TOC)	09/14/1993	null	null	PGDP	WG	N997	Groundwater Monitoring 19
SW846-9060	WETCHEM	Total Organic Carbon (TOC)	11/25/2003	10	1.0	PGDP	WG	N997	Surveillance Attenuation S
W-150	ANION	Total Organic Carbon (TOC)	05/08/1995	null	null	PGDP	WG	N997	Groundwater Monitoring 19
W-150	ANION	Total Organic Carbon (TOC)	05/08/1995	null	null	PGDP	WG	N997	Groundwater Monitoring 19
W-150	ANION	Total Organic Carbon (TOC)	05/08/1995	null	null	PGDP	WG	N997	Groundwater Monitoring 19
W-150	ANION	Total Organic Carbon (TOC)	05/08/1995	null	null	PGDP	WG	N997	Groundwater Monitoring 19
W-150	ANION	Total Organic Carbon (TOC)	06/03/1993	null	null	PGDP	WG	N997	Groundwater Monitoring 19
W-150	ANION	Total Organic Carbon (TOC)	06/03/1993	null	null	PGDP	WG	N997	Groundwater Monitoring 19
W-150	ANION	Total Organic Carbon (TOC)	06/03/1993	null	null	PGDP	WG	N997	Groundwater Monitoring 19
W-150	ANION	Total Organic Carbon (TOC)	06/03/1993	null	null	PGDP	WG	N997	Groundwater Monitoring 19
W-150	ANION	Total Organic Carbon (TOC)	02/21/1994	null	null	PGDP	WG	N997	Groundwater Monitoring 19
W-150	ANION	Total Organic Carbon (TOC)	02/21/1994	null	null	PGDP	WG	N997	Groundwater Monitoring 19
W-150	ANION	Total Organic Carbon (TOC)	02/21/1994	null	null	PGDP	WG	N997	Groundwater Monitoring 19
W-150	ANION	Total Organic Carbon (TOC)	02/21/1994	null	null	PGDP	WG	N997	Groundwater Monitoring 19
W-150	ANION	Total Organic Carbon (TOC)	06/15/1993	null	null	PGDP	WG	N997	Groundwater Monitoring 19
W-150	ANION	Total Organic Carbon (TOC)	06/15/1993	null	null	PGDP	WG	N997	Groundwater Monitoring 19
W-150	ANION	Total Organic Carbon (TOC)	06/15/1993	null	null	PGDP	WG	N997	Groundwater Monitoring 19
W-150	ANION	Total Organic Carbon (TOC)	06/15/1993	null	null	PGDP	WG	N997	Groundwater Monitoring 19

Submit Query for Download







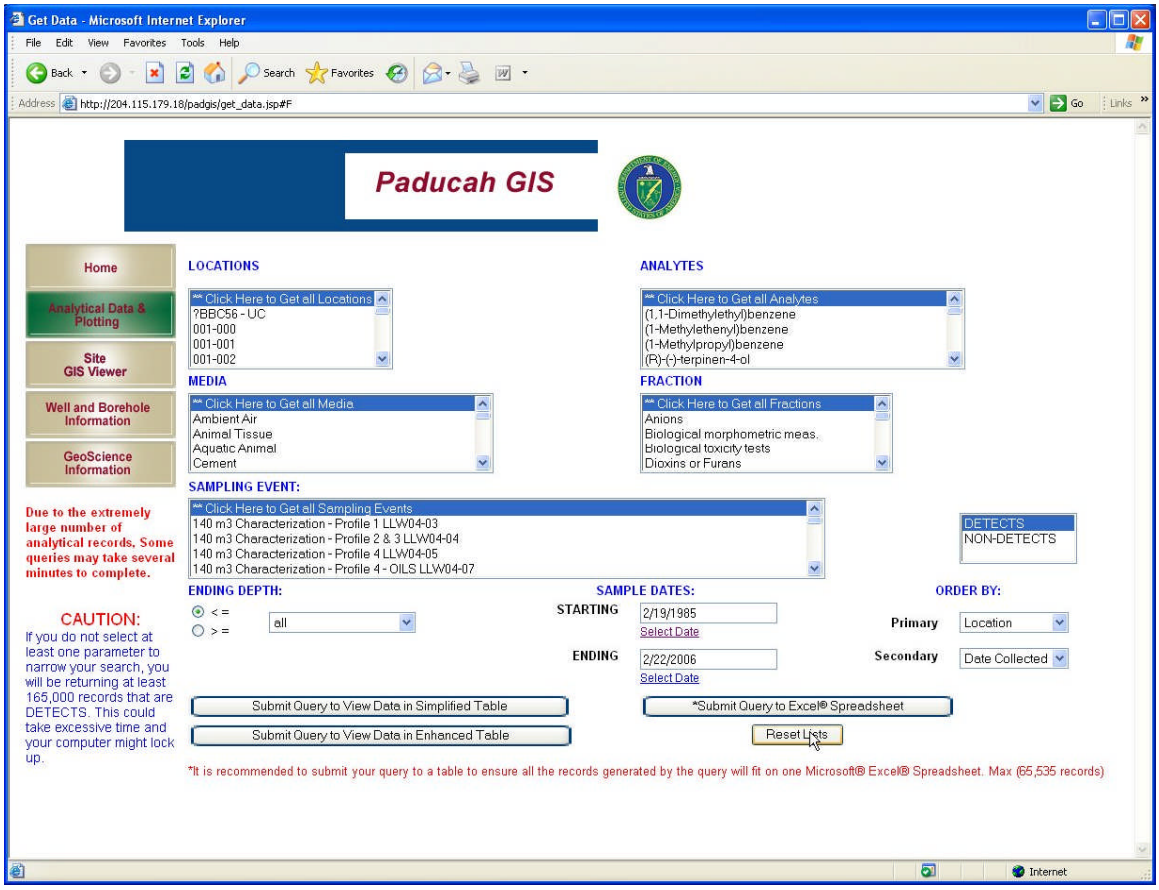
Users may want to download the results of queries into files for use in other applications such as spreadsheets and modeling applications. The Analytical Data and plotting query provides two methods to generate either an Excel® spreadsheet file or as an ASCII text file format.

Buttons to *Submit Query to Excel® Spreadsheet* file are available from both the general query window and the enhanced table window. The *Export Data into TXT File* is only available from the Enhanced Table Window.

When an Excel® spreadsheet file is requested, users will be prompted to either open the requested file or save it to disk. A standard Windows File Dialog box will open requesting the name and disk space to save the file.

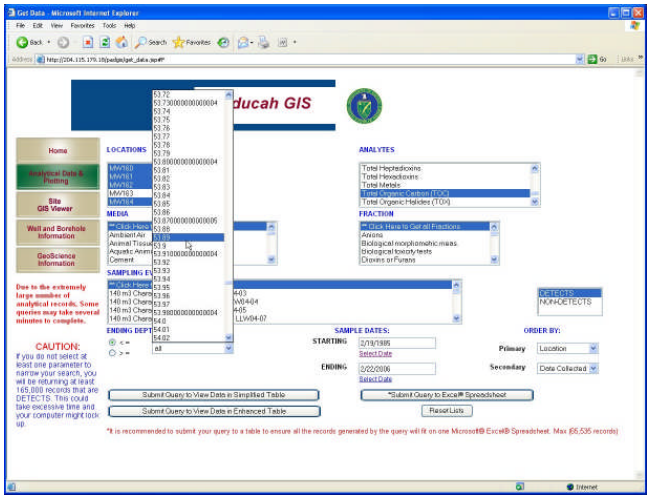
When an ASCII text file format is requested, a window will inform the user that the file has been created. Users must initiate the download of the text file by clicking the DOWNLOAD hyperlink on this window.

Clearing and Resetting Queries



To reset or clear the query, click the *RESET LIST* button on the lower right of the window. This will reset all of the defaults and clear all previous selections.

Analytical Data Query – Other Features

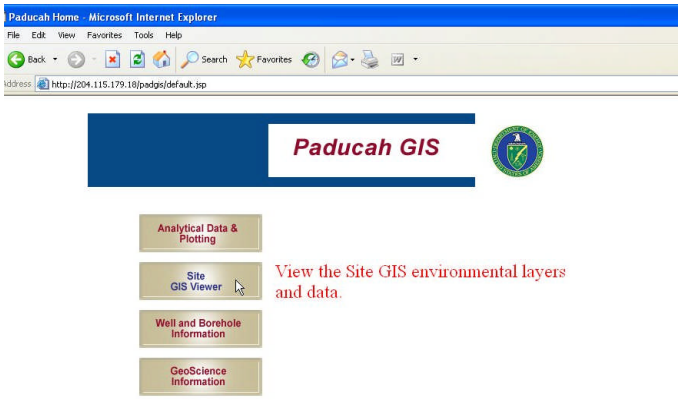


Some of the selectable fields in the **Analytical Data Query** window are populated with available parameters. *Locations*, *Analytes*, *Projects*, and *Fractions* have only values of data that are in the data warehouse.

In the image on the left, for example, only measured *Ending Depths* currently in the Data Warehouse are shown

A standard web calendar is also available to help select appropriate dates to query. Using the arrows to the left and right of the Month-Year title, users can navigate to the sample date of interest.

GIS Viewer



The **GIS Viewer** is used to view GIS environmental layers, plot locations of sampling sites, and query data from the Data Warehouse using a graphical user interface that employs map and images of the Paducah site.

- Click on the **GIS Viewer** button from the Home Page

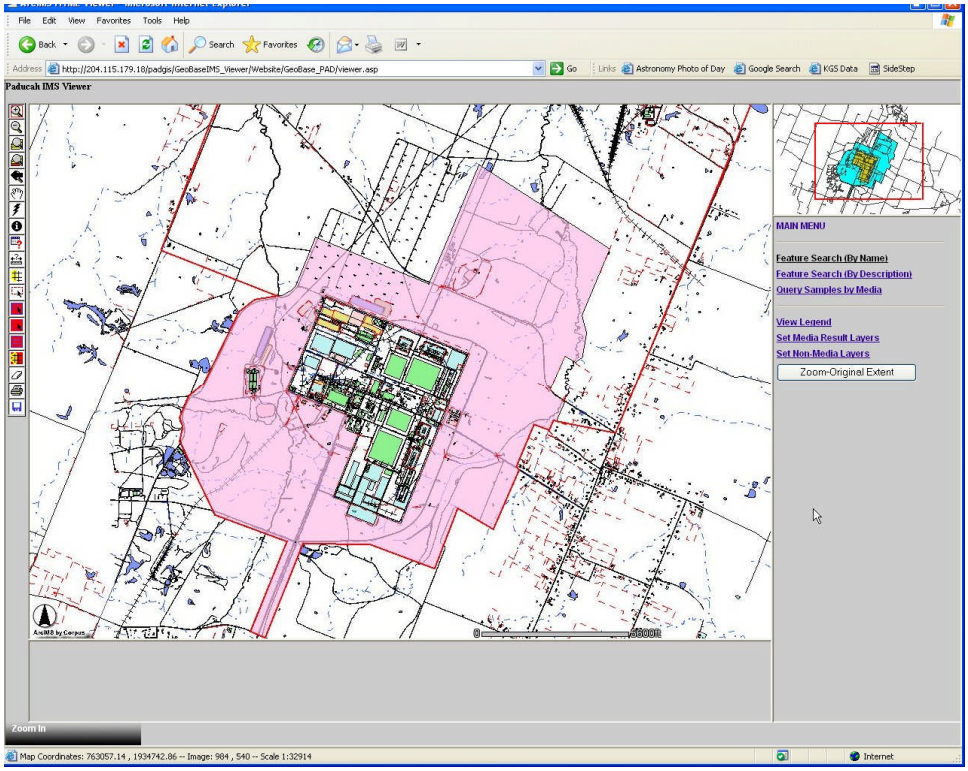
OR

- In your Web Browser, type the following URL address:

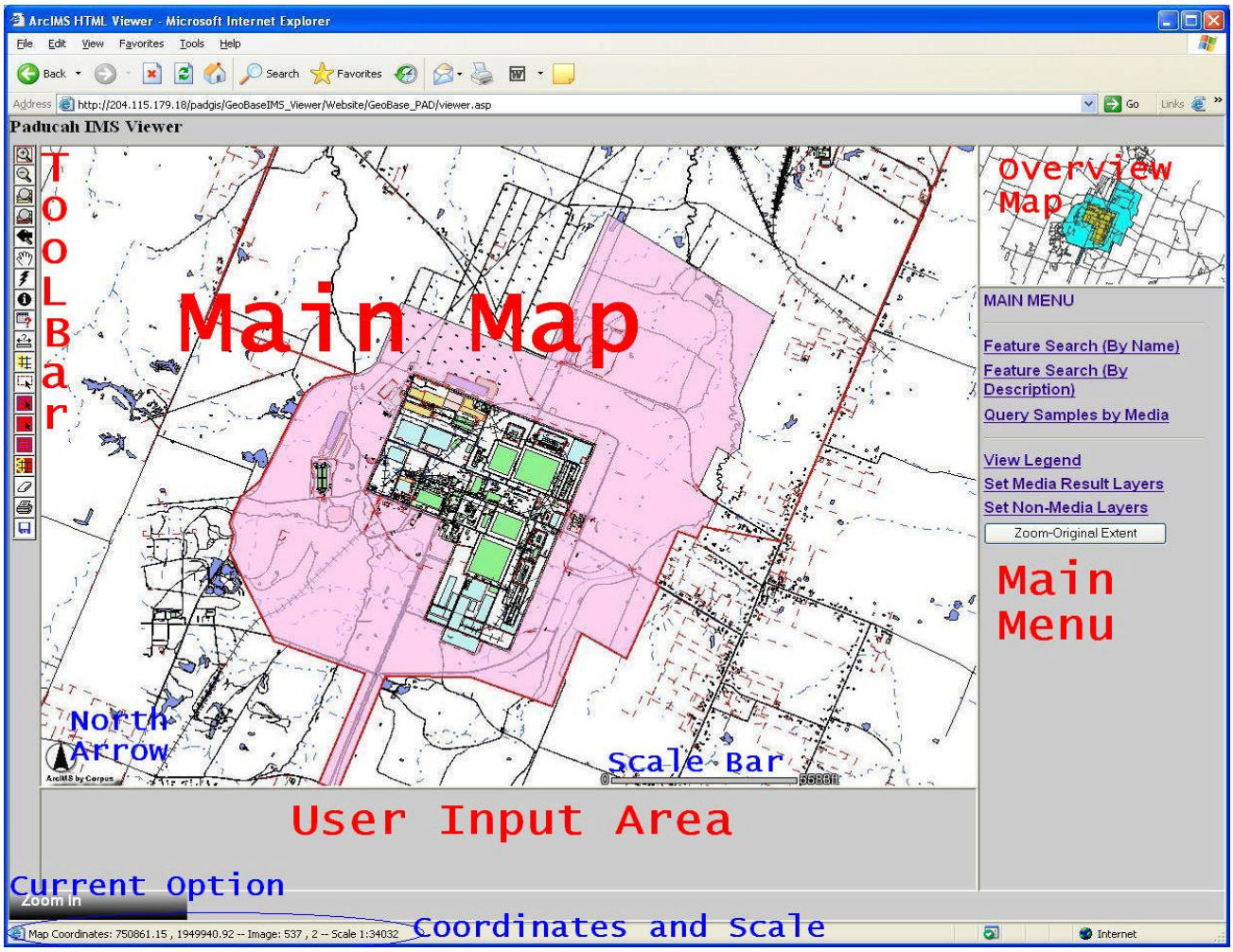
HTTP://204.115.179.18/padgis/GeoBaseIMS_Viewer/Website/GeoBase_PAD/viewer.asp

***Note**: Internet Explorer must be configured properly to allow pop-up windows to be displayed. See the section: Configuring Internet Explorer for information on how to configure Internet Explorer to allow pop-ups.*

The **GIS Viewer** user interface appears.



Layout of the GIS Viewer



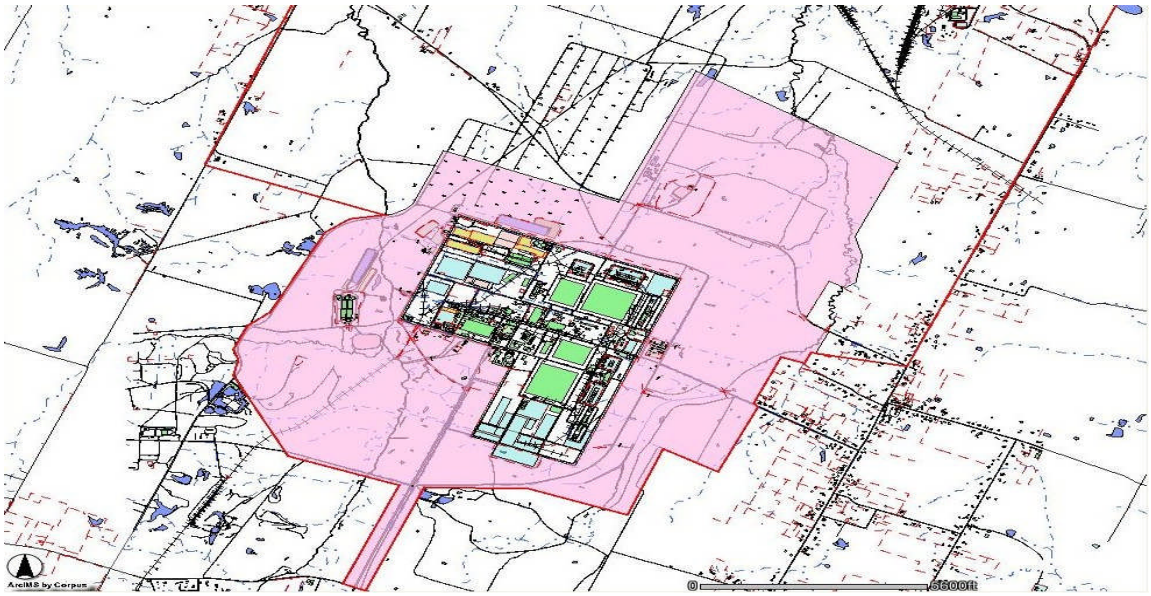
This is the main **GIS Viewer** window and the default screen. The various user interaction components (labeled in red) include:

❖ Main Map	❖ User Input and Query Area
❖ Options Toolbar	❖ Overview Map
❖ Main Menu	

Information about the current view and selections (labeled in blue) include:

❖ Selected Toolbar Option	❖ Scale Bar
❖ Coordinates of Mouse Pointer	❖ Scale of Current View
❖ North Arrow	

Main Map Features



The **Main Map** component provides the users with an interactive image to view features, query data, and see the spatial relationships of the features on the site.

