

National Remediation Roundtable Meeting

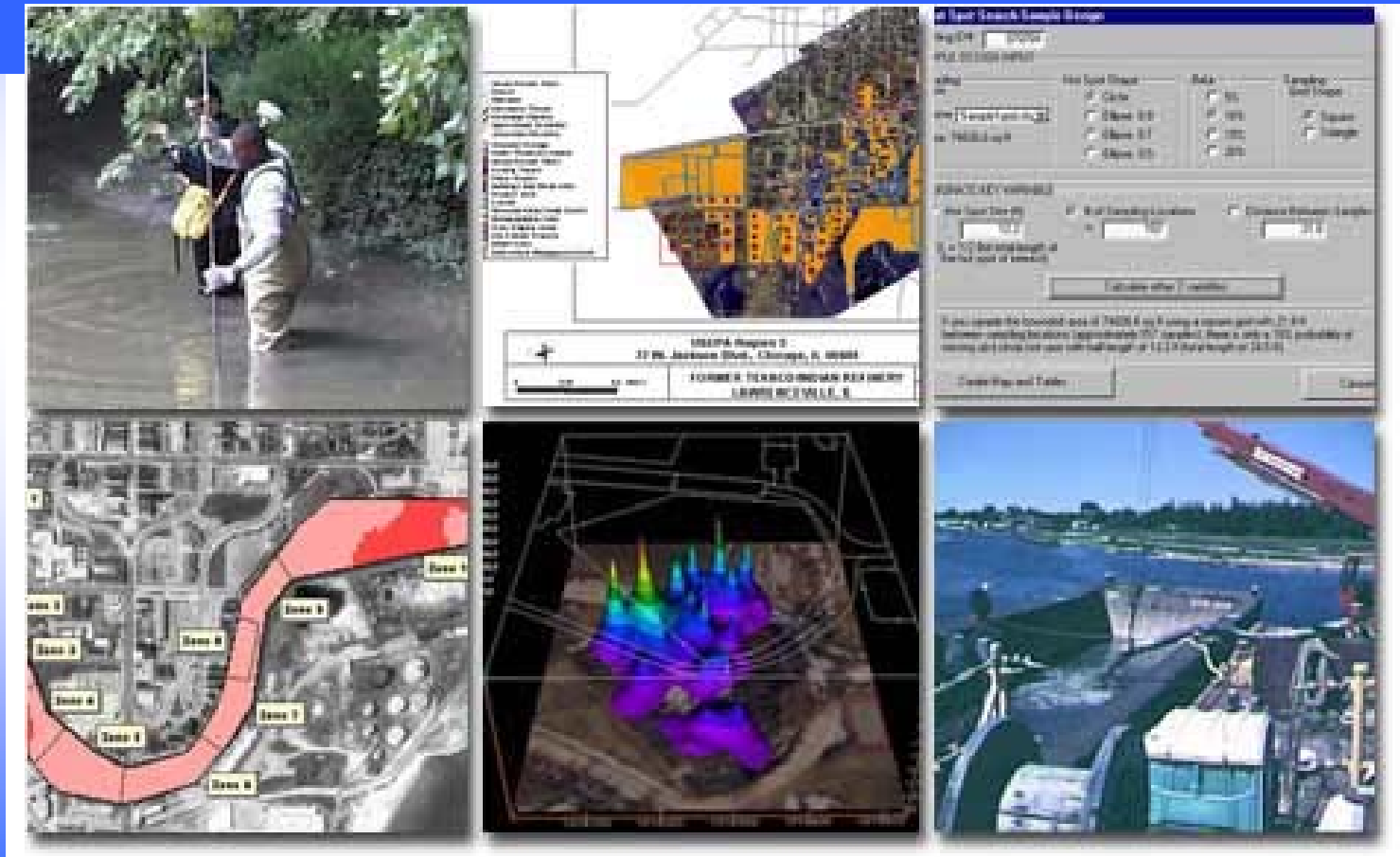
Decision Support Tools

- FIELDS (Field Decision Support System)
 - Region 5 Superfund Division
- SADA (Spatial Analysis & Decision Assistance)
 - University of Tennessee
- VSP (Visual Sample Plan)
 - Battelle, DOE contractor
- Integration

Brian Cooper & John Bing-Canar, FIELDS Team

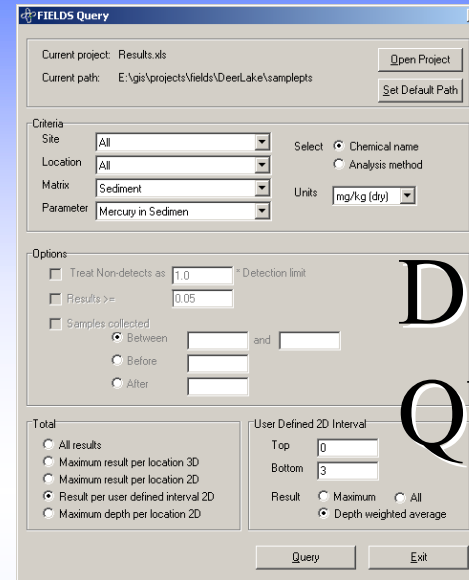
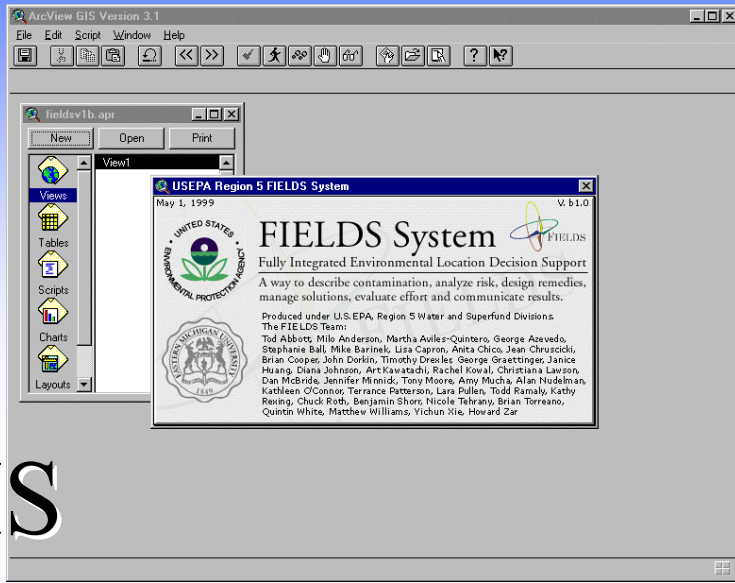
What is FIELDS?