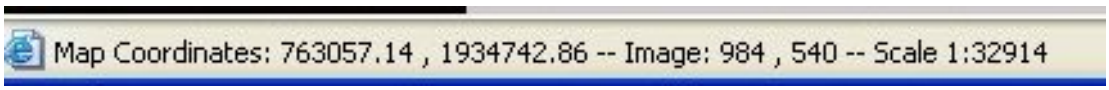
The Paducah **GIS Viewer** is preconfigured to present data from a variety of sources (CAD drawings, GIS data, sampling points, and images) in a consistent format and projection. The Paducah **GIS Viewer** uses the Kentucky State Plane South Zone Coordinate System (North American Datum of 1983). All coordinates and measurements, therefore, are in feet.

At the lower left of the **Main Map** is a North arrow. The current **GIS Viewer** provides for the North to be only at the top of the image. At the lower right is a Scale Bar showing the scale of the current view. This bar will change, therefore, as the users zooms in or out.

The **GIS Viewer** allows the user to select and view as many of the components (layers) as the user requires. Layers can be turned on or off according to need and one layer can be designated as the *active layer*. An *active layer* is the layer of interest that can be queried and spatially buffered for different purposes.

Some features may not be displayed at all scales. Others may be labeled at one scale and not another.

At the bottom of the window, is a status bar that is continuously updated as the cursor is moved around the **Main Map**.



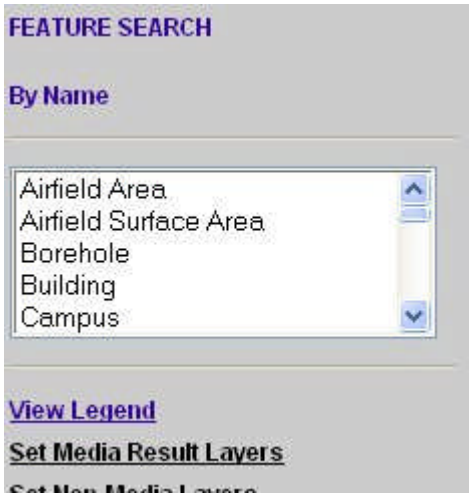
This status windows provides the coordinates in both map and image units (feet and pixels, respectively). Also a numeric scale of the current image is displayed.

GIS Viewer Main Menu

The **GIS Viewer Main Menu** provides the necessary options to allow the selection of map layers to be displayed, analyses to be queried, or to search for features of the Paducah site.

Main Menu Options	
Feature Search (by Name)	Provides a pick list of features by their name
Feature Search (by Description)	Provides a pick list of features by a general descriptive narrative.
Query Samples by Media	Provides a pick list of the various media types and their fractions, detects, etc.
View Legend	Display legend of the items displayed in the **Main Map** view.
Set Media Result Layers	Provides a pick list to choose one media sample type for query results.
Set Non-Media Layers	Provides a mechanism to choose the visible map layers, set the order of displaying the visible layers on the map, and select one layer as *active layer*.
Zoom-Original Extent	Zooms to the full extent (default) of the **GIS Viewer**.

Feature Search by Name



Many of the features at the Paducah Site have an associated name. These features include *buildings*, *roads*, *boreholes*, and *water bodies*. Users can search the geodatabase to select named features. Obviously, if a feature was not named, it cannot be selected using the **Feature Search by Name** option.

To search for a feature by Name,

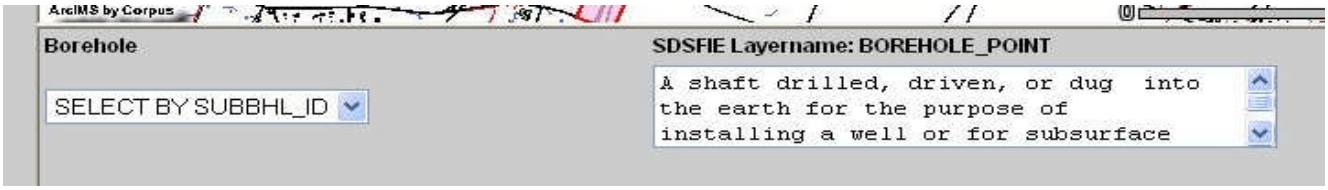
- Click **Feature Search (by Name)** in the **Main Menu**.

A new pick list will appear in the **Main Menu** area showing the available layers that have a name associated with the features.

- Select only one layer of interest.

***Note**: Use the scroll bar to the right of the pick list to see other available features.*

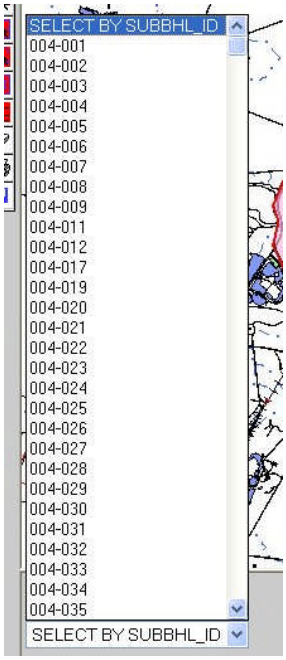
A new option window will appear in the **User Input Area** below the **Main Map**.

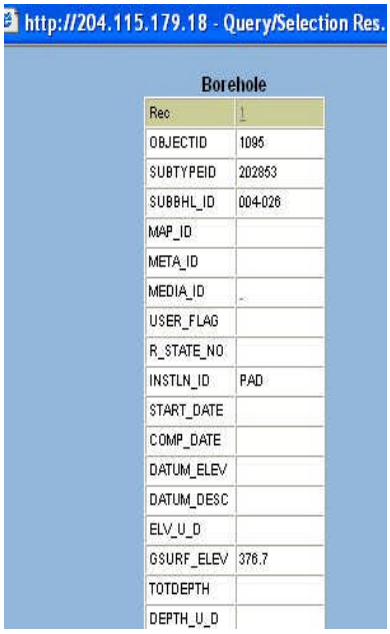


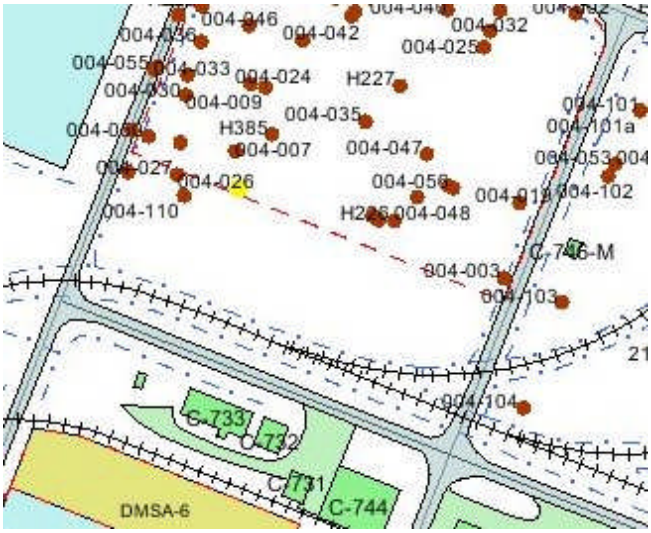
In this example the feature Borehole was selected. A short description of the feature is provided in the box on the right. The pull-down list on the left side is populated with the name of every feature in that layer.

(Continued)

Feature Search by Name (continued)







Using the *pull-down list*,

- Click on only one name.

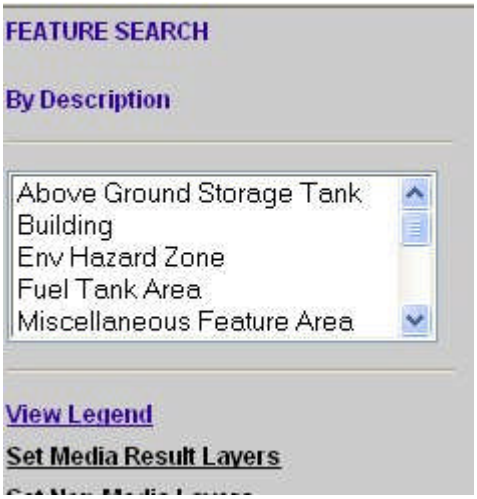
A new window will open with all of the attributes for the selected named feature and the **Main Map** will zoom and center on this feature. The selected feature will be highlighted in Yellow.

***Note 1**: Notice that the window with the selected feature's attributes has the feature as the title (in this example: Borehole) and an underlined number that is linked to the Main Map. Clicking this number will return the Main Map to center on and highlight this feature.*

***Note 2**: You may return to the drop-down menu to select another name. The attribute window will be updated with the new selection, but the first selection is replaced and the Main Map is updated to show the new selection.*

***Note 3**: Data for the name is obtained from the SUBBHL_ID attribute of the feature.*

Feature Search by Description



Many of the features at the Paducah Site share a common description. These features include *buildings*, *roads*, *boreholes*, and *water bodies.* Users can search the geodatabase to select features based on the general descriptions assigned to the features. Obviously, if a feature was not described, it cannot be selected using the **Feature Search by Description** option.

To search for a feature by its description,

- Click **Feature Search (by Description)** in the **Main Menu**.

A new pick list will appear in the **Main Menu** area showing the available features having descriptions stored in the geodatabase.

- Select only one layer of interest.

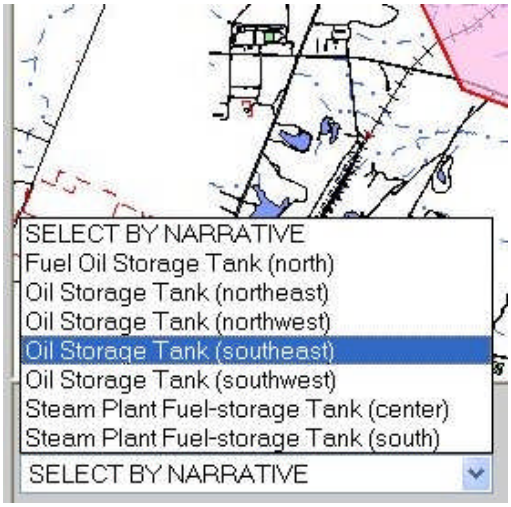
***Note**: Use the scroll bar to the right of the pick list to see other available features.*

A new option window will appear in the **User Input Area** below the **Main Map**.

In this example, the feature Fuel Tank Area was selected. A description is provided in the box on the right. The pull-down list on the left side is populated with the name of every feature in that layer.

(continued)

Feature Search by Description (continued)



Using the drop-down menu, a list of all possible descriptions for the selected feature is displayed.

- Click on only one description.

A new window will open with attributes for all the features matching the selected description. Use the Scroll bar on the right of this window to see the other features.

***Note 1**: Notice that the window with the selected feature's attributes has the feature as the title (in this example: Fuel Tank Area) and an underlined number that is linked to the Main Map. Clicking this number center, zoom in, and highlight this feature on the Main Map.*

***Note 2**: You may return to the drop-down menu to select another name. The attribute window will be updated with the new selection, but the first selection is replaced.*

***Note 3**: Data for the description is obtained from the Narrative attribute of the feature.*

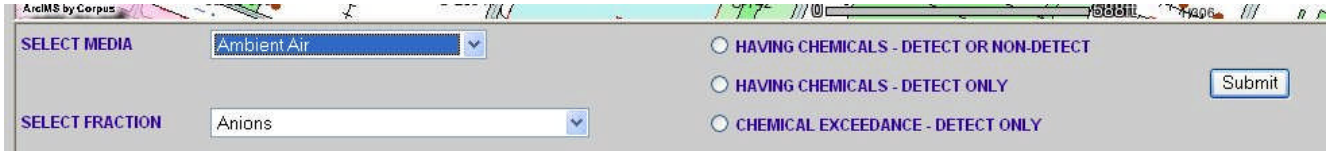
Query Samples by Media

Users can search for analytical data stored in the Data Warehouse from the **GIS Viewer** using a number of different tools. The **Query Samples by Media** option of the **Main Menu** provides a simple query interface to search for and display samples locations and their associated results of analyses.

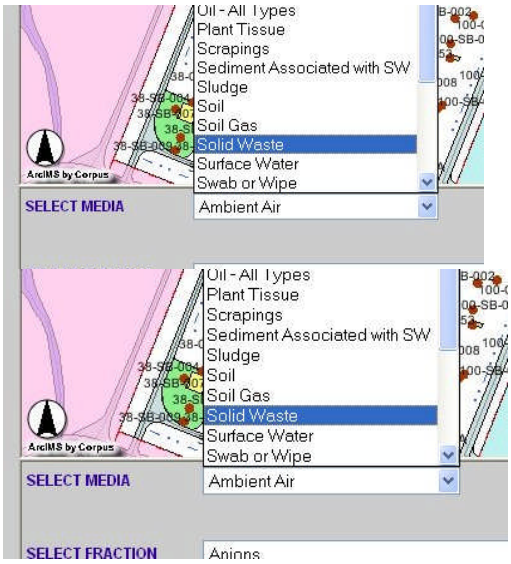
To search for a feature by Media,

- Click **Query Samples by Media** in the **Main Menu**.

A new option window will appear in the **User Input Area** below the **Main Map**.



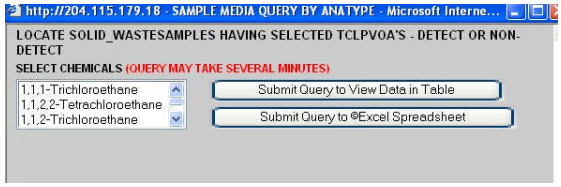
This dialog box has 3 user input options: *Select Media*, *Select Fraction*, and a choice of one radial button for either *Having Chemicals – Detect or Non_Detect,* or *Having Chemicals – Detect Only*, or *Chemical Exceedance – Detect Only.*



- Use the *Select Media* drop-down list to display a list of all possible media.
- Click on only one media type.
- Use the *Select Fraction* drop-down list to display a list of all possible fractions.
- Click on only one fraction type.
- Next, select one of the 3 chemical options.

- Finally, click the *Submit* button to start the search.

A new window will open with the results of the query.

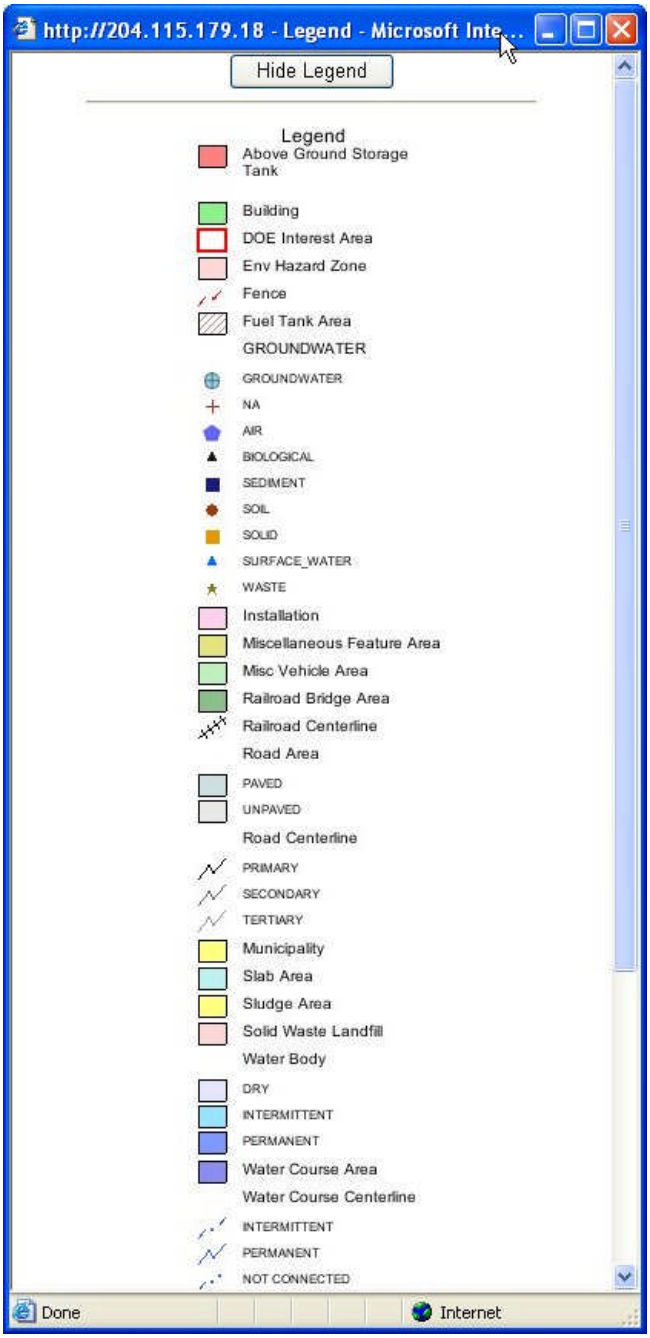


From the left list box select the list of chemicals of interest. Multiple chemicals may be selected by simply using the *Shift* or *Control* key while selecting from the list.

Choose how the data is to be displayed or saved as a spreadsheet file.

If the query generated by the *Select Media* and *Select Fraction* options has no results, a window such as the example on the left will be displayed

Legend



The **GIS Viewer** legend, by default, is not visible.

To view the legend of the current Map Display Area,

- Click **View Legend** in the **Main Menu**.

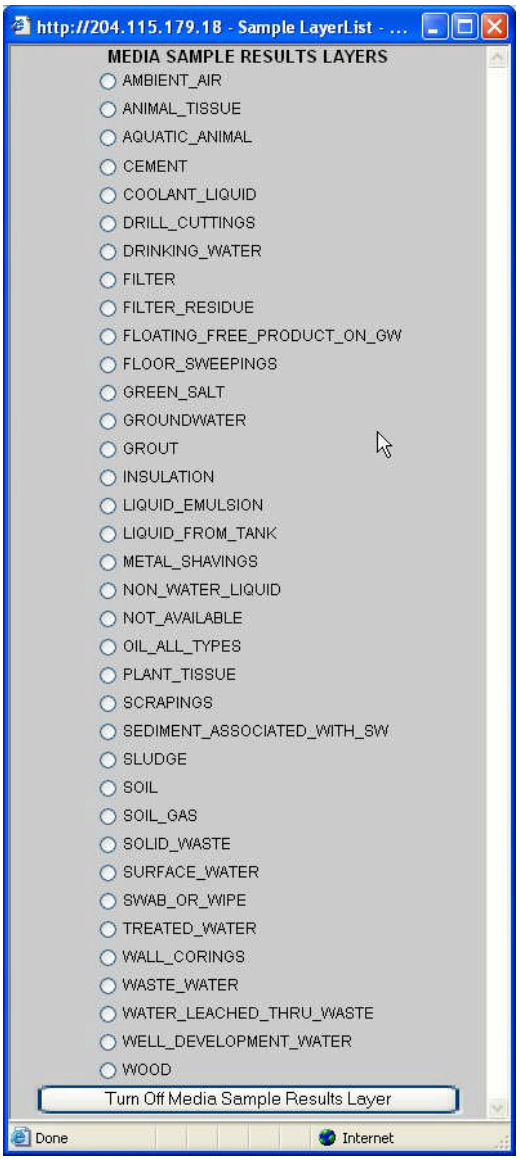
Features are listed in the order they are displayed on the map; from the lowest layers at the bottom to the top-most layers shown at the top of the legend.

Colors and symbology are automatically set by the **GIS Viewer** and cannot be changed.

***Note 1**: The legend will change as different features are selected or dropped from the map.*

***Note 2**: Clicking the red "X" in the top right corner to close the legend window will only temporarily remove it from the screen and will continue to pop up each time you access the data. To remove the legend permanently until you choose to view it again, Click the Hide Legend button to make the legend disappear.*

Set Media Results Layer



Setting the **Media Results Layer** determines which sample media type in the Data Warehouse will be targeted in queries from the **GIS Viewer**.

To set the **Media Results Layer**,

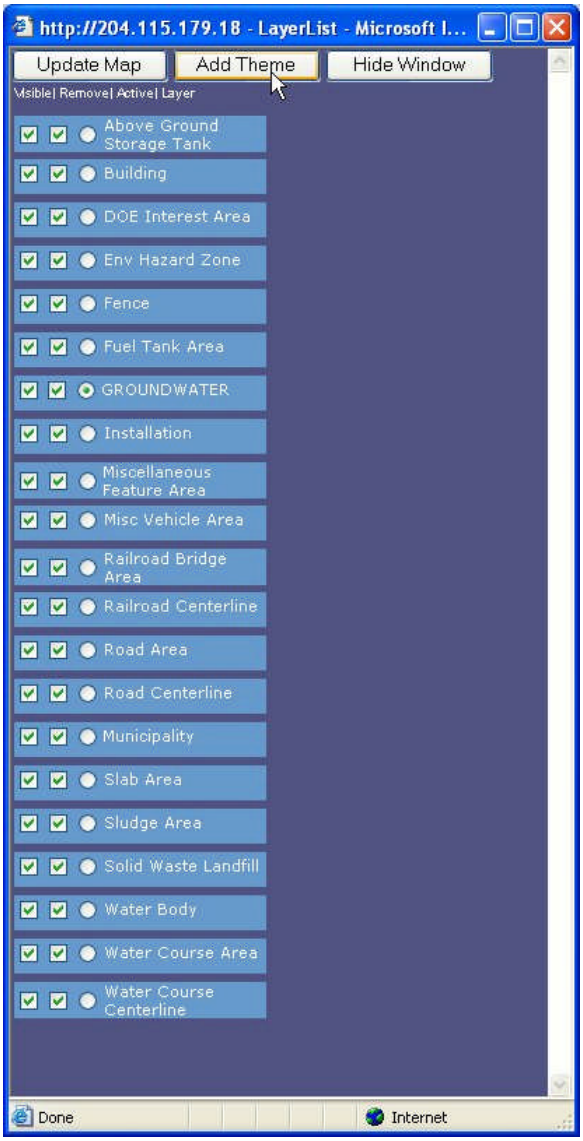
- Click **Set Media Result Layers** option in the **Main Menu**.

A new window will open showing all of the available **Media Sample Result Layers** currently in the data warehouse.

- Select one media by clicking the radio button to the left of the media type.

***Note**: This media list may change as new media types are added to the data warehouse.*

Set Non-Media Layers



***Note 1**: Some layers will completely cover layers that are lower in the list. For example, adding an aerial photo to the top of the list will completely mask all of the features from the other layers. It is upon the user, therefore, to be sure that the layers are arranged in such a way that all of the features of the lower layers are visible on the Main Map.*

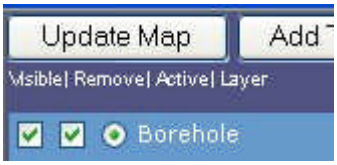
***Note 2**: This layer list may change as new layers types are added to the GIS viewer.*

Selecting the **Set Non-Media Layers** option provides a list of layers to display in the **GIS Viewer Main Map**. It also allows the user to select the specific layer as the *active layer* for subsequent queries when using the *Identify*, *Select By Buffer*, *Querying*, and *Hyperlink* options.

To set the **Non-Media Layers**,

- Click **Set Non-Media Layers** option in the **Main Menu**.

A new window will show all current layers being displayed on the **Main Map**. Each layer is contained within a movable box with two check-boxes and a radial button.

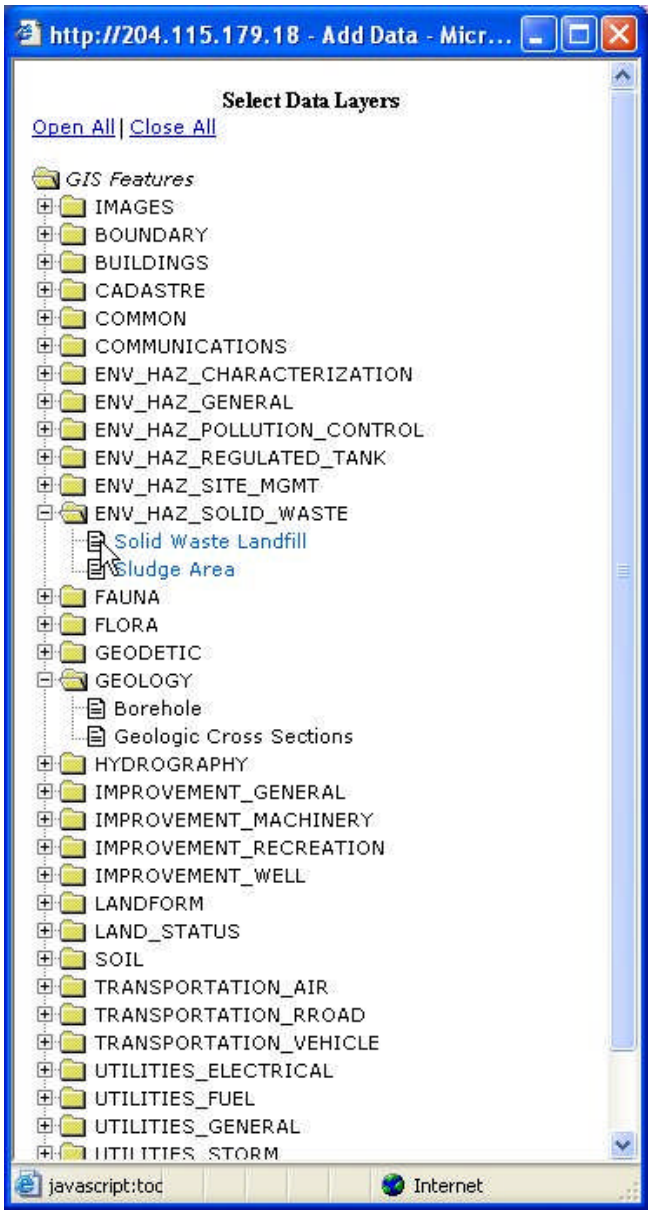


- The 1st checkbox enables the layer to be visible;
- The 2nd is *unchecked* when the layer is to be removed completely from the list;
- The radial button is selected to make the layer the *active layer*.

Users can add additional layers by clicking on the *Add Theme* button at the top of the window. New layers are added to the top of the list. Click the *Update Map* button to update the **Main Map** to show the changes you may have made by adding or removing layers.

The position of the layers in this list determines how they are displayed in the **Main Map**. The top of the list is the last layer to be displayed. Users can rearrange these boxes in any order they need.

Adding New Themes as Layers



Adding a theme to the **Non-Media Layers** provides the **GIS Viewer** with additional layers (theme) to display in the **Main Map**.

To add additional themes to the **Non-Media Layers**,

- Click the *Add Theme* button in the **Non-media Layers** window.

A new window will open showing all themes currently available to the **GIS Viewer**. The themes are grouped according to feature class. These feature classes can be expanded to show the available data layers within that class.

To select a data layer to be added to the **Non-Media Layers**:

- Click on the little icon to the left of the desired data layer.
- Continued to add as many layers as needed then return to the **Non-Media Layers** window.

New layers are added to the top of the list. Click the *Update Map* button to update the **Main Map** with the new layer(s).

The position of the layers in this list determines how they are displayed in the **Main Map**. The top of the list is the last layer to be displayed. Users can rearrange these boxes in any order they need.

***Note 1**: Some layers will completely cover layers that are lower in the list. For example, adding an aerial photo to the top of the list will completely mask all of the features from the other layers. It is upon the user, therefore, to be sure that the layers are arranged in such a way that all of the features of the lower layers are visible on the Main Map.*

***Note 2**: This layer list may change as new layers types are added to the GIS viewer.*

Rearranging Main Map Layers

The position of the layers in this list determines how they are displayed in the **Main Map**. The top of the list is the last layer to be displayed.

Users can rearrange these boxes in any order they need. To move layers to a new position:

- Left click and hold the click on the layer to be moved.
- Move the layer to the desired position on the list and release the click.

The layer will now appear in its new position when the **Main Map** is updated.

***Note**: Some layers will completely cover layers that are lower in the list. For example, adding an aerial photo to the top of the list will completely mask all of the features from the other layers. It is upon the user, therefore, to be sure that the layers are arranged in such a way that all of the features of the lower layers are visible on the Main Map.*

GIS Viewer Toolbar Icons

Zoom In	Zooms in to the area of the map that you click or drag a box around.
Zoom Out	Zooms out from the area of the map that you click or drag a box around.
Zoom to Full Extent	Zooms to full extent of map.
Zoom to Active Layer	Zooms to full extent of the *active layer*.
Back to Last Extent	Zooms to the previous extent.
Pan	Pans the display in the direction that you drag the mouse pointer.
Hyperlink	Links between a feature or element on the map to an external document (limited availability)
Identify	Displays attribute data for the feature that is clicked.
Query	Searches for features based on a query expression.
Measure	Measures distances on map.
Buffer	Selects the features of one layer that are within the specified buffer distance of selected features of another layer.
Select by Rectangle	Selects the group of features contained by or in contact with a rectangle you draw on the map.
Select Query by Polygon	Creates a query to find analytical sample results for the group of features contained by or in contact with a polygon.
Select Query by Circle	Creates a query to find analytical sample results for the group of features contained by or in contact with a circle.
Select Query by Rectangle	Creates a query to find analytical sample results for the group of features contained by or in contact with a polygon.
Select Query by Buffer	Creates a query to find analytical sample results for the group of features contained by or in contact within a buffered area.
Clear Selection	Clears the selected set of features.
Print	Prints the map to your default printer.
Extract Feature Layers	Downloads Feature Layers and Imagery as ESRI Shapefile.

Buffer Option

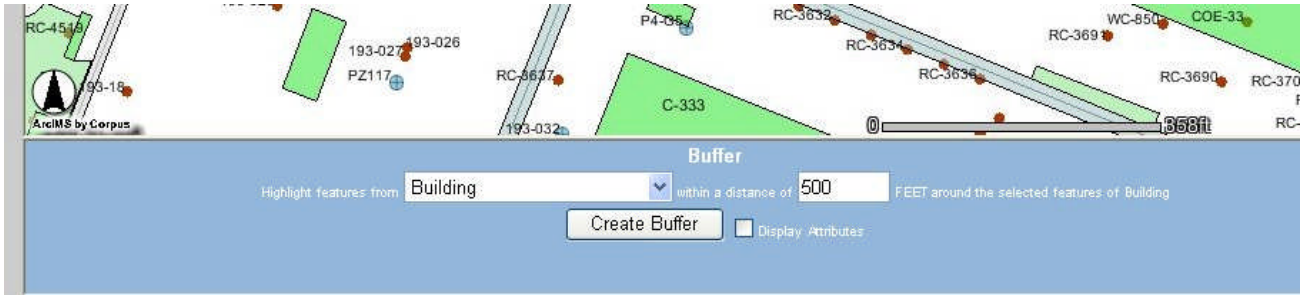
The **Buffer** option on the **GIS Viewer Toolbar** provides an easy to use mechanism to select and review features within a given distance around a selected feature.

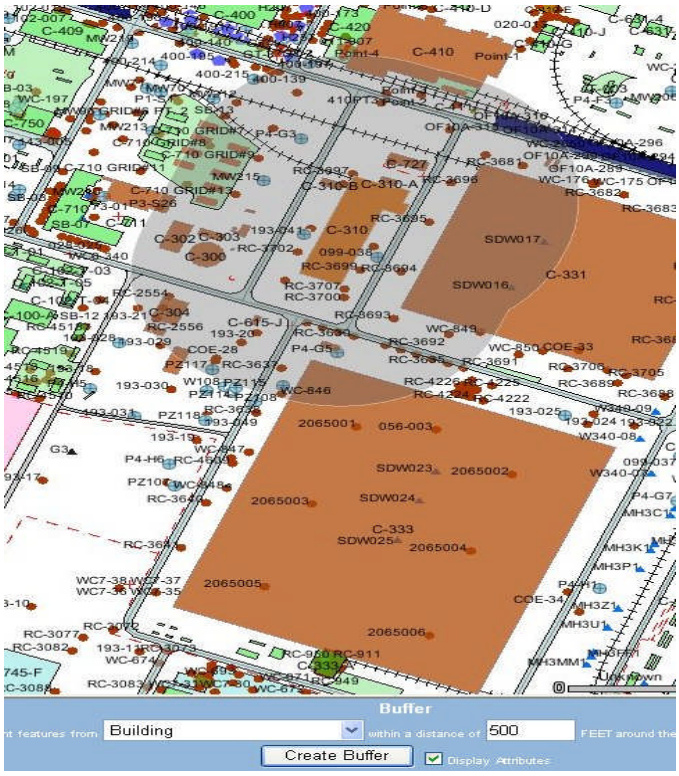
To use the **Buffer** option,

- Set the *active layer* containing the feature to use as the center of the buffer.
- Click the **Buffer** tool on the GIS Viewer Toolbar.

A drop-down list of available features will be displayed in the **User Input** area below the Main Map.

This will open a new user input box below the **Main Map**.





- Using the pull-down list, select the type of feature to be selected by the buffer query.

***Note**: Only one layer can be selected.*

- Type a buffer distance to be searched.