A collection of **automated tools** that provide analysis in support of environmental decision-making



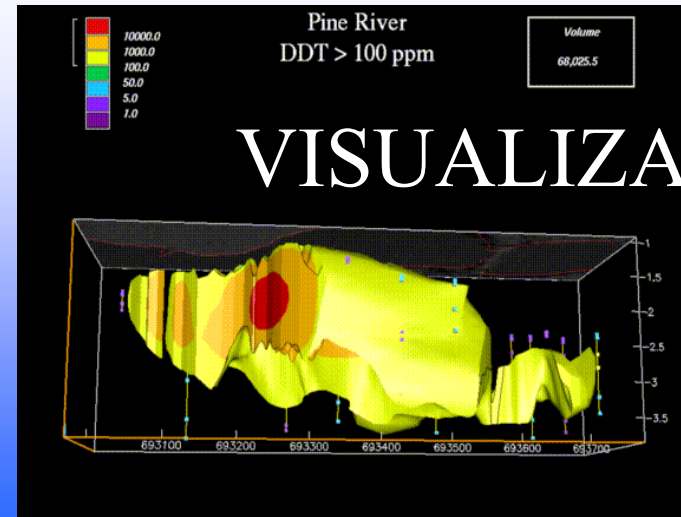
FIELDS Tools: Technologies

GIS



Database
QUERIES

GPS



VISUALIZATION

FIELDS Tools

Sample Design

Database Querying

Contamination Characterization

- interpolation
- mass and volume estimation

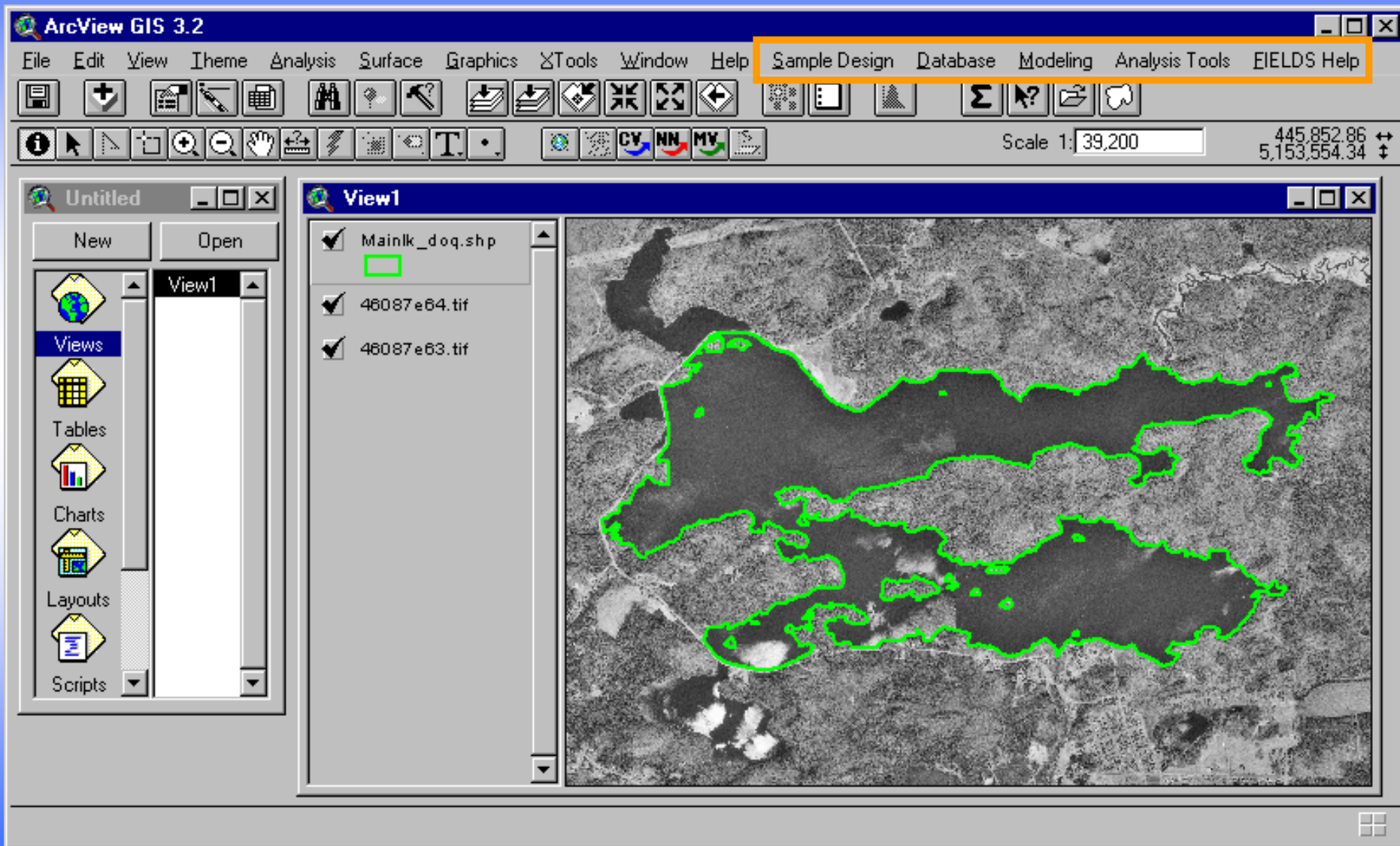
Analysis Tools

- remediation design
- risk assessment
- implement cleanup goals

Monitoring

Communication

FIELDS Tools: Components



Sample Design

Sample Design | Modeling | Analysis Tool

JUDGMENTAL

Add Points

RANDOM

Simple

Stratified

SYSTEMATIC

Aligned Grid (Hot Spot Search)

Unaligned Grid

LINEAR

Make Centerline

Use Linear Tools

TOOLS

Modify Design

Find Largest Unsampled Area

Load to GPS

Print Design

Aligned Grid Sample Design (Hot Spot Search)

Starting ID#:

SAMPLE DESIGN INPUT

Sampling Area Theme: <input type="text" value="por99a_poly.shp"/> Area: 145988 sq m	Hot Spot Shape <input checked="" type="radio"/> Circle <input type="radio"/> Ellipse 0.9 <input type="radio"/> Ellipse 0.7 <input type="radio"/> Ellipse 0.5	Beta <input type="radio"/> 5% <input checked="" type="radio"/> 10% <input type="radio"/> 15% <input type="radio"/> 20%	Grid Shape <input checked="" type="radio"/> Square <input type="radio"/> Triangle <input type="radio"/> Rectangle <input checked="" type="checkbox"/> Random Start
---	--	--	--

DESIGNATE KEY VARIABLE

<input checked="" type="radio"/> Hot Spot Size (m) L: <input type="text"/>	<input type="radio"/> # of Sampling Locations n: <input type="text"/>	<input type="radio"/> Distance Between Samples (m) G: <input type="text"/>
---	--	---

(L = 1/2 the total length of the hot spot of interest)

Simple Random design

1. Sample Design

- Pt05141.shp
- Pt11133.shp
- Pt11132.shp
- Pt11131.shp
- Pt05152.shp
- Pt03051.shp
- Maink_doq.shp
- Maink_doq_strat.st

Legend: clay

Shape	ID	X	Y
Point	514001	447748.39599	5153280.14082
Point	514002	447675.33490	5152207.52899
Point	514003	445862.43898	5153266.44373
Point	514004	445929.32124	5152782.32793
Point	514005	447309.30944	5151930.41622
Point	514006	448173.95697	5152985.33841
Point	514007	446309.15017	5153471.40042
Point	514008	446686.51714	5153320.09900
Point	514009	446363.80753	5153514.93971
Point	514010	448631.95492	5153119.56745
Point	514011	447776.54322	5152145.02997
Point	514012	449999.21622	5152212.27124