***Note**: Distance is always in feet.*

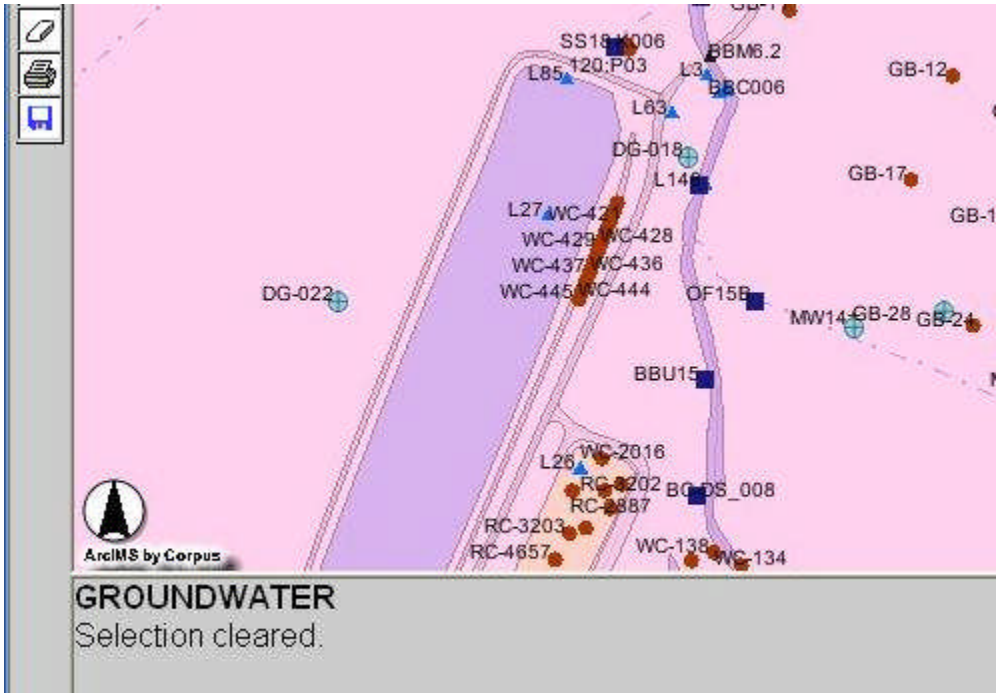
- You can request an attribute table for the buffered feature by checking the *display attributes* check box.
- Click *Create Buffer* button.

In this example, any Building features within 500 feet of the currently selected feature will be selected. The extent of the buffered area is shown as a shaded outline on the **Main Map**, as shown in the image to the left.

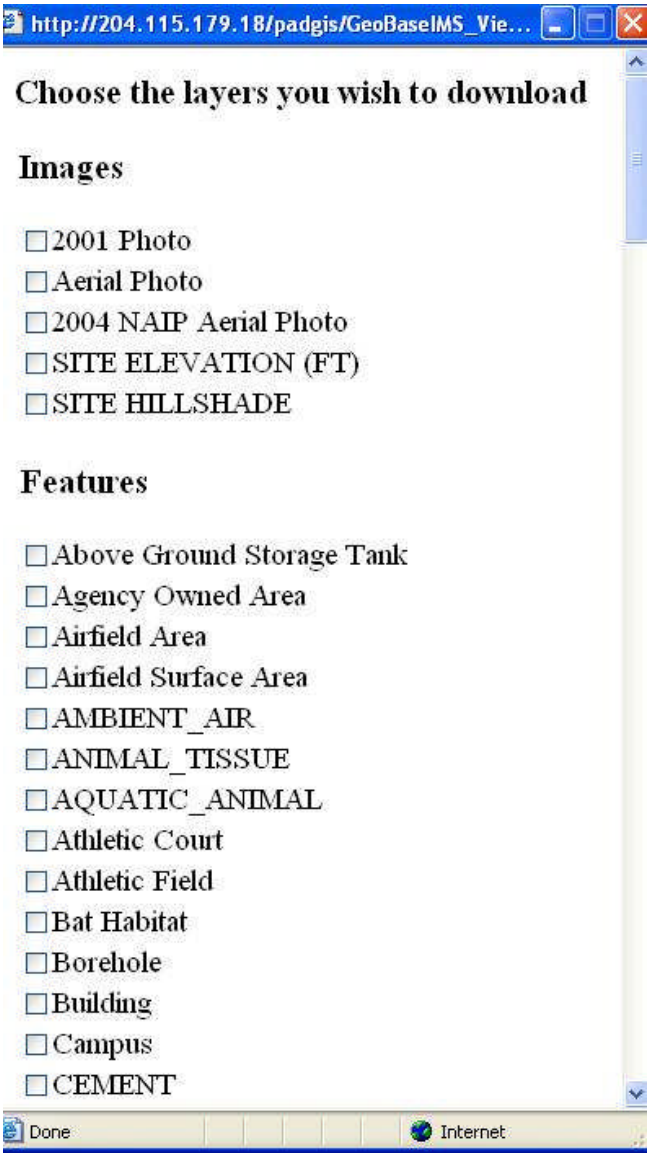
Clear Selection

The **Clear Selection** option of the GIS Viewer Toolbox is used to clear all of the selected features of the *active layer* and update the Main Map. The current zoom remains the same.

In this example, all of the selected Groundwater features have been cleared.



Feature Extraction Tool



The **Feature Extraction Tool** in the **GIS Viewer Toolbox** provides an easy to use mechanism to extract and download layers and imagery from the **GIS Viewer**. These downloads can be used in the ESRI family of GIS Software or with any application supporting the ESRI Shapefile® format.

To download layer:

- Zoom to an area of interest where you would like to download shape files and/or imagery.
- Click the **Feature Extract Tool** in the GIS Viewer Toolbox option.
- Left click on one corner of the area that you would like to select. Drag the mouse to the opposite corner and click.

A pick list window, similar to the examples on the left, will open an alphabetical listing all available features/imagery to select. Images first, then features.

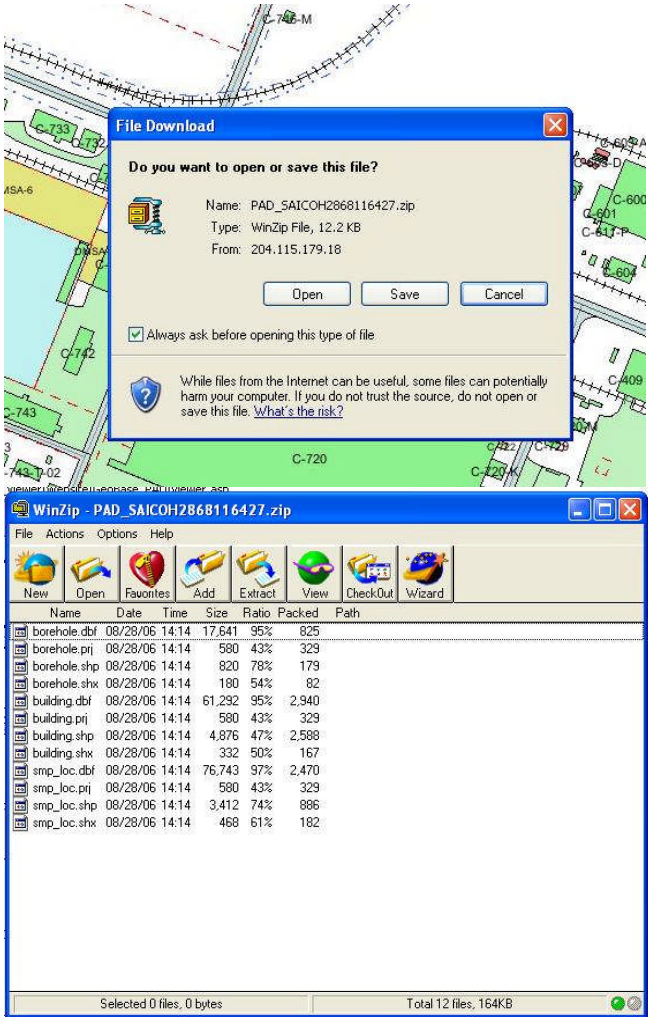
- Pick from one to all features in this window. Scroll to the bottom of the list to select the *All Layers* option.
- Click the *Download* button to generate a ZIP file containing your request.

***Note**: Be careful with the size (area) of the imagery that you select. It is limited to the size that ArcIMS can generate JPEGs and the pixel size of the image.*

2001 Photo	*1 foot pixel*
Aerial Photo	*1.63 foot pixel*
2004 NAIP Aerial Photo	*3.33 foot pixel*
SITE ELEVATION (FT)	*6.56 foot pixel*
SITE HILLSHADE	*6.56 foot pixel*

(Continued)

Feature Extraction Tool (continued)



Once the ZIP is ready for download, a dialog window will be displayed. Click the *Save* button to save the ZIP file to your hard drive.

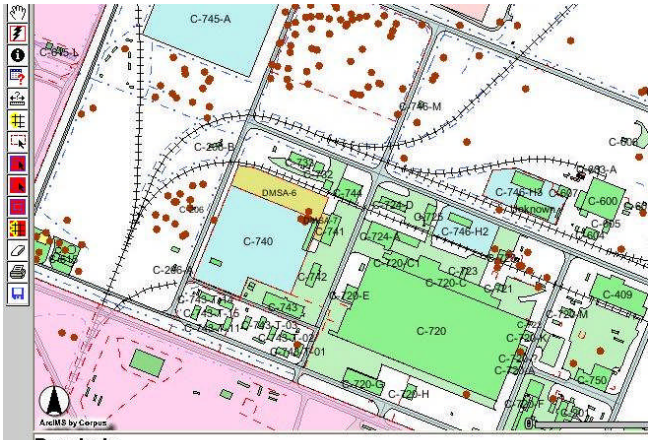
***Note**: If your browser blocks downloads, you will need to make the appropriate security setting to allow file downloads. On some browsers you can right click the information bar that appears just below the menu bars. This usually has an option to allow downloads.*

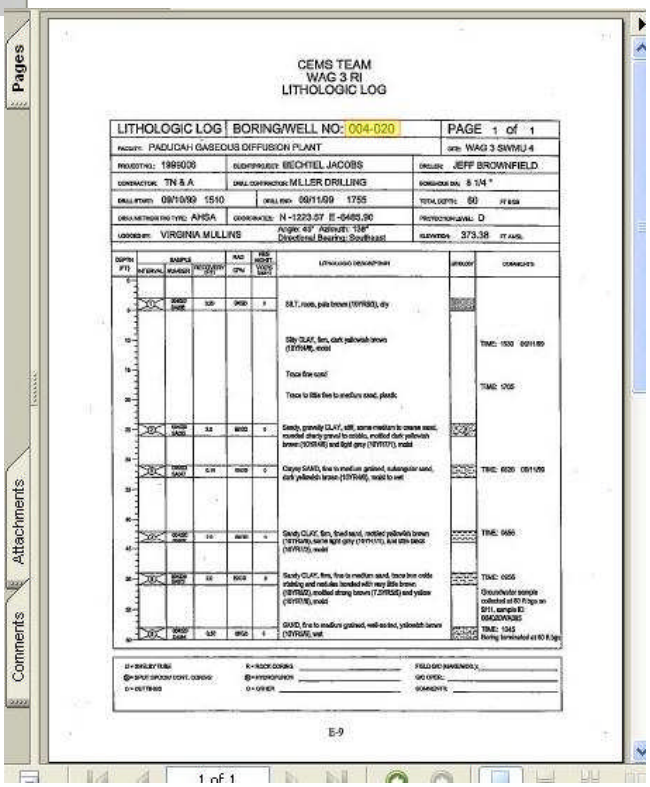
Use WinZip or whatever ZIP program you have and unzip the contents to a directory.

***Note**: If you make multiple feature extraction downloads of the same features, the downloaded shape files for each feature have the same name.*

For example: If you zoom into the North part of the plant and extract from the buildings feature. The ZIP file will contain a shape file called buildings.shp for that area. If you later zoom into another area and extract from the buildings feature. You will get the same named buildings.shp file.

Hyperlink Tool





The **Hyperlink Tool** of the **GIS Viewer Toolbox** provides a method to link non-textual data with features on the **Main Map**. Non-textual data may be photos, handwritten notes, reports, or other types of documents that are not easily or completely copied into the data warehouse. Sometimes these non-textual documents are invaluable to researchers and contractors.

To use the **Hyperlink Tool** of the **GIS Viewer Toolbox**,

- Select one layer to be the *active layer*.
- Click the **Hyperlink Tool** on the GIS Viewer Toolbox.

A separate window will open displaying the hyperlinked document.

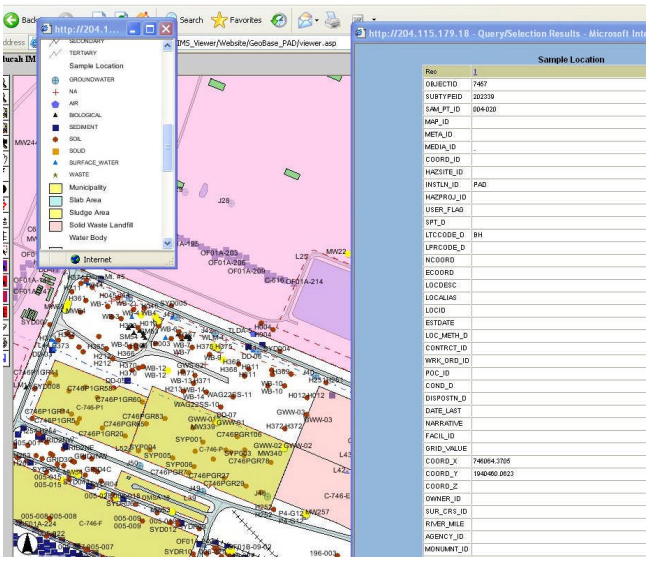
In the example on the left, the Borehole layer is hyperlinked to the driller's logs.

***Note**: If the selected layer does not have any hyperlinks, a pop-up message will be displayed.*

Tip: Once you have selected a layer with hyperlinks, you can find out quickly what other layers do and do not have hyperlinks.

- Open the *Set Non-Media Layers* window by clicking the Set Non-Media Layers option in the Main Menu.
- Click on the radial button to make the layer the *active layer*. If the layer does not have a hyperlink associated with it, a pop-up window will be displayed.

Identify Tool



The **Identify Tool** option in the **GIS Viewer Toolbox**, displays attribute data for a selected feature in the *active layer*.

To use the **Identify Tool** option in the **GIS Viewer Toolbox**,

- Make sure the correct layer containing the feature of interest is selected as the *active layer*.
- Select the **Identify Tool** option in the GIS Viewer Toolbox.
- Click on the feature of interest.

A new window will display the attribute data for the selected feature.

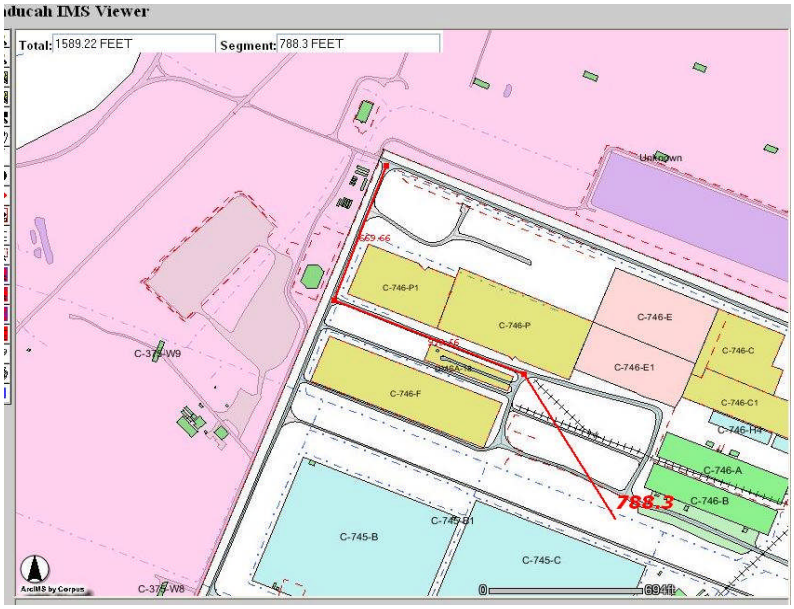
Measure Tool

The **Measure Tool** option on the **GIS Viewer Toolbar** allows users to measure lengths between 2 or more points on the **Main Map**.

- Zoom or move to the area of interest on the Main Map.
- Click on the **Measure Tool** icon in the GIS Viewer Toolbox.
- Left Click on the starting point.
- Move the cursor to another location.

As you move the cursor, a red line will appear as will red numbers to indicate the length.

***Note**: Length is always measured in feet.*



To obtain a traverse measurement,

- Simply single click at intermediate points along the traverse.
- Each click will generate a red line between the last point clicked and the current point. A red number will also be show indicated the length of that segment.

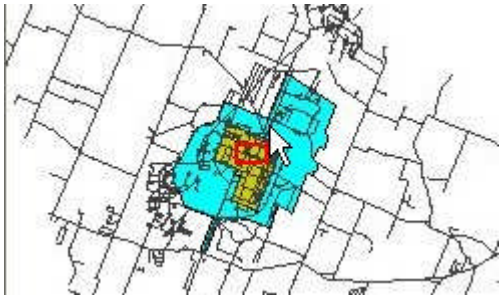
Two boxes are displayed in the upper left of the **Main Map** when using the **Measure tool**. The left box is the total length of all segments measured. The right box is the length of the current segment.

***Note**: Distance is always measured in feet.*

Double clicking clears the Measure tool and resets all measurements to zero.

Pan Tool and Moving Around the Map

There are a number of ways to move around the Main Map, depending on need: **Pan** tool, using the Overview Map, and referencing *record numbers* returned in query operations.

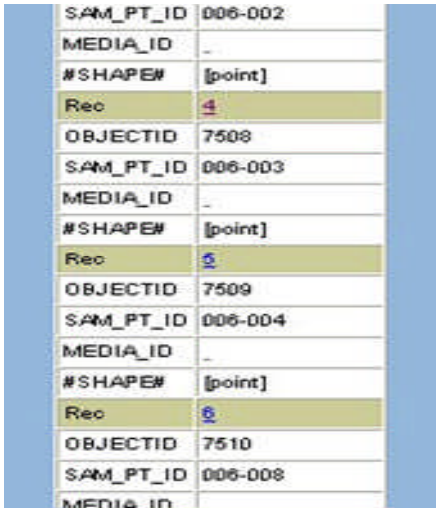


1). The **Pan** tool in the GIS Viewer Toolbox provides a simple method to move the **Main Map** view to new areas.

To use the **Pan** tool,

- Click on the **Pan Tool** icon in the **GIS Viewer Toolbox**.
- Left-click and hold the mouse as you move in the direction you wish to view.
- Release the left-click.

The **Main Map** will automatically refresh with a new view centered over the point where the mouse pointer stopped. The map view will be at the same scale as the previous view.



SAM_PT_ID	006-002
MEDIA_ID	
#SHAPE#	[point]
Rec	4
OBJECTID	7508
SAM_PT_ID	006-003
MEDIA_ID	
#SHAPE#	[point]
Rec	5
OBJECTID	7509
SAM_PT_ID	006-004
MEDIA_ID	
#SHAPE#	[point]
Rec	6
OBJECTID	7510
SAM_PT_ID	006-008

2). A second method for moving around the **Main Map** utilizes the **Overview Map**.

- On the **Overview Map**, point the mouse pointer and left-clicking the new area of interest.

The **Main Map** will automatically refresh with a new view centered over the point where the pointer stopped on the **Overview Map**.

The map view will be at the same scale as the previous view and the red box in the **Overview Map** will also be updated with the new position.

3). Many records may be returned as a result of a query. Clicking on the underlined record (*REC*) number will automatically refresh the **Main Map** with a new view centered over the feature represented by that *record number*.

Print Option

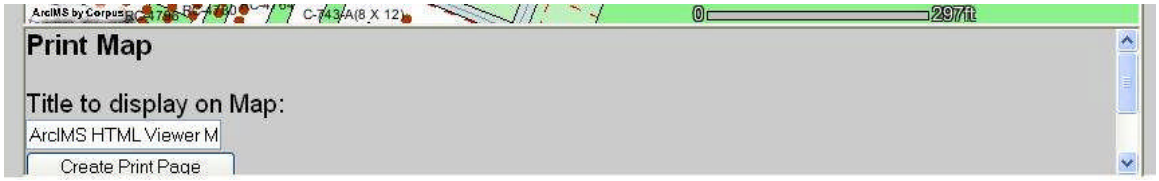
The **Print** option of the **GIS Viewer Toolbox** is used to generate an image suitable for printing.

- Click the **Print** option icon of the GIS Viewer Toolbox.

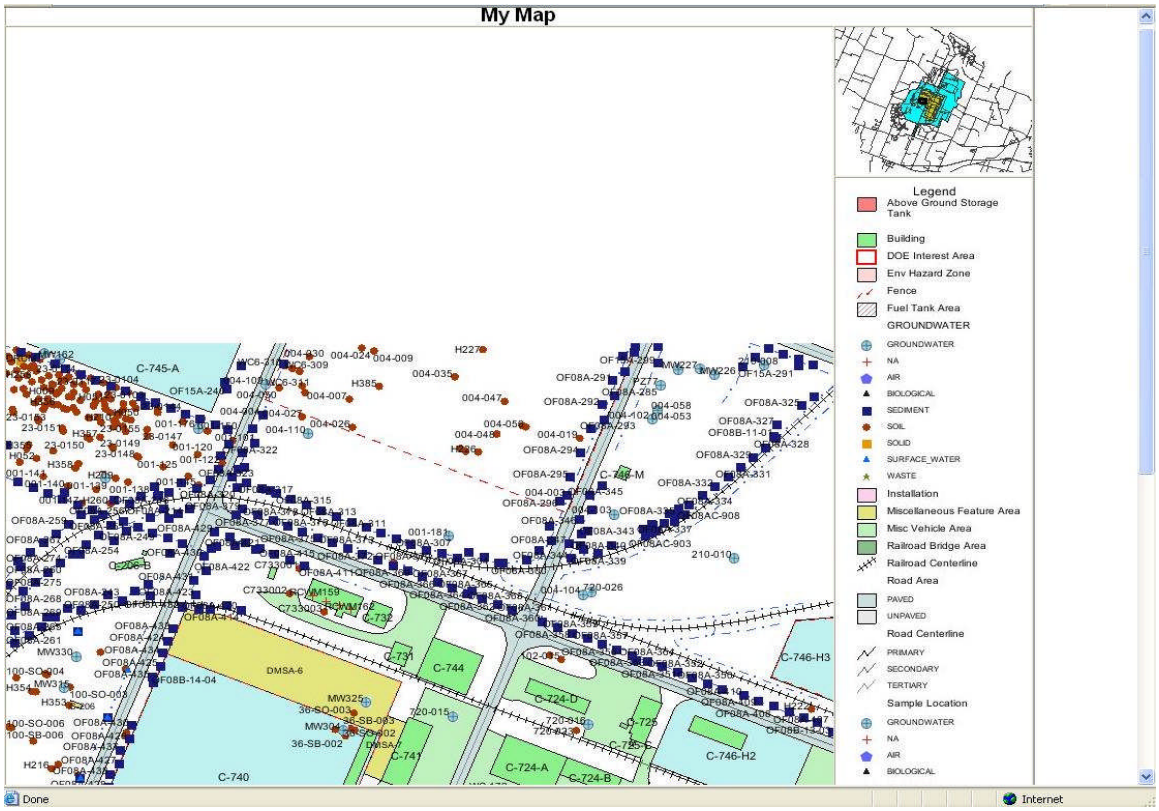
A simple input box appears below the Main Map.

- Replace the default Map Title with one suitable for your needs.
- Click the *Create Print Page* button to generate a new window that will have a standard format with the Main Map, Overview Map, and Legend displayed.

You can then use the *File/Print* menu item on the Web Browser's menu bar to send the display to your printer.



An example of an image that can be sent to any printer using the Web Browsers Print function is shown below. "My Map" was used as a title in the dialog box displayed in the above example.



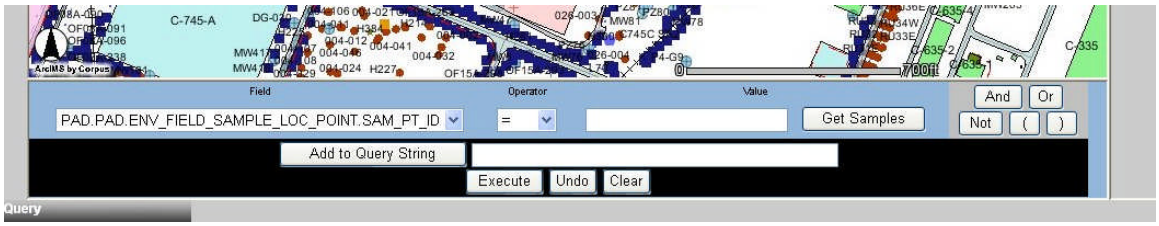
GIS Query Builder

The **Query Builder** tool in the **GIS Viewer Toolbox** enables users build the necessary statements to search the GIS attribute data of the *active layer*. The **Query Builder** extends the usefulness of the **GIS Viewer** by allowing users to select features using their own criteria.

To use the **Query Builder** tool in the **GIS Viewer Toolbox**,

- Be sure the layer containing the features you want to query is selected as the *active layer*.
- Click the **Query Builder** tool in the GIS Viewer Toolbox.

A new user input dialog box opens below the Main Map.



=	Attribute ***equals*** the value
<	Attribute ***is less than*** the value
>	Attribute ***is greater than*** the value
<=	Attribute ***is less than or equals*** the value
>=	Attribute ***is greater than or equals*** the value
Like	Attribute ***is similar*** to the value

The left side pull-down list has a list of all of the attributes (fields) available for the *active layer*.

- Select the attribute you want to search.

The next pull down menu is a list of possible *logical operators*. The available *logical operators* are shown in the table to the left.

The 3rd box inputs the value that meets your need. You can get a sample of values for the first 50 records of the *active layer*.

- Enter a *value* to search against your logical operator.

(continued)

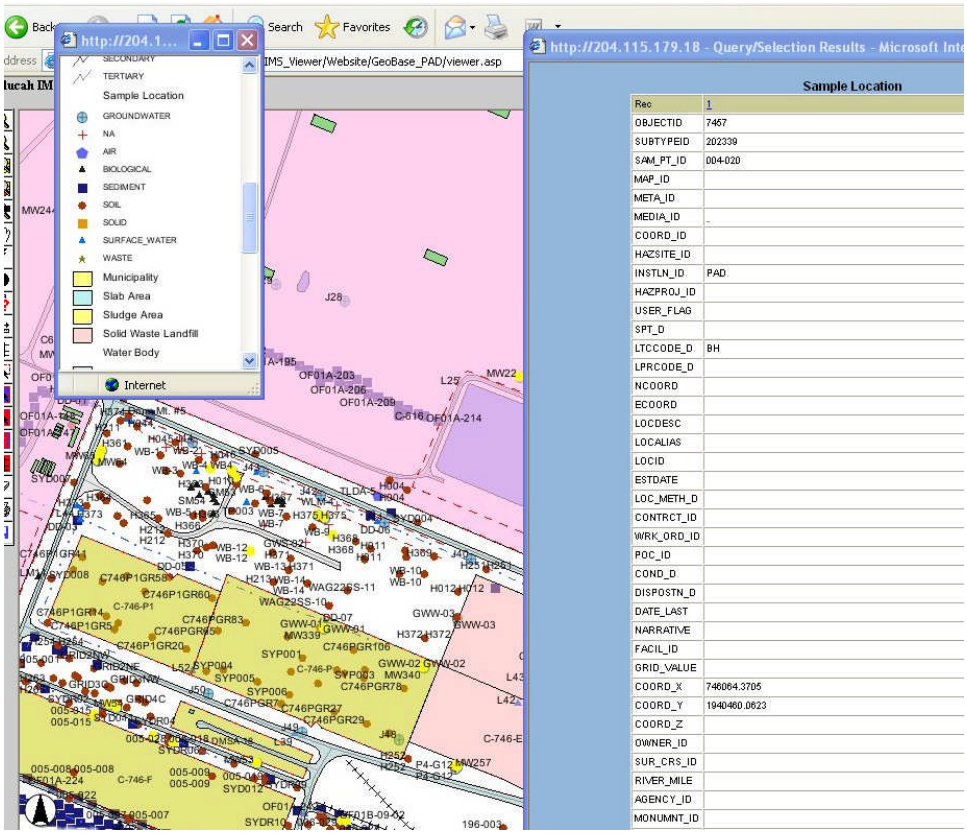
GIS Query Builder (Continued)

The following example searches for all sample locations in ENV_FIELD_LOC_POINT (the *active layer)* having the SAM_PT_ID attribute value greater than *40*.

To execute your query,

- Click *Add to Query String* button to add the query string to the command line.
- Click Execute button to execute the query.

The results of the query are displayed on the Main Map. Features whose attributes match the request criteria are highlighted and a separate window will open with a table showing all of the attributes of the selected features.



The **Query Builder** tool in the **GIS Viewer Toolbox** allows users to build complex query statements by using additional Logical operators (*AND, OR, NOT)* plus using parentheses to determine the order of selecting attribute values. These options are discussed in the advanced querying help.

Select Features by Rectangle

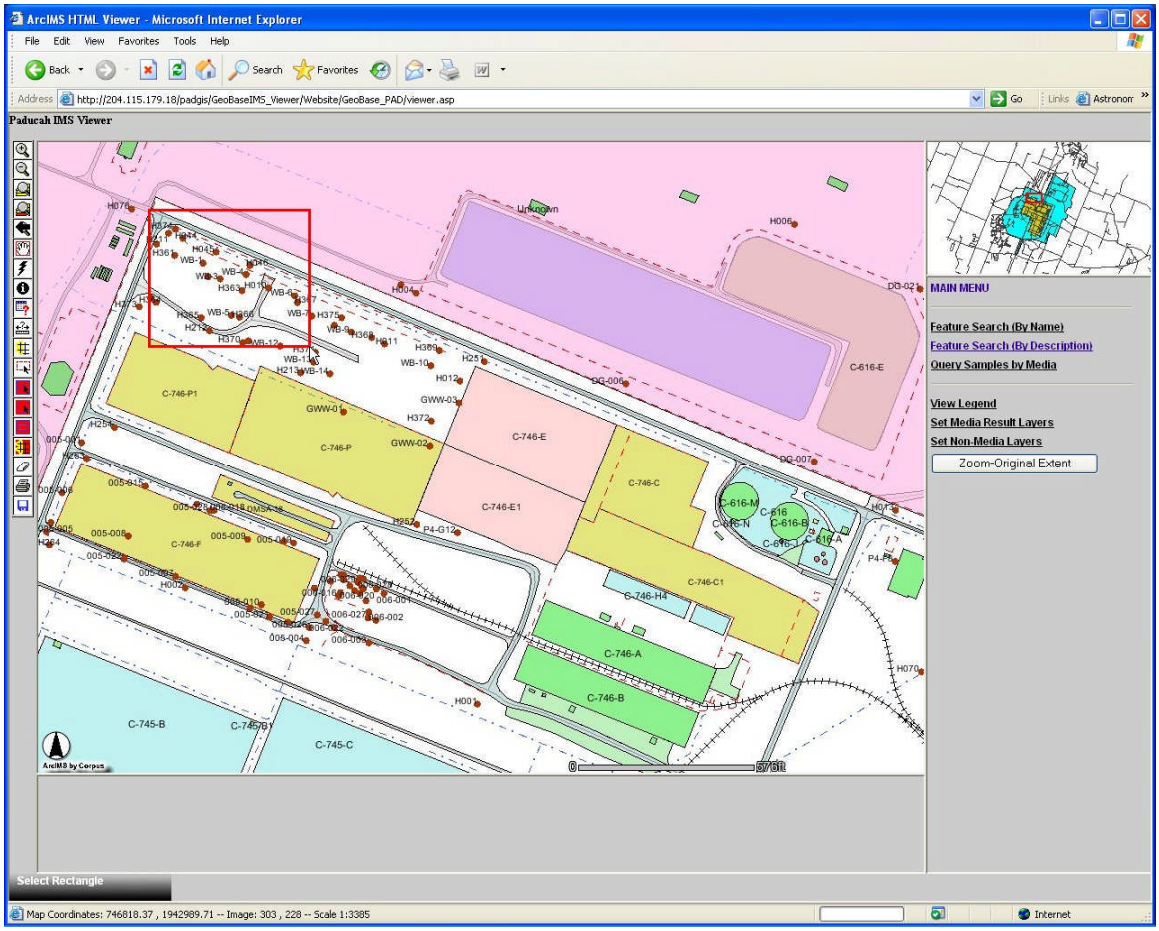
The **Select Rectangle** tool of the **GIS Viewer Toolbar** allows features of the *active layer* to be selected within a user defined rectangle.

To select features using a rectangle,

- Be sure on the features to be selected is the *active layer*.
- Click the **Select Rectangle** tool from the GIS Viewer Toolbar.
- Left click and hold on one corner of the area to be selected.
- Move the cursor to the opposite corner of the area to be selected.
- Release the left click.

***Note**: Only features that fall completely within the rectangle will be selected.*

The Main Map will be updated to display the selected features within the rectangle. A new window will also be displayed with the attributes of the selected features.



Select Query by Buffer

The **Select Query by Buffer** tool of the **GIS Viewer Toolbar** provides a method to select analytical results from *Sample Locations* within a user-defined buffer.

To select locations within a Buffer,

- Be sure *Sample Locations* is the *active layer*.
- Click the **Select Query by Buffer** tool from the GIS Viewer Toolbar.

This will open a new user input box below the Main Map.

- Using the pull-down list in the **User Input Area** below the **Main Map**, select the type of features to be highlighted by the buffer query.