Convert to Waypoints

Theme to convert to waypoints: Pt05141.shp

Point ID field: ID

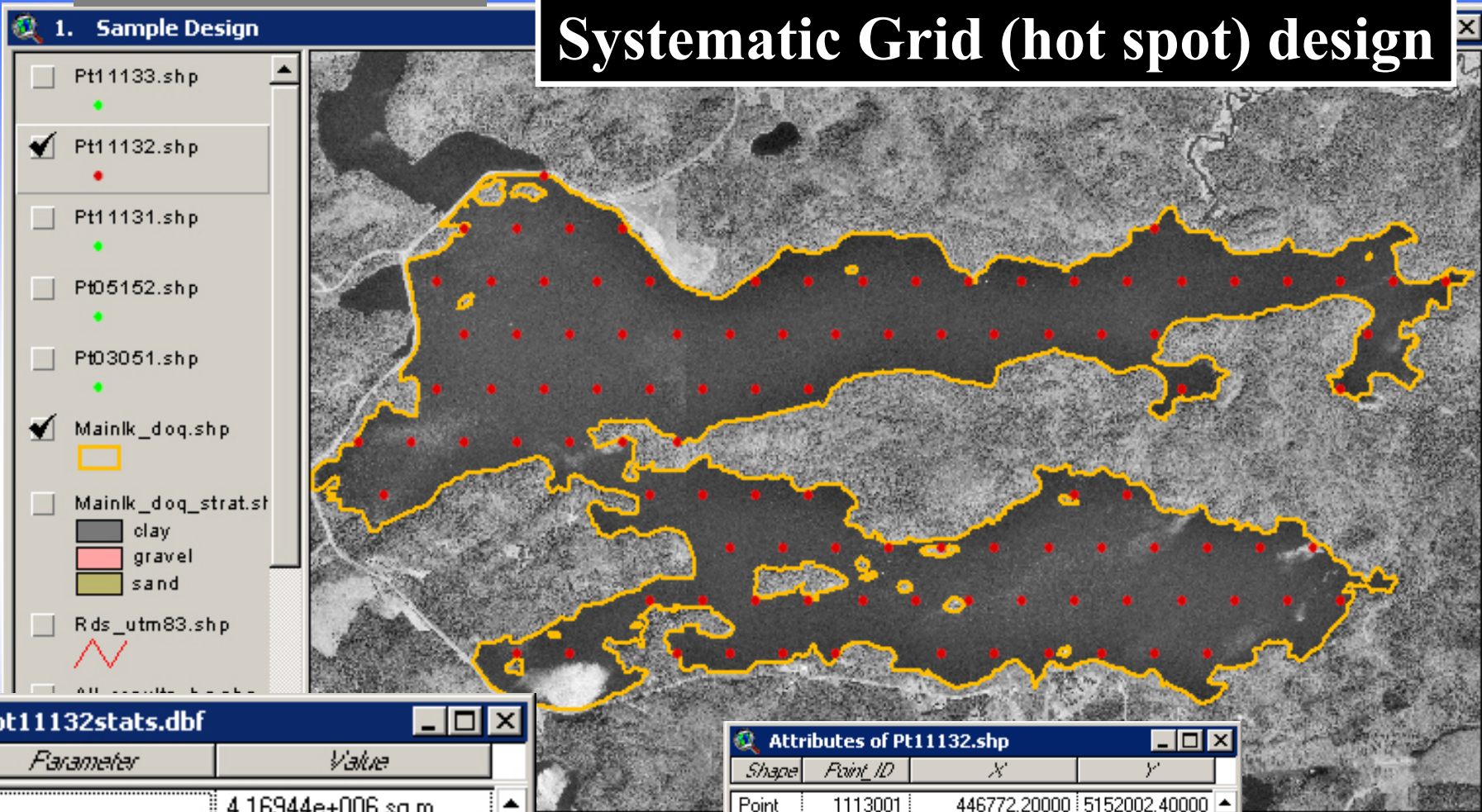
X coordinate field: X

Y coordinate field: Y

Buttons: Cancel, Convert

Sample Design

Systematic Grid (hot spot) design



Parameter	Value
Area	4.16944e+006 sq m
Sampling Grid	triangle
Hot Spot Shape	ellipse, ES=0.5
Hot Spot Size	L=159.3 m
Beta Level (%)	10
Dist between samples	204.2 m
# Sample Locations	102

Shape	Point_ID	X	Y
Point	1113001	446772.20000	5152002.40000
Point	1113002	446976.40000	5152002.40000
Point	1113003	447180.60000	5152002.40000
Point	1113004	447384.80000	5152002.40000
Point	1113005	447589.00000	5152002.40000
Point	1113006	447793.20000	5152002.40000
Point	1113007	447997.40000	5152002.40000
Point	1113008	448201.60000	5152002.40000
Point	1113009	448405.80000	5152002.40000
Point	1113010	448610.00000	5152002.40000
Point	1113011	448814.20000	5152002.40000

Database Querying

Database

- View FIELDS EDD
- Set Fields
- Duplicate Processing
- Query



FIELDS Query

Current project: Results.xls Open Project

Current path: E:\gis\projects\fields\DeerLake\samplers Set Default Path

Criteria

Site: All

Location: All

Matrix: Sediment

Parameter: Mercury in Sedimen

Select: Chemical name
 Analysis method

Units: mg/kg (dry)

Options

Treat Non-detects as 1.0 * Detection limit

Results >= 0.05

Samples collected

- Between [] and []
- Before []
- After []

Total

- All results
- Maximum result per location 3D
- Maximum result per location 2D
- Result per user defined interval 2D
- Maximum depth per location 2D