***Note**: Only one layer can be selected.*

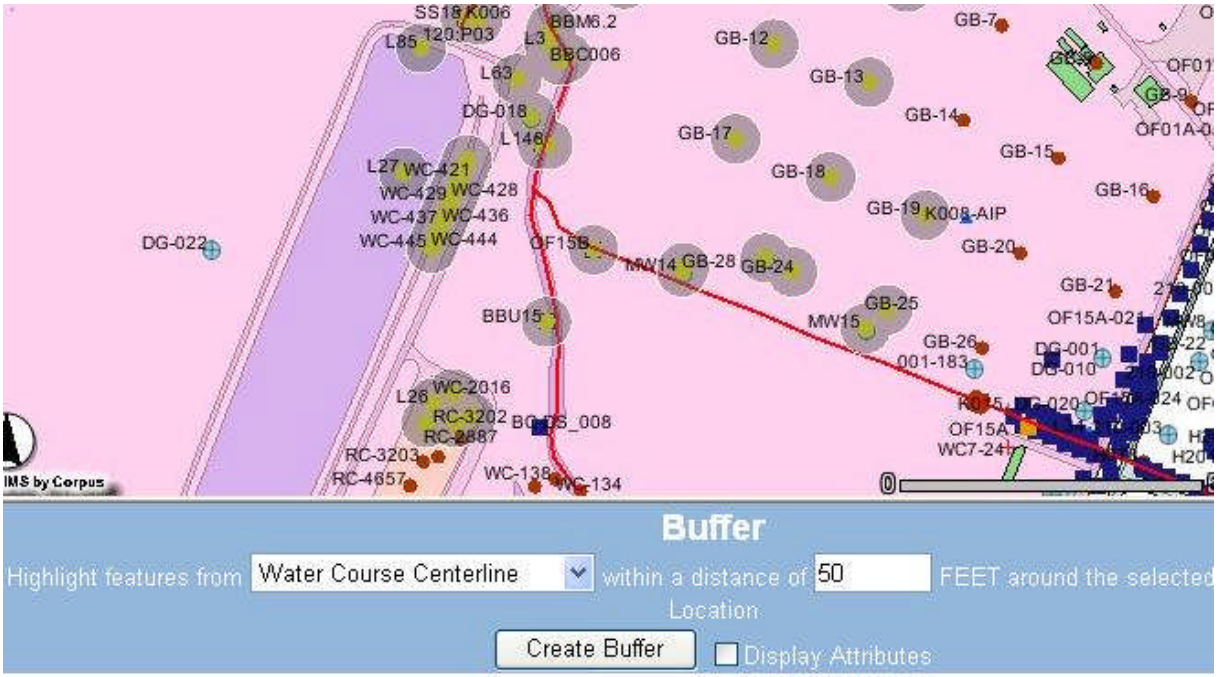
- Type a buffer *distance* to be searched.

***Note**: Distance is always in feet*.

- You can request an attribute table for the buffered features by checking the *Display Attributes* check box.
- Click *Create Buffer* button.

The **Main Map** will be updated to display the selected features within the Buffer.

In this example below, all *Sample Locations* within *50 feet* of the *Water Course Centerline* are highlighted in a charcoal-gray color.



Select Query by Circle

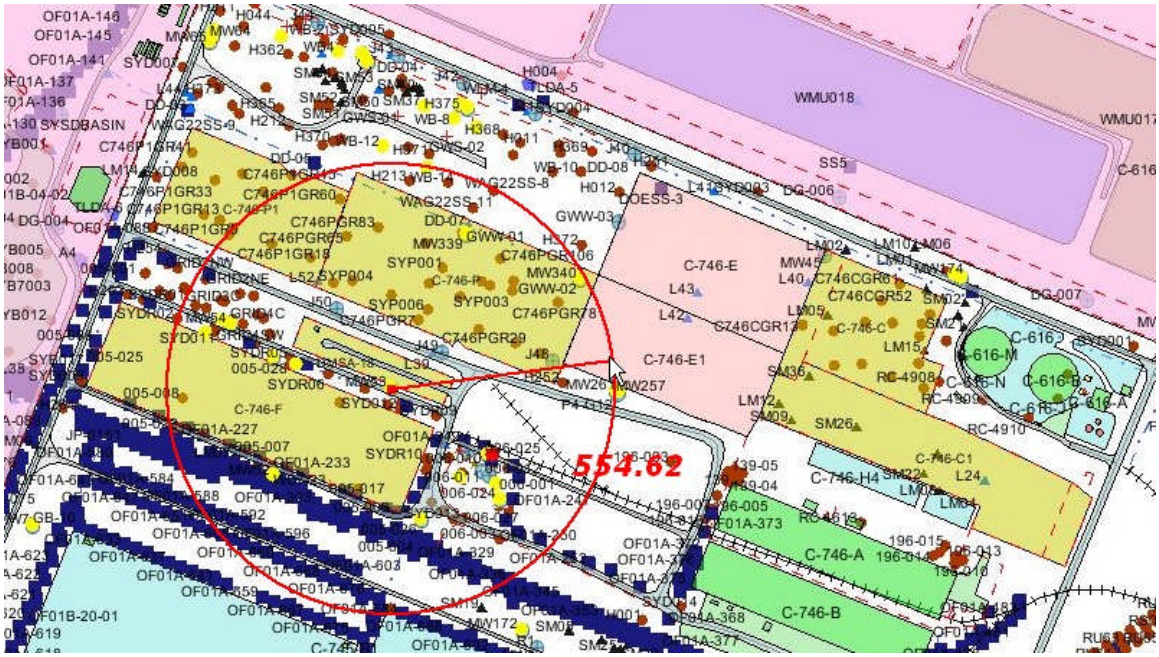
The **Select Query by Circle** tool of the **GIS Viewer Toolbar** provides a method to select analytical results from *Sample Locations* within a user-defined circle.

To select locations within a Circle,

- Be sure *Sample Locations* is the *active layer*.
- Click the **Select Query by Circle** tool from the GIS Viewer Toolbar.
- Left click and hold on one corner of the area to be selected.
- Move the cursor to the desired radius of the circle.
- Release the left click.

***Note**: Only features that fall completely within the Circle will be selected*.

The Main Map will be updated to display the selected features within the circle. A new window will allow users to request the analyses to be displayed.



Select Query by Polygon

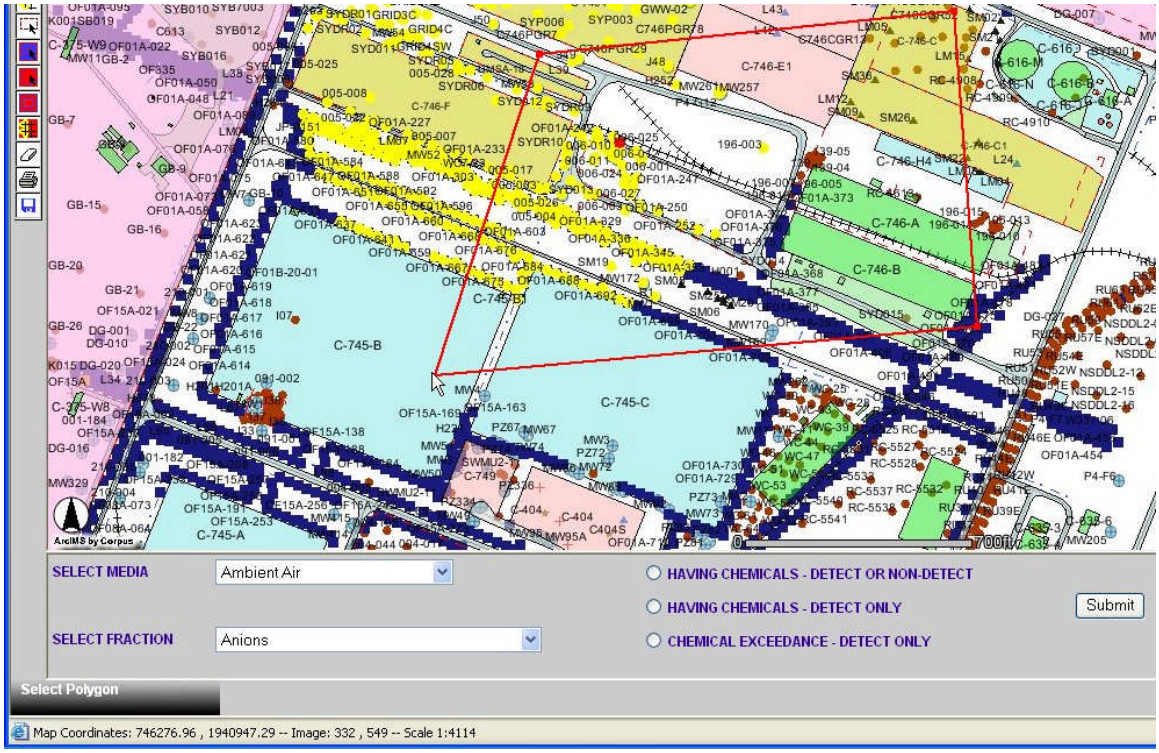
The **Select Query by Polygon** tool of the **GIS Viewer Toolbar** provides a method to select analytical results from *Sample Locations* within a user-defined polygon.

To select locations within a Polygon,

- Be sure *Sample Locations* is the *active layer*.
- Click the **Select Query by Polygon** tool from the GIS Viewer Toolbar.
- Left click and hold on one corner of the area to be selected.
- Move the cursor and click on points to define the shape of the Polygon.
- Double click on the last point of the Polygon.

***Note**: Only features that fall completely within the Polygon will be selected.*

The Main Map will be updated to display the selected features within the polygon. A new window will allow users to request the analyses to be displayed.



Select Query by Rectangle

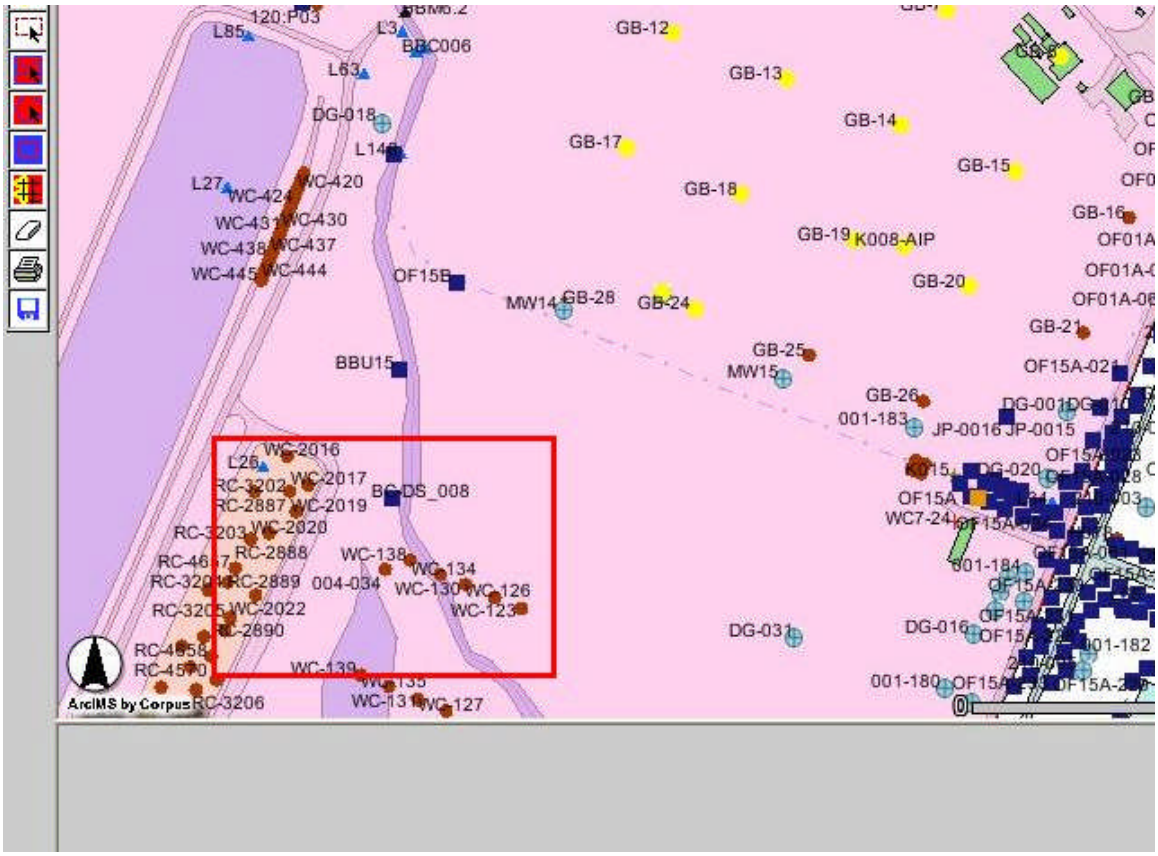
The **Select Query by Rectangle** tool of the **GIS Viewer Toolbar** provides a method to select analytical results from *Sample Locations* within a user-defined rectangle.

To select locations within a Rectangle,

- Be sure *Sample Locations* is the *active layer*.
- Click the **Select Query by Rectangle** tool from the GIS Viewer Toolbar.
- Left click and hold on one corner of the area to be selected.
- Move the cursor to the opposite corner of the rectangle.
- Release the left click.

***Note**: Only features that fall completely within the Rectangle will be selected*.

The Main Map will be updated to display the selected features within the rectangle. A new window will allow users to request the analyses to be displayed.



Zoom to Active Layer

The **Zoom to Active Layer** of the GIS Viewer Toolbar zooms to the full extent of the *active layer* which was previously selected using either the *Set Media Results Layers* or *Set Non-Media Layers* options. Depending on the *active layer*, the map will show only the area that fully encloses the features of the *active layer*.

Zoom to Full Extent

The **Zoom to Full Extent** of the GIS Viewer Toolbar zooms to the full extent of the map.

This option provides the same functionality as the *Zoom-Original Extent* button on the Main Menu.

Zoom to Last Extent

The **Zoom to Last Extent** of the GIS Viewer Toolbar will toggle between the current view and the last viewed extent.

It will not go back beyond the last view. In other words, the current view immediately becomes the "last" view.

Zoom In

The **Zoom In** of the GIS Viewer Toolbar zooms into the area of the Main Map that you click or drag a box around.

Users may either:

- Use a single click on the area to be zoomed.

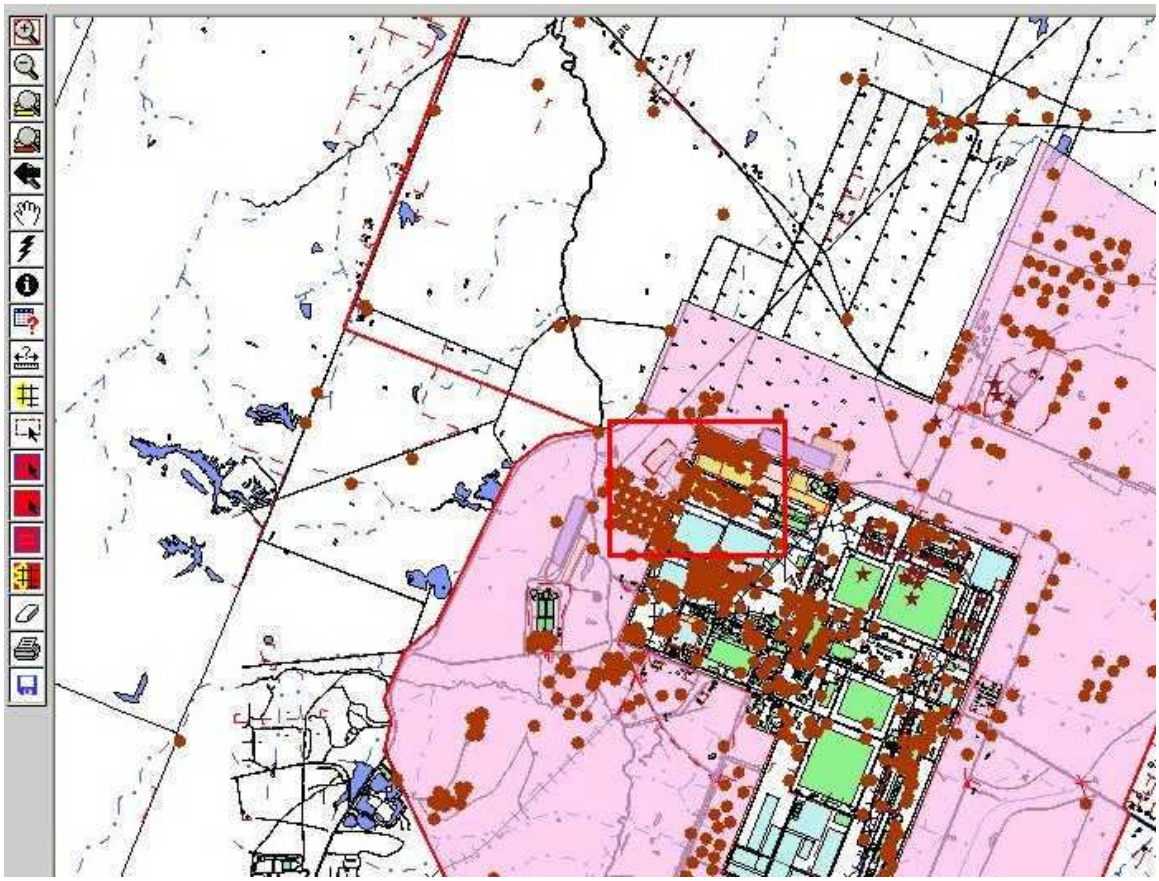
The **Main Map** will zoom in a predefined amount and the map centered on the point that was clicked.

OR

draw a box around the area of interest by

- Left clicking on one corner of the box and hold the left button.
- Drag a box to fit the area of interest as shown on the image to the left.
- Release the left click.

The **Main Map** will fit the contents of the drawn box into the full window.



Zoom Out

The **Zoom out** of the GIS Viewer Toolbar zooms out from the area of the Main Map that you click or drag a box around.

Users may either:

- Use a single click on the area to be zoomed.