User Defined 2D Interval

Top: 0

Bottom: 3

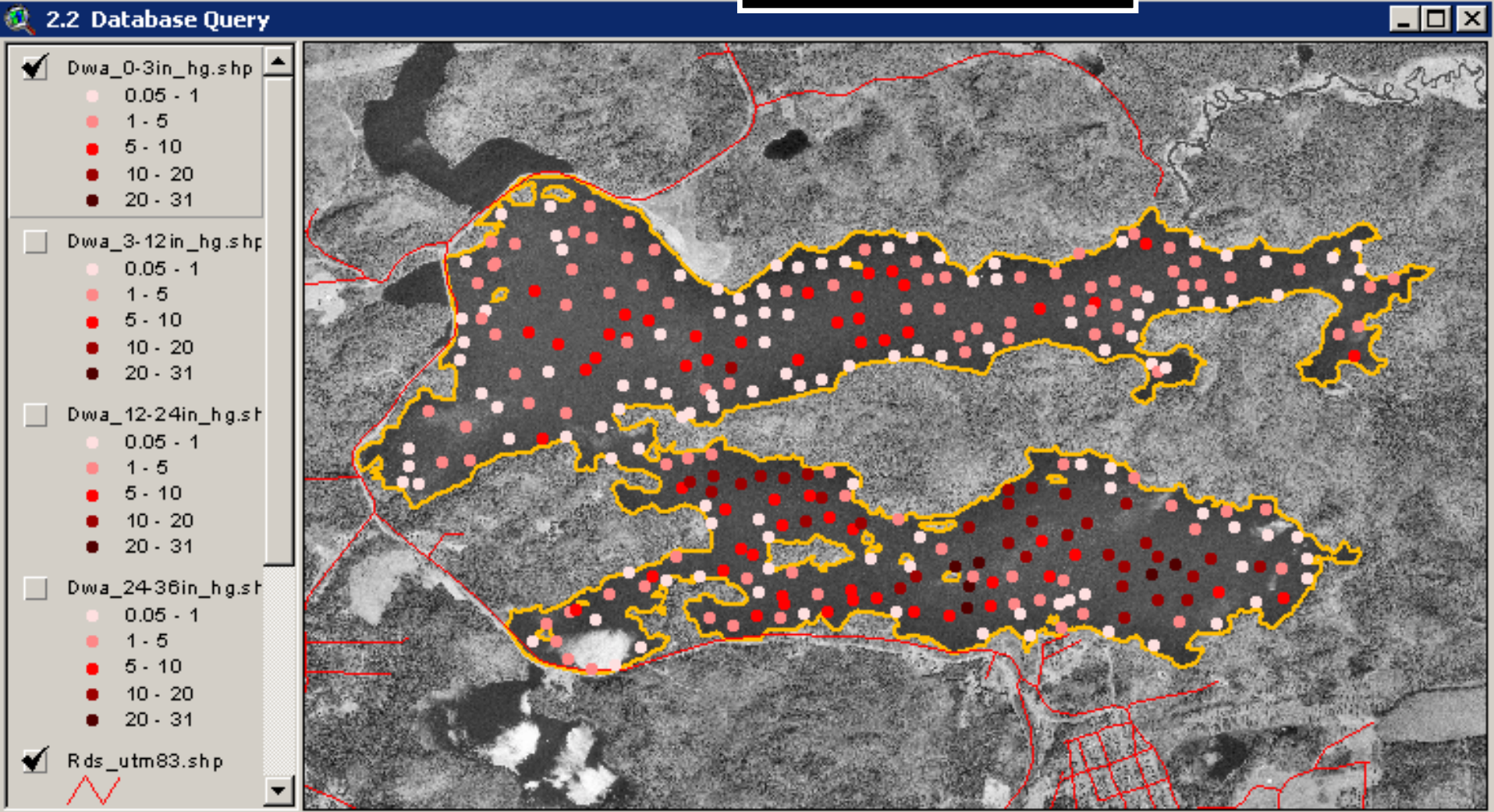
Result: Maximum All
 Depth weighted average

Query Exit

Database Querying

- Query a simple, “flat file” table from the following format:
 - *.mdb, *.dbf, *.xls, *.txt, *.csv
- Ability to import from:
 - Query Manager (NOAA)
 - STORET
 - EQuIS
 - others?

Interval query



Contamination Characterization

Cross Validation for IDW

- Modeling
- Log of Points
- Log 10 of Points
- Clip Grid from Polygon
- Merge Grids
- Magimum of Grids
- Anti-Natural Log of Grid
- Antilog Base 10 of Grid
- Cross Validation for IDW
- Natural Neighbor

Cross Validation for IDW

Power:

Neighbors:

Cell Size:

Area:

Cross Validation

Power:

Neighbors:

Start:

Finish:

Interval:

Minimum:

Maximum:

Interval:

Scattered:

Cross Validation for IDW

Cross validation report
 Standard Error Report for
 Polygon Theme: IDW_1.SHP
 Grid Cell Size: 10
 Minimum Error: 4.3269 (Power 2, Neighbor 7)

Print Date: May 14 2002
 Time: 09:28 PM

Neighbor	2	3	4	5	6	7	8
Power 2	5.0711	4.6978	4.4158	4.3689	4.3787	4.3269	4.3395
Power 3	5.2156	4.8742	4.6425	4.5951	4.5903	4.5530	4.5506
Power 4	5.3326	5.0272	4.8471	4.8108	4.8038	4.7796	4.7736
Power 5	5.4253	5.1539	5.0156	4.9903	4.9850	4.9700	4.9645
Power 6	5.4994	5.2583	5.1514	5.1338	5.1303	5.1212	5.1170
Power 7	5.5592	5.3451	5.2612	5.2486	5.2464	5.2408	5.2378
Power 8	5.6083	5.4181	5.3510	5.3416	5.3403	5.3368	5.3347

Retain the table used to create this report

Contamination Characterization

IDW Interpolation

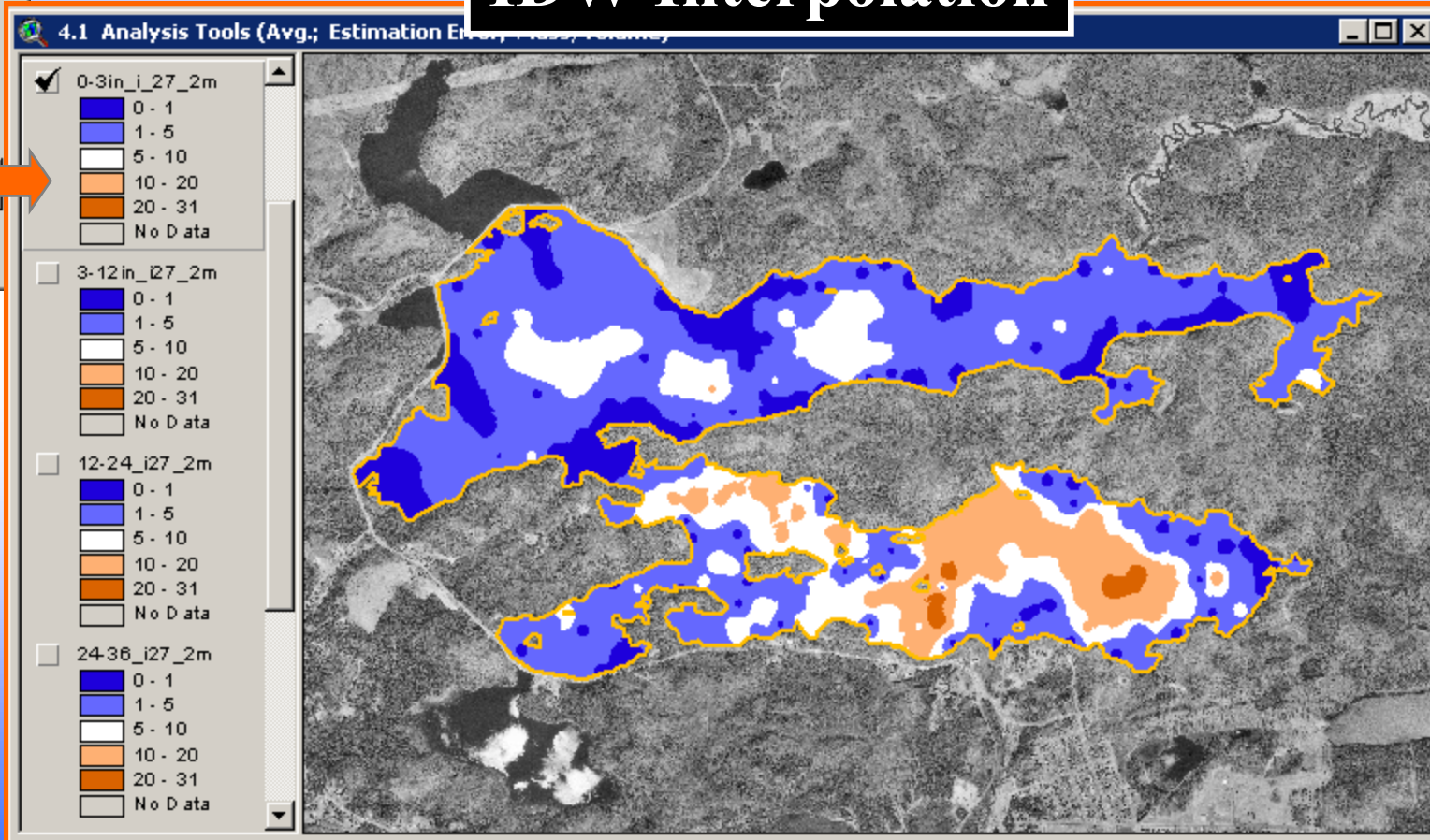
Cross Validation for IDW

Power

Neighbors

Cell Size

Area



Contamination Characterization

Natural Neighbor [X]

Range X Y

Minimum 445449 5151570

Maximum 449949 5153650

Number of Cells 450 208

Options

Extrapolation

Set Negatives to Zero

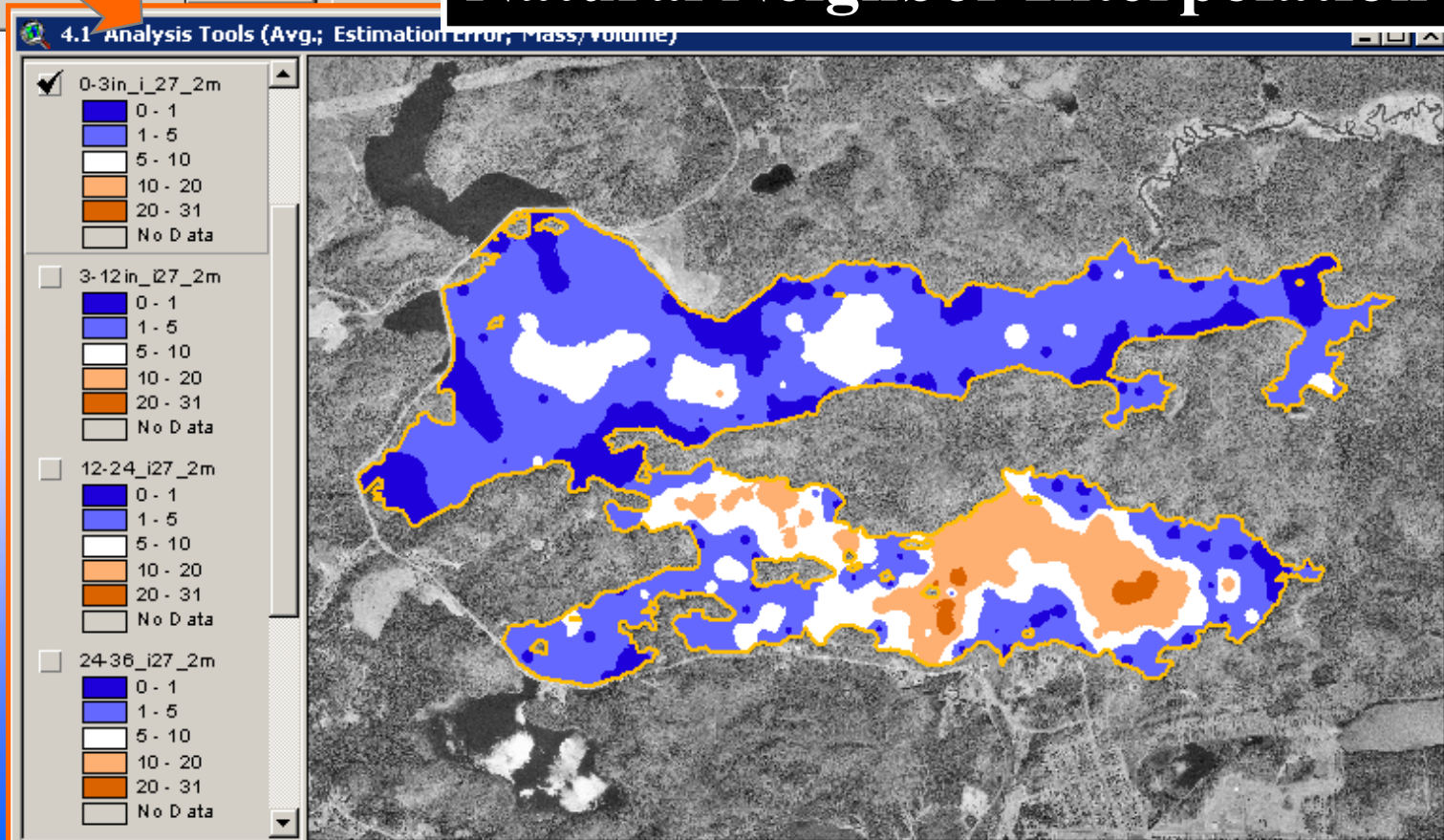
Allow Nulls

Cell Size

Grid Cell Size 10

Grid Exit

Natural Neighbor Interpolation



Contamination Characterization

Mass/Volume

- Analysis Tools
- Average of Grid
- Estimation Error
- Mass/Volume**
- Remediation
- Ecological Risk Assessment
- Human Health Risk Assessment

Mass and Volume

Contamination by Interval

Select Interval Grids: Concentration Units:

Top Depth: Depth Units:

Bottom Depth:

0-3in_i27_2m	0-3
3-12in_i27_2m	3-12
12-24_i27_2m	12-24
24-36_i27_2m	24-36

Total Depth Grid: Depth Units:

Concentration Ranges

Min Concentration: Units:

Max Concentration:

0-5
5-31

Sediment/Soil Density

Dry Density (lb/yd3)

Wet Density (lb/yd3)

% Solids:



Contamination Characterization



Mass/Volume

MassVol Report

Mass / Volume Report

MASS-VOLUME REPORT for

Grid Themes:

Grid: "0-3in i 27 2m" (Bottom = "Thick 2 (feet)")

Grid: "12-24 i27 2m" (Bottom = "Thick 2 (feet)")

Grid: "24-36 i27 2m" (Bottom = "Thick 2 (feet)")

Grid: "3-12in i27 2m" (Bottom = "Thick 2 (feet)")

Print Date: May 14 2002

Time: 04:48 PM

Grid Name	Top Depth	Bottom Depth	Min. Conc.	Max. Conc.	Density	Volume (cu yd)	Mass (lbs)
0-3in i 27 2m	0.00	0.25	0	5	2000	260378.16828	1162.82131
	0.00	0.25	5	31	2000	116660.77048	2228.26864
Subtotals:						377038.93876	3391.08995
12-24 i27 2m	1.00	2.00	0	5	2000	853318.44866	1578.24701
	1.00	2.00	5	31	2000	95786.08660	1617.64344
Subtotals:						949104.53526	3195.89045
24-36 i27 2m	2.00	3.00	0	5	2000	560850.88243	737.65015
	2.00	3.00	5	31	2000	9736.89269	125.63028
Subtotals:						570587.77512	863.28043
3-12in i27 2m	0.25	1.00	0	5	2000	917601.37645	1706.72520
	0.25	1.00	5	31	2000	105192.93805	2313.47934
Subtotals:						1022794.31450	4020.20454
GRAND TOTALS:						2919525.56364	11470.46536