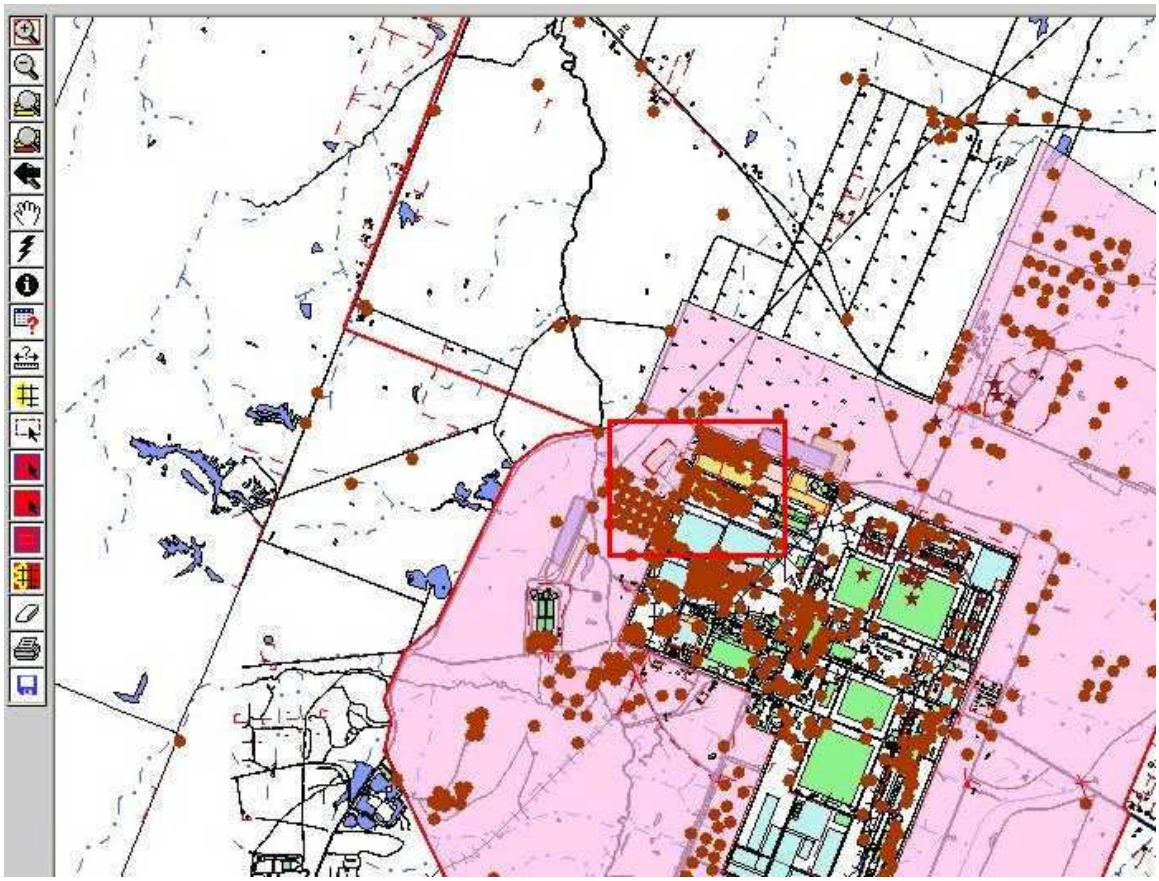
The **Main Map** will zoom out a predefined amount and the map centered on the point that was clicked.

OR

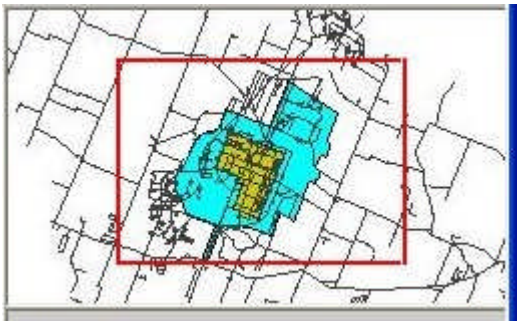
draw a box around the area of interest by

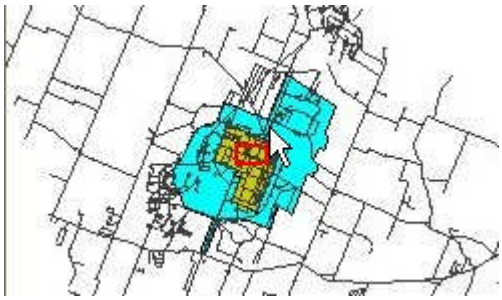
- left clicking on one corner of the box and hold the left button.
- Drag a box to fit the area of interest as shown on the image below.

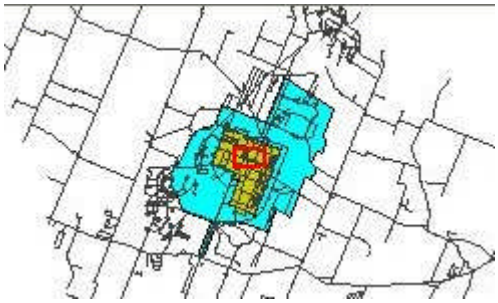
The **Main Map** will fit the contents of the full window into the drawn box. ***Beware of drawing too small of a box!***



Overview Map



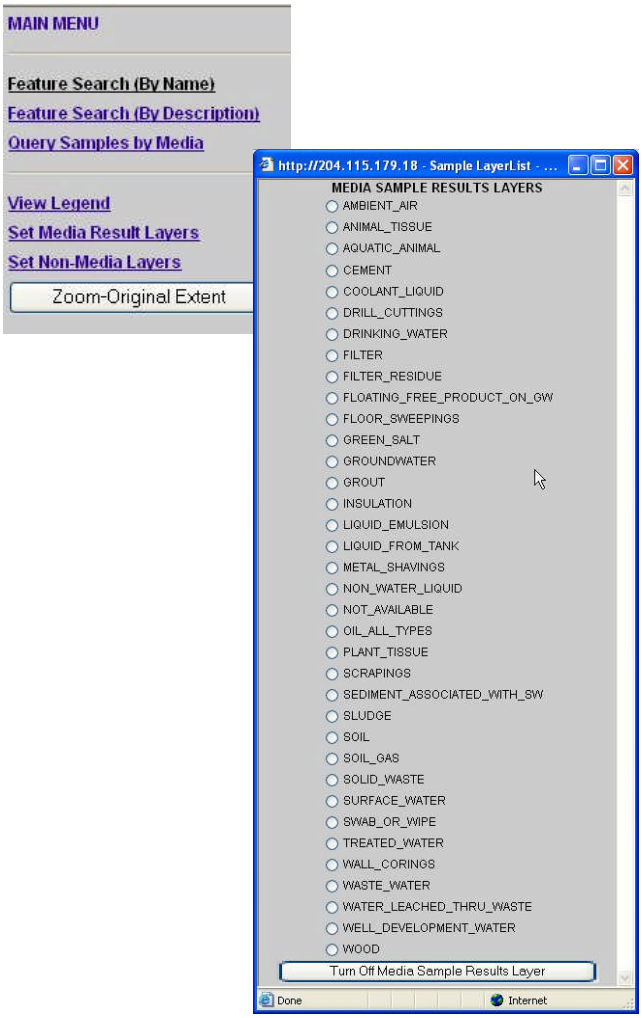




The **Overview Map** provides a visual reference to the Main Map. As the user zooms in or out of the **Main Map**, the red box will shrink or grow respectively and re-position over the area currently viewed in the **Main Map**.

***Tip**: You can view different areas at the same scale as the current **Main Map** view, by pointing at the **Overview Map** and left-clicking the new area of interest. This is convenient for quickly moving about the site without having to use the PAN option button.*

Setting the Active Layer



The *active layer* is designated as the target for selecting features, querying analytical results, or as the base layer for doing spatial analyses. In the Paducah GIS Viewer, there are two fundamental active layers, the *Media Results Layer*, and Non-Media Layers. Only one layer from either group can be the *active layer*.

The *Media Results Layer* is used to search the Data Warehouse for analytical results of sampling events. The *Non-Media Layers* searches for GIS features such as buildings, streams, and boreholes.

To set a layer as the *active layer*,

- From the Main Menu, select either the *Set Media Result Layers* or the *Set Non-Media Layers* option.
- Depending on which option you choose, pick one layer to be the *active layer*.
- From the list, set the active layer by clicking the *radial button* next to the name of the layer.
- For *Non-Media Layers* only: if you need to additional themes to the *Non-Media Layers*, do that prior to selecting a *Non-Media Layers* as the *active layer*.

***Note**: be sure to move the active layer to the top of the list to be sure it is not covered by another layer in the **Main Map**. (How?)*

Zoom Tools

The GIS Viewer Toolbar offers multiple options to help users zoom to features on the map.

Five options are available on the GIS Viewer toolbar and other options are inherent in the functionality of the viewer and as a result of search and selection operations.

Zoom In: Zooms in to the area of the map that you click or drag a box around.

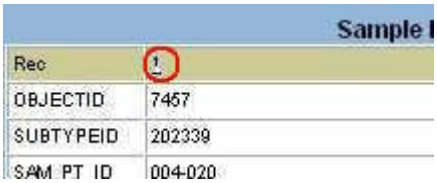
Zoom Out: Zooms out from the area of the map that you click or drag a box around.

Zoom to Full Extent: Zooms to full extent of map.

Zoom to Active Layer: Zooms to full extent of the active layer.

Zoom to Previous Extent: This will toggle between the current and the last extent.

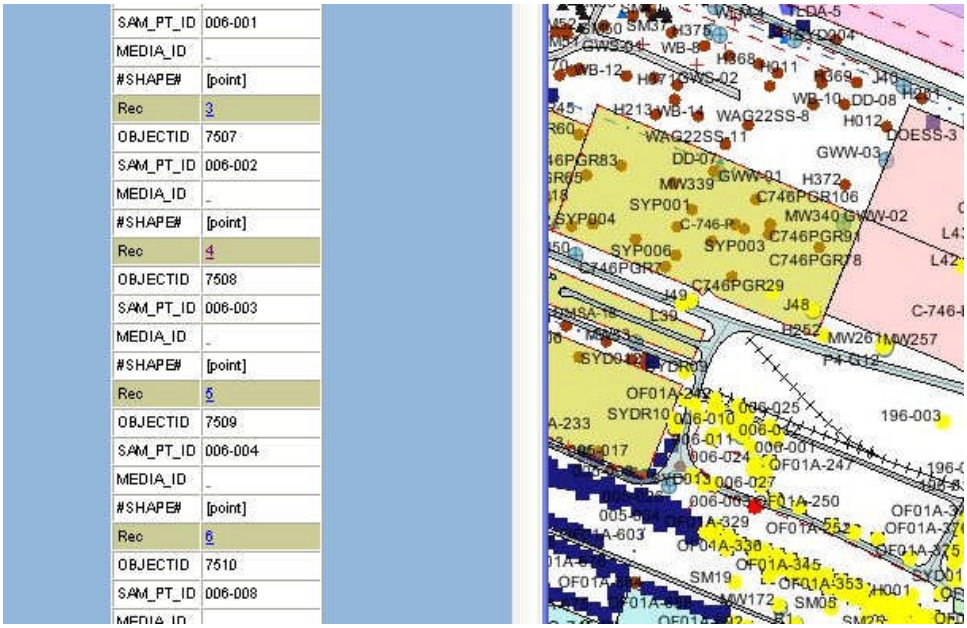
The **Main Map** will automatically zoom to a specific feature as a result of a media or non-media Main Menu queries (such as buildings, boreholes, SMU, etc.).



Users can also zoom to specific areas or features on the map by clicking on the record (*REC*) number found on the results of a query.

Notice the underlined *Rec* number on this query results window. Clicking this link will zoom the map to the referenced feature. This feature will also be highlighted on the Main Map for easy identification.

Selection and Current Image



SAM_PT_ID	006-001
MEDIA_ID	
#SHAPE#	[point]
Rec	3
OBJECTID	7507
SAM_PT_ID	006-002
MEDIA_ID	
#SHAPE#	[point]
Rec	4
OBJECTID	7508
SAM_PT_ID	006-003
MEDIA_ID	
#SHAPE#	[point]
Rec	5
OBJECTID	7509
SAM_PT_ID	006-004
MEDIA_ID	
#SHAPE#	[point]
Rec	6
OBJECTID	7510
SAM_PT_ID	006-008
MEDIA_ID	

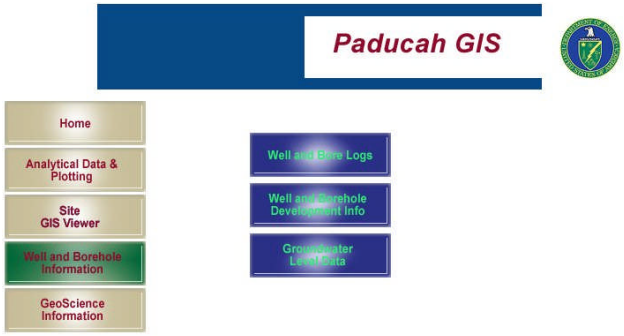
The **GIS Viewer** provides various visual aids to help users identify features of interest. Selected features are usually highlighted in YELLOW, but one of the selected features may be highlighted in RED under certain conditions.

In the example above, there are 2 images, one from the Main Map (on the right) and a list of records matching the result of a query or selection by a buffer operation. Multiple sample points are selected and are highlighted in yellow.

In reviewing the list of records, the user selected record number (*REC*) 5 by clicking on the underlined record number (5). The Main Map was updated and the selected point is now highlighted in red.

Buffered areas are usually highlighted using charcoal-gray shading.

View Well and Borehole Information



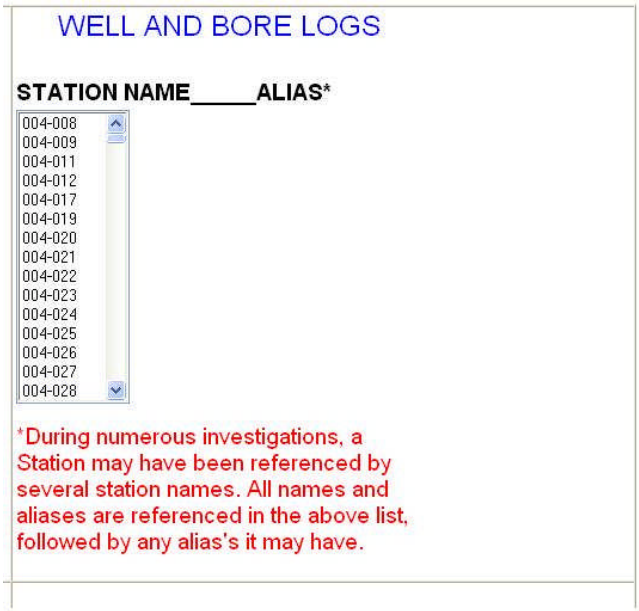
To view available well and borehole information and development logs:

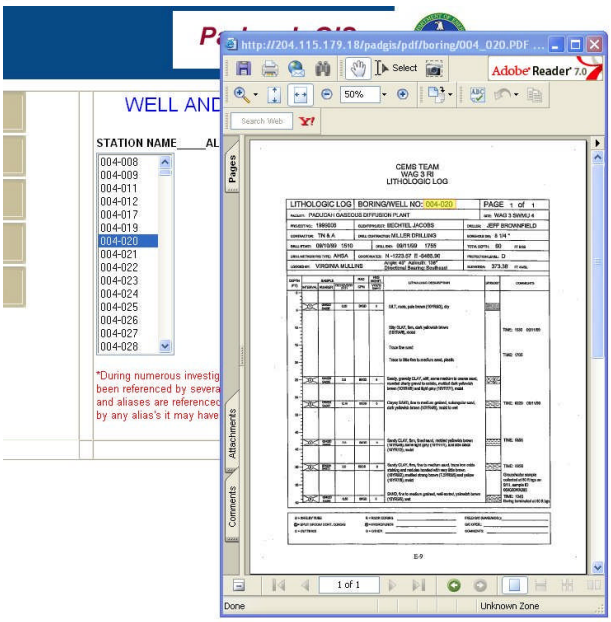
- Click on the **Well and Borehole Information** button from the *Paducah Data Warehouse and GIS Viewer* home page.

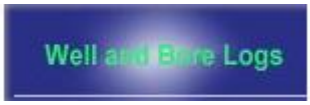
Three new options will be displayed.

Well and Bore Logs	View well and bore information and development logs.
Well and Borehole Development Information	Display well and borehole development information, coordinates, depths, screens, etc.
Groundwater Level Data	Display and graph groundwater level data.

Well and Bore Logs







Many of the wells and boreholes have driller's logs, completion reports, photos, and other pertinent data that are not easily or completely copied into the data warehouse. Sometimes these non-textual documents are invaluable to researchers and contractors.

In an effort to preserve and present these data, the *Paducah Data Warehouse and GIS Viewer* provides images of these documents to be displayed in the web browser.

To view available well and bore information and development logs,

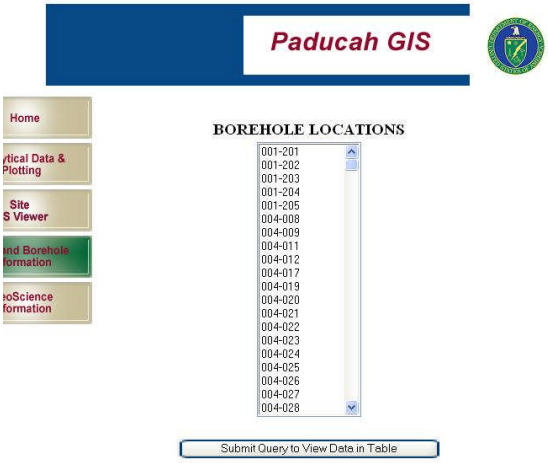
- Select the Well and Borehole Information option from the *Paducah Data Warehouse and GIS Viewer* home page.
- Click the **Well and Bore Logs** button.
- Select the borehole location to view.