Print

Save Text

Close

Retain the table used to create this report

Remediation scenarios

- Analysis Tools
- Average of Grid
- Estimation Error
- Mass/Volume
- Remediation**
- Ecological Risk Assessment
- Human Health Risk Assessment



Remediation

Select remediation theme Units

Please select a remediation tool

Block-based remediation tool

Removal concentration

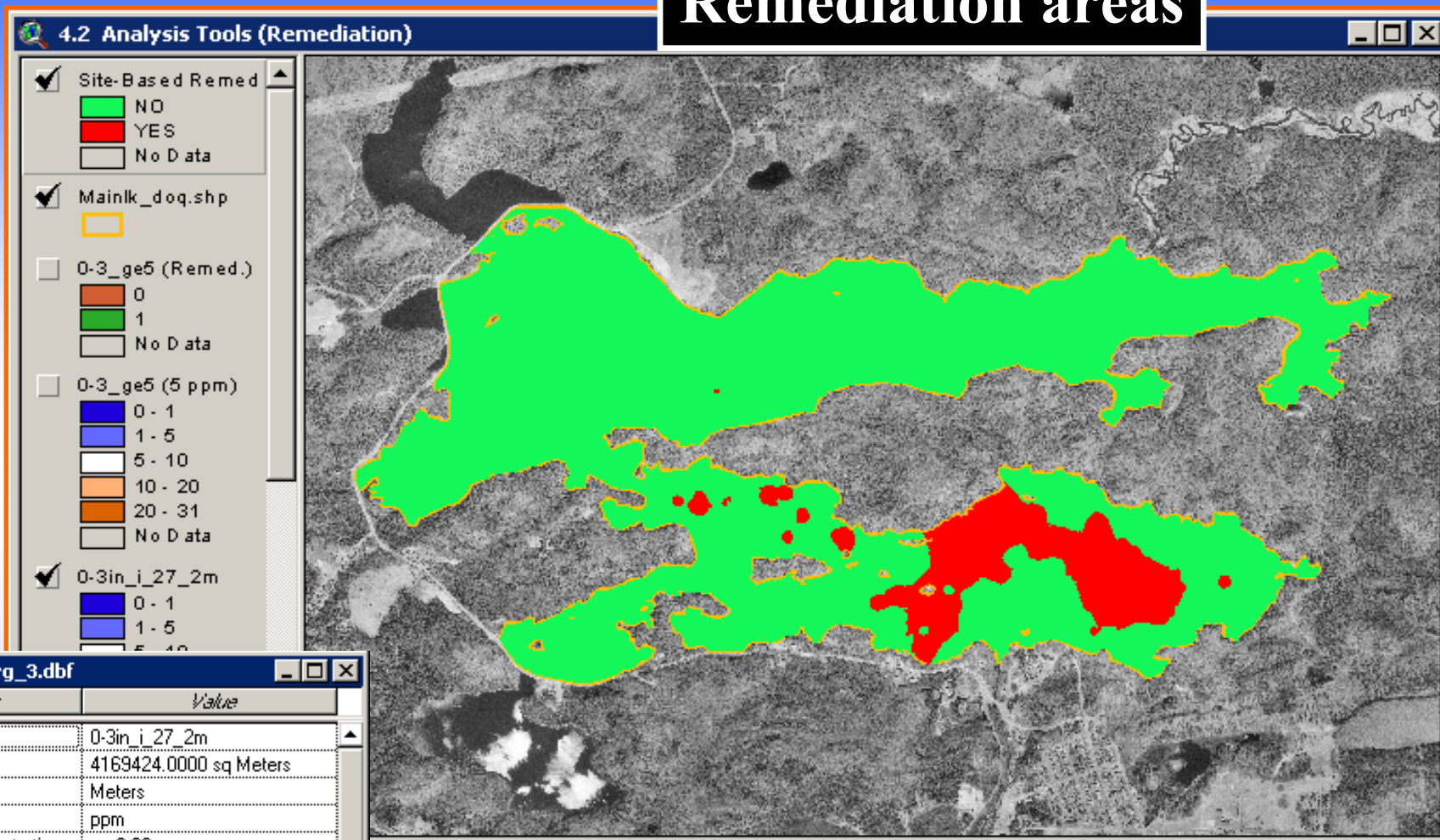
Expected fill concentration ppm

Site-based remediation tool

Site-based clean up goal ppm

Expected fill concentration ppm

Remediation areas

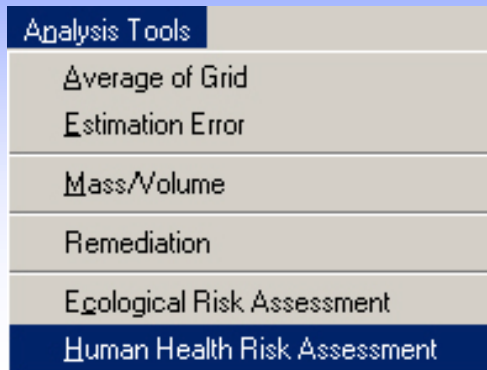


Parameter	Value
The Grid	0-3in_i_27_2m
The Area	4169424.0000 sq Meters
Area Units	Meters
Concentration Units	ppm
Cleanup Goal Concentration	<= 3.00
Expected Fill Concentration	0.5
Pre-Remediation Max	30.996
Pre-Remediation Conc.	4.4054
Post-Remediation Max	10.398
Post-Remediation Conc.	3.0000
Area Remediated	431543.0000
Percent Area Remediated	10.3502 %