***Note 1**: As the text in red states, during numerous investigations, a Station may have been referenced by several station names. All names and aliases are referenced in the pick list, followed by any alias's it may have.*

***Note 2**: This function requires Adobe Acrobat Reader® version 4.0 or higher to view and only one log can be viewed at a time.*

Well and Borehole Development Information

Geotechnical data from many of the wells and boreholes have been collected from driller's logs, completion reports, and other pertinent sources. These data include lithology, coordinates, screening depths, and interpreted results. These data have been compiled and added to the data warehouse.



To view available **Well and Borehole and Development Information**,

- Select the Well and Borehole Information option from the *Paducah Data Warehouse and GIS Viewer* home page.
- Click on the **Well and Borehole Development Info** button.
- Select the borehole location to view.

***Note 1**: Multiple locations can be selected from the list by holding down the CNTRL or SHIFT keys during the selection process.*

- Click the *Submit Query to View Data in Table* button.

Below is an example of the results of a query in a web browser view.

The LOCATION / ORIENTATION query generated 1 record(s).

BOREHOLE	RANGE	LONGITUDE	LATITUDE	EASTING	NORTHING	ELEVATION	TOTAL DEPTH	DEPTH	BEARING	INCLINATION	TOWNSHIP	SECTION
004-008	SWMU-4	338552.6646	4109432.8827	-6264.29	-1229.27	376.22	39	60.0	303.0	45.0	null	0

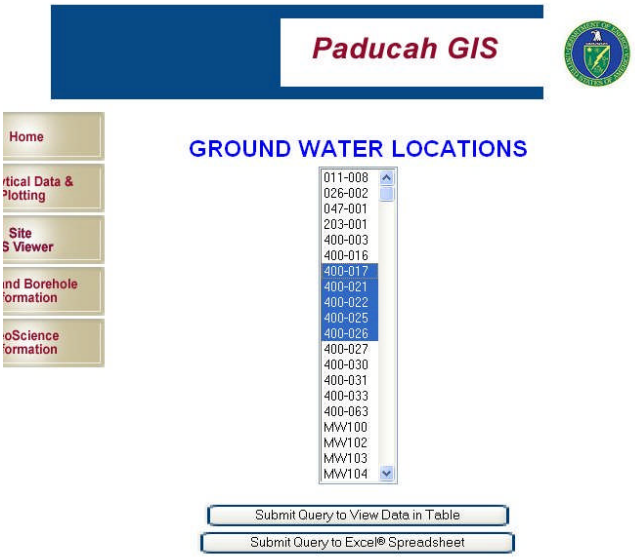
The LITHOLOGY query generated 5 record(s).

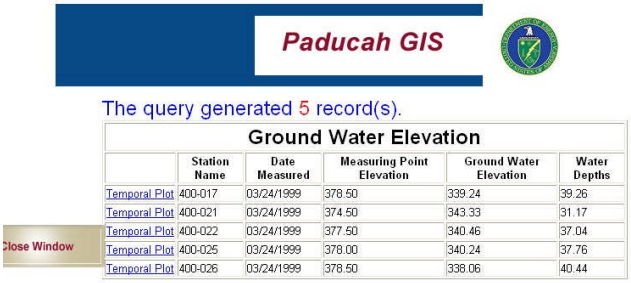
BOREHOLE	STARTING DEPTH	ENDING DEPTH	LITHOLOGY	DESCRIPTION
004-008	0.00	3.00	ML	SILT: organics, roots, pale brown
004-008	3.00	13.00	CM	SILTY CLAY: firm to stiff, friable, little iron oxide nodules, some chert gravel fragments, trace plastic sheeting, mottled yell
004-008	13.00	22.00	CM	SILTY CLAY: firm, mottled brownish yellow and light brownish grey
004-008	22.00	37.00	CS	SILTY SANDY CLAY: firm, fine to medium grained sand, light brownish grey and some brownish yellow
004-008	37.00	39.00	CS	SANDY CLAY: firm, fine to medium grained sand, mottled pale brown and yellowish brown

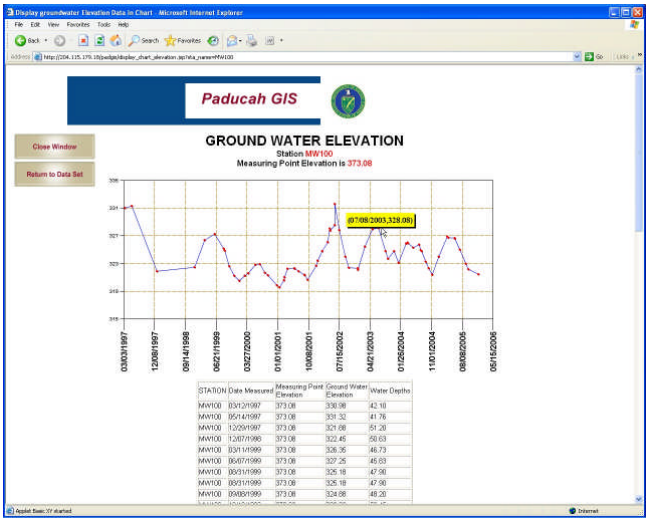
The STRATIGRAPHY query generated 2 record(s).

BOREHOLE	STARTING DEPTH	ENDING DEPTH	STRATIGRAPHY
004-008	0.00	22.00	HU-1
004-008	22.00	39.00	HU-2B

Groundwater Level Data







Groundwater Level Data for selected locations can be viewed and graphed.

To view available groundwater level data,

- Select the Well and Borehole Information option from the *Paducah Data Warehouse and GIS Viewer* home page.
- Click on the **Groundwater Level Data** button.
- Select the location to view.

***Note 1**: Multiple locations can be selected from the list by holding down the CNTRL or SHIFT keys during the selection process.*

Selections may be submitted to be viewed in a web browser to be downloaded as an Excel® spreadsheet file.

On the left is an example of the results of a query in a web browser view.

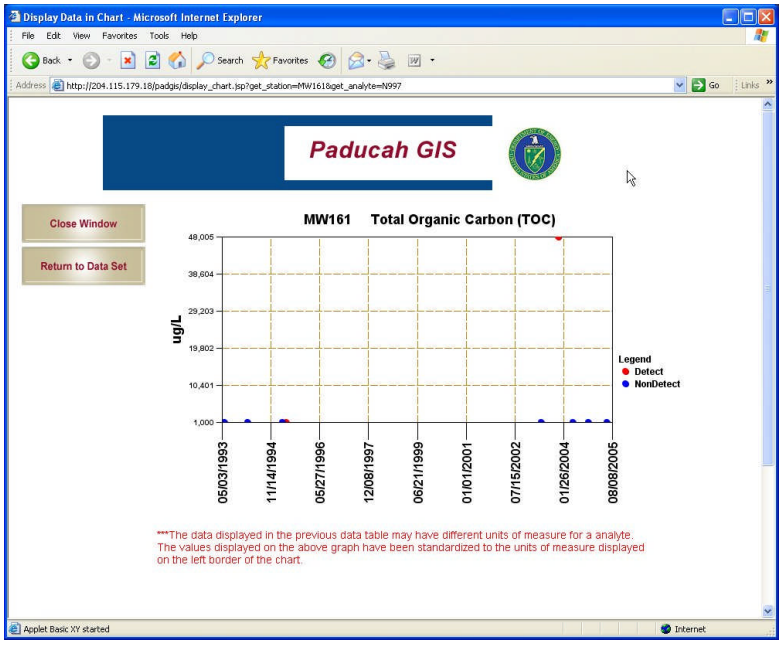
To view the change in groundwater level over time for this well,

- Click on Temporal Plot.

A new will display a plot of groundwater levels for the selected location over time. In addition, a data table with the same data appears below the plot.

***Note 2**: You can get dates and groundwater levels for any point on the graph by sampling hovering the mouse pointer over the point of interest. The associated data will automatically appear in small yellow pop-up box.*

Temporal Plots

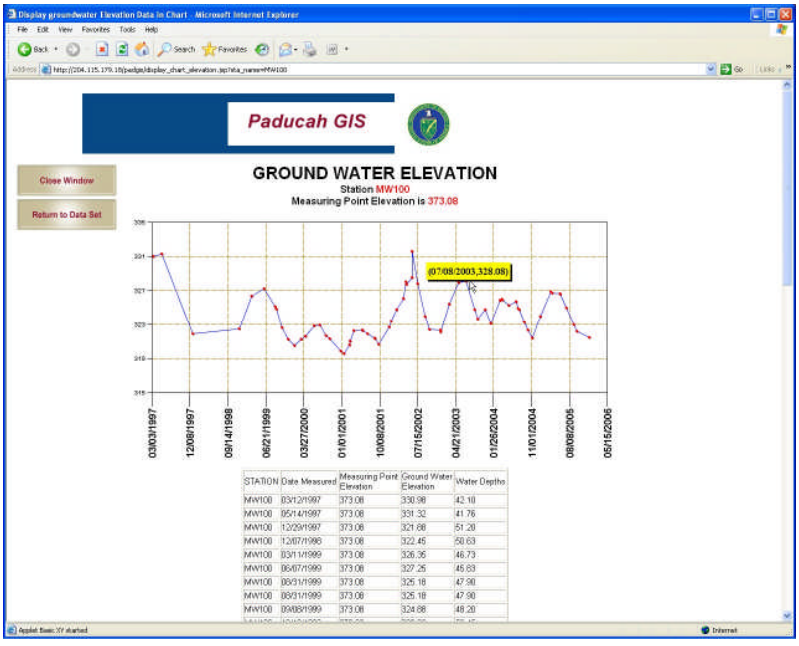


Temporal Plots graphically show the range of values of every analysis done for a given analyte or measurement at a specific location.

- Click the **Temporal Plot** hyperlink,

A new window will open with a graph for the location.

It does not matter which **Temporal Plot** option is clicked on for a specific location, as each will result in the same plot. This is because the query is for one analyte (or parameter) for one location. For queries that include multiple locations and/or multiple analytes (or parameters), each analyte-location combination will result in a unique temporal plot.



To view the actual value of a specific sample collection date,

- Move the mouse cursor over any data point.

The associated date and value will automatically appear in a yellow pop-up box.

In the example in the lower left, a ground water elevation of 328.08 ft was measured on 7/08/03.

This image may be printed by using the browser's **PRINT** functionality.

GeoScience Information

This Feature is not Implemented with this version of the Paducah Data Warehouse and GIS Viewer

Tutorial

Appendices

MEDIA SAMPLE RESULTS LAYERS	
As of August 2006	
AMBIENT_AIR	NON_WATER_LIQUID
ANIMAL_TISSUE	NOT_AVAILABLE
AQUATIC_ANIMAL	OIL_ALL_TYPES
CEMENT	PLANT_TISSUE
COOLANT_LIQUID	SCRAPINGS
DRILL_CUTTINGS	SEDIMENT_ASSOCIATED_WITH_SW
DRINKING_WATER	SLUDGE
FILTER	SOIL
FILTER_RESIDUE	SOIL_GAS
FLOATING_FREE_PRODUCT_ON_GW	SOLID_WASTE
FLOOR_SWEEPINGS	SURFACE_WATER
GREEN_SALT	SWAB_OR_WIPE
GROUNDWATER	TREATED_WATER
GROUT	WALL_CORINGS
INSULATION	WASTE_WATER
LIQUID_EMULSION	WATER_LEACHED_THRU_WASTE
LIQUID_FROM_TANK	WELL_DEVELOPMENT_WATER
METAL_SHAVINGS	WOOD

Available GIS Features and Layers

As of September 2006

GIS Features and Layers

- IMAGES
  - SITE HILLSHADE
  - SITE ELEVATION (FT)
  - Aerial Photo
  - 2001 Photo
  - 2004 NAIP Aerial Photo
- BOUNDARY
  - State
  - Municipality
  - County
- BUILDINGS
  - Slab Area
  - Pavilion Area
  - Hospital
  - Building
- CADASTRE
  - Security Area
  - Parcel Areas
  - Installation
  - DOE Interest Area
  - Campus
  - Agency Owned Area
- COMMON
  - Coordinate Grid
- COMMUNICATIONS
  - Communications Antenna
- ENV_HAZ_CHARACTERIZATION

- Sample Location
- ENV_HAZ_GENERAL
  - Env Hazard Zone
- ENV_HAZ_POLLUTION_CONTROL
  - Gwt TCE Plume 2004URGA
  - Gwt TCE Plume 2004MRGA
  - Gwt TCE Plume 2004LRGA
  - Gwt TCE Plume 2004
  - Gwt TCE Plume 2002URGA
  - Gwt TCE Plume 2002MRGA
  - Gwt TCE Plume 2002LRGA
  - Gwt TCE Plume 2002
  - Gwt TCE Plume 2001URGA
  - Gwt TCE Plume 2001MRGA
  - Gwt TCE Plume 2001LRGA
  - Gwt TCE Plume 2001
  - Gwt TCE Plume 2000URGA
  - Gwt TCE Plume 2000MRGA
  - Gwt TCE Plume 2000MAX
  - Gwt TCE Plume 2000LRGA
  - Gwt TCE Plume 1999
  - Gwt TCE Plume 1998
  - Gwt TC99 Plume 2004URGA
  - Gwt TC99 Plume 2004MRGA
  - Gwt TC99 Plume 2004LRGA
  - Gwt TC99 Plume 2004
  - Gwt TC99 Plume 2002URGA
  - Gwt TC99 Plume 2002MRGA
  - Gwt TC99 Plume 2002LRGA
  - Gwt TC99 Plume 2002
  - Gwt TC99 Plume 2001URGA
  - Gwt TC99 Plume 2001MRGA
  - Gwt TC99 Plume 2001LRGA

- Gwt TC99 Plume 2001
- Gwt TC99 Plume 2000URGA
- Gwt TC99 Plume 2000MRGA
- Gwt TC99 Plume 2000MAX
- Gwt TC99 Plume 2000LRGA
- Gwt TC99 Plume 1999
- Gwt TC99 Plume 1998

ENV_HAZ_REGULATED_TANK
- Above Ground Storage Tank

ENV_HAZ_SITE_MGMT
- SWMU

ENV_HAZ_SOLID_WASTE
- Solid Waste Landfill
- Sludge Area

FAUNA
- Snake Habitat
- Muselbed Habitat
- Gov Wildlife Management Area
- Eagle Habitat
- Bat Habitat

FLORA
- Treeline

GEODETIC
- Control Point

GEOLOGY
- Geologic Cross Sections
- Borehole

HYDROGRAPHY
- Water Course Centerline
- Water Course Area
- Water Body

IMPROVEMENT_GENERAL
- Smokestack Chimney

- Miscellaneous Feature Area
- Fence
- IMPROVEMENT_MACHINERY
  - Silo
- IMPROVEMENT_RECREATION
  - Recreation Park
  - Miscellanous Recreation Area
  - Hunting Area
  - Athletic Field
  - Athletic Court
- IMPROVEMENT_WELL
  - Well
- LANDFORM
  - Elevation Contours
- LAND_STATUS
  - Cemetery Point
  - Cemetery Area
- PAD
  - WOOD
  - WELL_DEVELOPMENT_WATER
  - WATER_LEACHED_THRU_WASTE
  - WASTE_WATER
  - WALL_CORINGS
  - TREATED_WATER
  - SWAB_OR_WIPE
  - SURFACE_WATER
  - SOLID_WASTE
  - SOIL_GAS
  - SOIL
  - SLUDGE
  - SEDIMENT_ASSOCIATED_WITH_SW
  - SCRAPINGS
  - PLANT_TISSUE

- OIL_ALL_TYPES
- NOT_AVAILABLE
- NON_WATER_LIQUID
- METAL_SHAVINGS
- LIQUID_FROM_TANK
- LIQUID_EMULSION
- INSULATION
- GROUT
- GROUNDWATER
- GREEN_SALT
- FLOOR_SWEEPINGS
- FLOATING_FREE_PRODUCT_ON_GW
- FILTER_RESIDUE
- FILTER
- DRINKING_WATER
- DRILL_CUTTINGS
- COOLANT_LIQUID
- CEMENT
- AQUATIC_ANIMAL
- ANIMAL_TISSUE
- AMBIENT_AIR
- SITE HILLSHADE
- SITE ELEVATION (FT)
- Aerial Photo
- 2001 Photo

SOIL

- Soil

TRANSPORTATION_AIR

- Airfield Surface Area
- Airfield Area

TRANSPORTATION_RROAD

- Railroad Centerline
- Railroad Bridge Area

- Rairoad Area
- TRANSPORTATION_VEHICLE
  - Road Centerline
  - Road Bridge Area
  - Road Area
  - Parking
  - Misc Vehicle Area
  - Driveway
- UTILITIES_ELECTRICAL
  - Exterior Lighting
  - Electrical Substation
  - Electric Cable Line
- UTILITIES_FUEL
  - Fuel Tank Area
- UTILITIES_GENERAL
  - Utility Pole
- UTILITIES_STORM
  - Storm Sewer Headwall Point
  - Storm Sewer Headwall
  - Manholes
- UTILITIES_WATER
  - Fire Hydrant