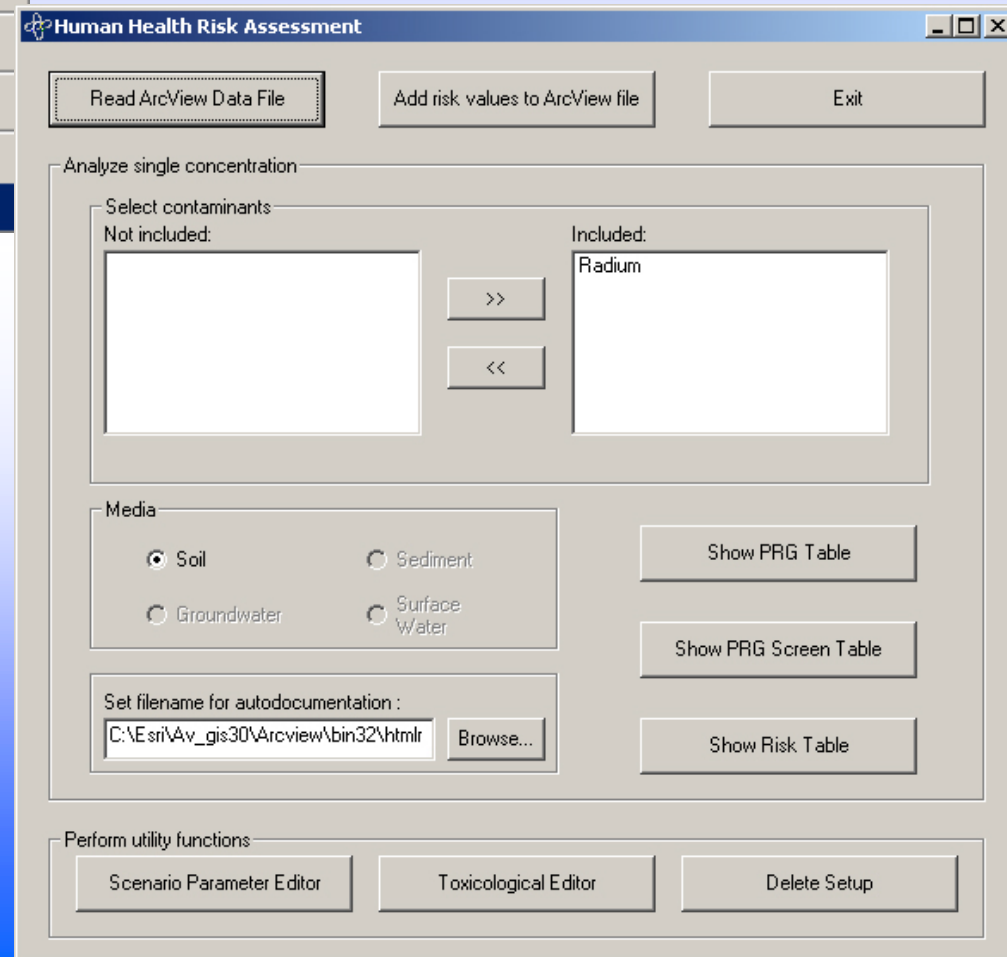


Human Health Risk Assessment

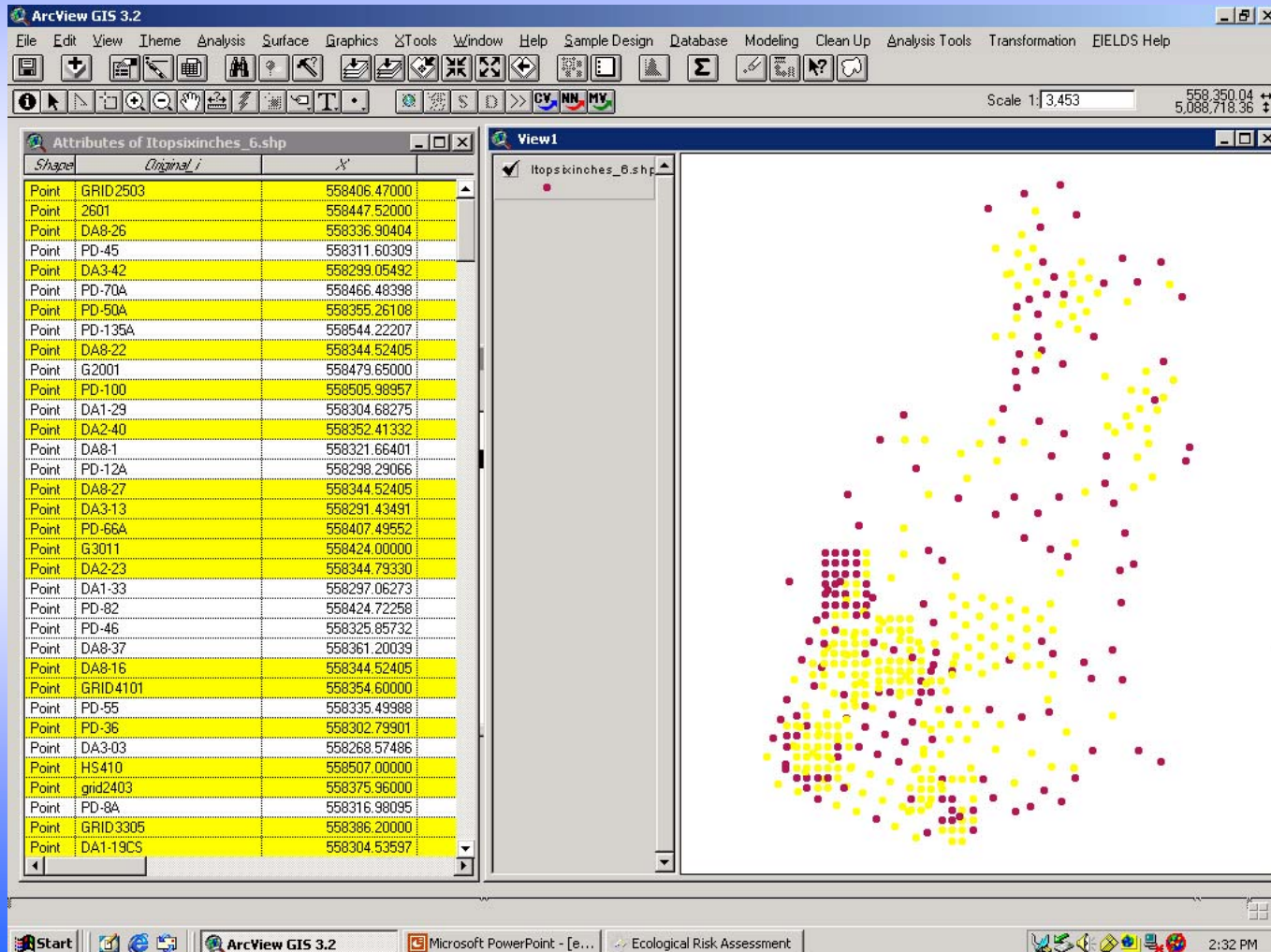
- estimate human health risks from exposure to pollutants



- select one or more contaminants
- select medium (e.g., soil)
- estimate PRG (preliminary remediation goals) or human health risk (IRIS DB)
- edit scenario or toxicological values



PRG Exceed Map





Human Health Risk Assessment

Risk table output

- estimated cancer risk from exposure to Radium-228 in soil for different pathways

The screenshot shows a software window titled "Human Health Risk Results". The interface includes a toolbar with various icons and a "Pathways" section with several checked options: Ingestion, Inhalation, External, Vegetables, Dairy, Beef, and All. Below this is a table titled "Rads/Soil/Residential/Carcinogenic" with columns for Name, CAS, Ingestion, Inhalation, External, Vegetables, Milk, Beef, and All. The table contains two rows: one for Ra-228 and one for the Total risk.

Name	CAS	Ingestion	Inhalation	External	Vegetables	Milk	Beef	All
Ra-228	15262201	9.3E-5	2.7E-8		1.E-2	1.4E-3	1.1E-4	1.2E-2
Total		9.3E-5	2.7E-8		1.E-2	1.4E-3	1.1E-4	1.2E-2

Ecological Risk Assessment

Uses sample values to identify locations or areas of a site that exceed or are predicted to exceed selected benchmarks (thresholds)

- Data screening
- Probability maps

Follows Ecological Risk Assessors Forum (ERAF) guidelines

The module is based on calculations and benchmark values developed for Spatial Analysis and Design Assistance (SADA). For further information go to <http://www.tiem.utk.edu/~sada>

Ecological Risk Assessment

Show Benchmark Screens

Enter Concentration

Contaminants

Select each contaminant in listbox, below, then enter a representative concentration for that contaminant in the text field to the right:
(To use default values just press OK)

Default values:

95% upper confidence level of mean results in data file

Maximum of results in data file

Aroclor-1254
Arsenic, Inorganic
Barium
Benz[a]anthracene
Beryllium and Compounds
Cadmium
Methylene Chloride
Trichlorobenzene, 1,2,4-
Trichloroethylene

Concentration:

Clear selection (left)

OK Cancel

Surface Water Ecological Benchmark Screening Results

Freshwater Benchmarks

Canadian WQG LCV Aquatic Plants

EC20 Daphnids LCV Daphnids

EC20 Fish LCV Fish

EC20 Sensitive Species LCV Non-Daphnid Inverts

EC25 Bass Population NAWQC- Acute

EPA R4- Acute NAWQC- Chronic

EPA R4- Chronic Tier II SAV

EPA R5 ESL Tier II SCV

Benchmark information is from version 2.1. Dated 8/20/2001.

Water Analysis Type

Total

Dissolved

Surface Water Constants

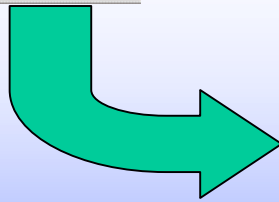
Hardness

pH

Recalculate

Bolded cell contents are a function of water type, hardness, and/or pH.

Analyte	Concentration	Units	EPA R5 ESL
Benz[a]anthracene	3.29234820641	mg/L	Yes
Methulene chloride	3.29234820641	mg/L	Yes
Trichloroethylene (TCE)	3.29234820641	mg/L	Yes
1,2,4-Trichlorobenzene	3.29234820641	mg/L	Yes
Arsenic	3.29234820641	mg/L	Yes
Barium	3.29234820641	mg/L	No
Beryllium	3.29234820641	mg/L	Yes
Cadmium	3.29234820641	mg/L	Yes
PCB-1254	3.29234820641	mg/L	

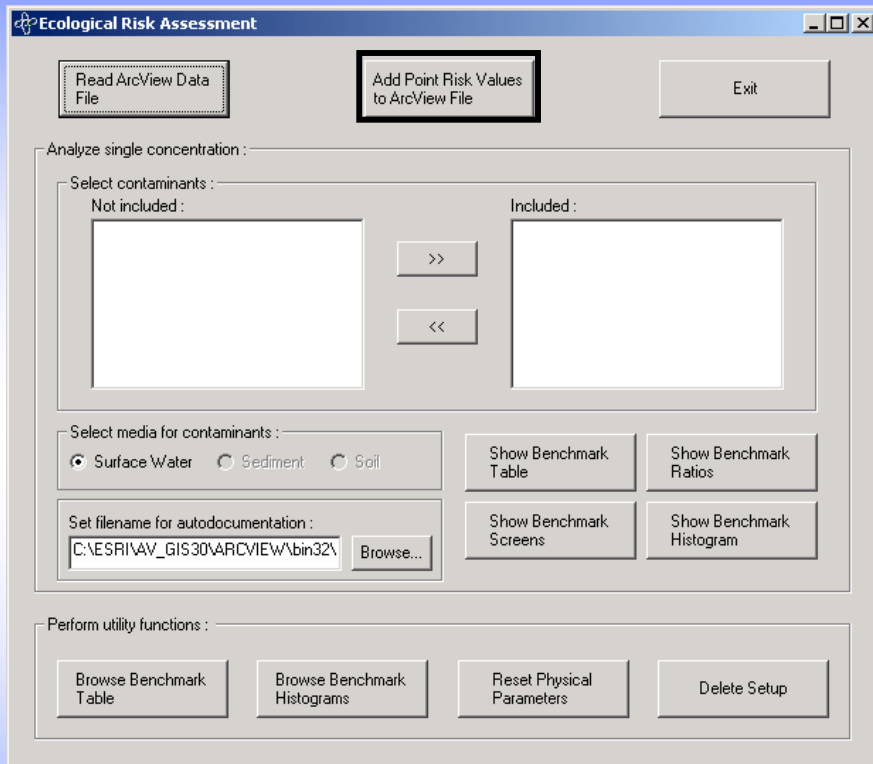


Benchmark is compared to either the 95% upper confidence level or the maximum of results in your data file.

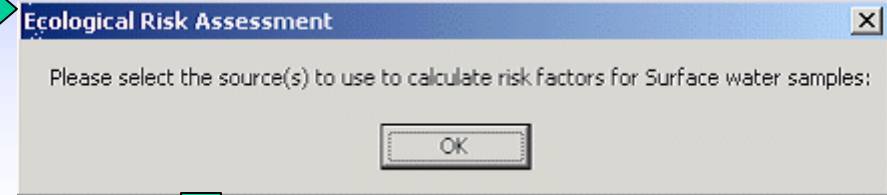
Screening results will show "Yes" if the concentration exceeds the benchmark, "No" if the concentration is less than the benchmark, and a blank cell if there is no benchmark for that contaminant-benchmark combination.

Ecological Risk Assessment

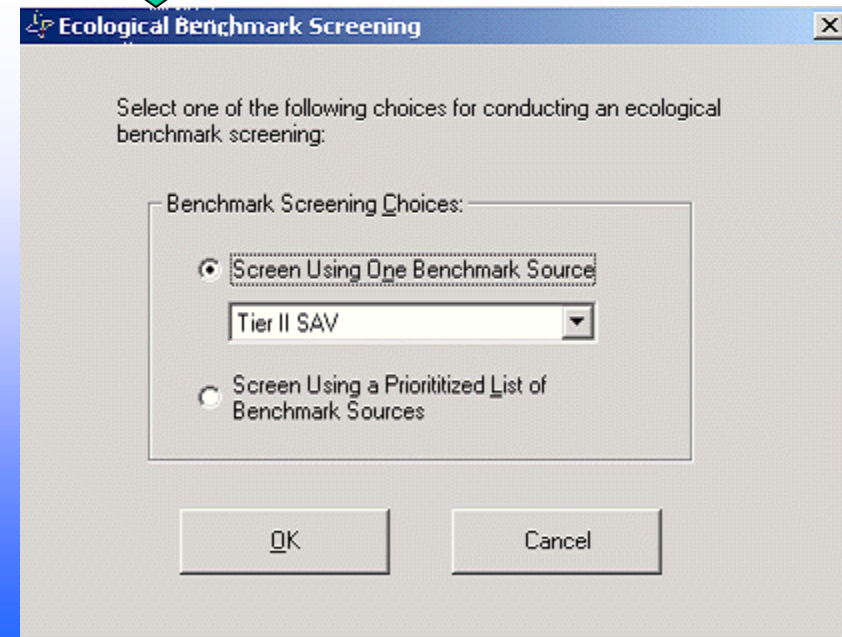
Spatial Ecological Benchmark Screening



The main window of the Ecological Risk Assessment software. It features several sections: 'Read ArcView Data File' and 'Add Point Risk Values to ArcView File' buttons at the top; 'Exit' button; 'Analyze single concentration' section with 'Select contaminants' (Not included and Included lists with >> and << arrows); 'Select media for contaminants' (Surface Water, Sediment, Soil radio buttons); 'Show Benchmark Table', 'Show Benchmark Ratios', 'Show Benchmark Screens', and 'Show Benchmark Histogram' buttons; 'Set filename for autodocumentation' with a text field and 'Browse...' button; and 'Perform utility functions' section with 'Browse Benchmark Table', 'Browse Benchmark Histograms', 'Reset Physical Parameters', and 'Delete Setup' buttons.



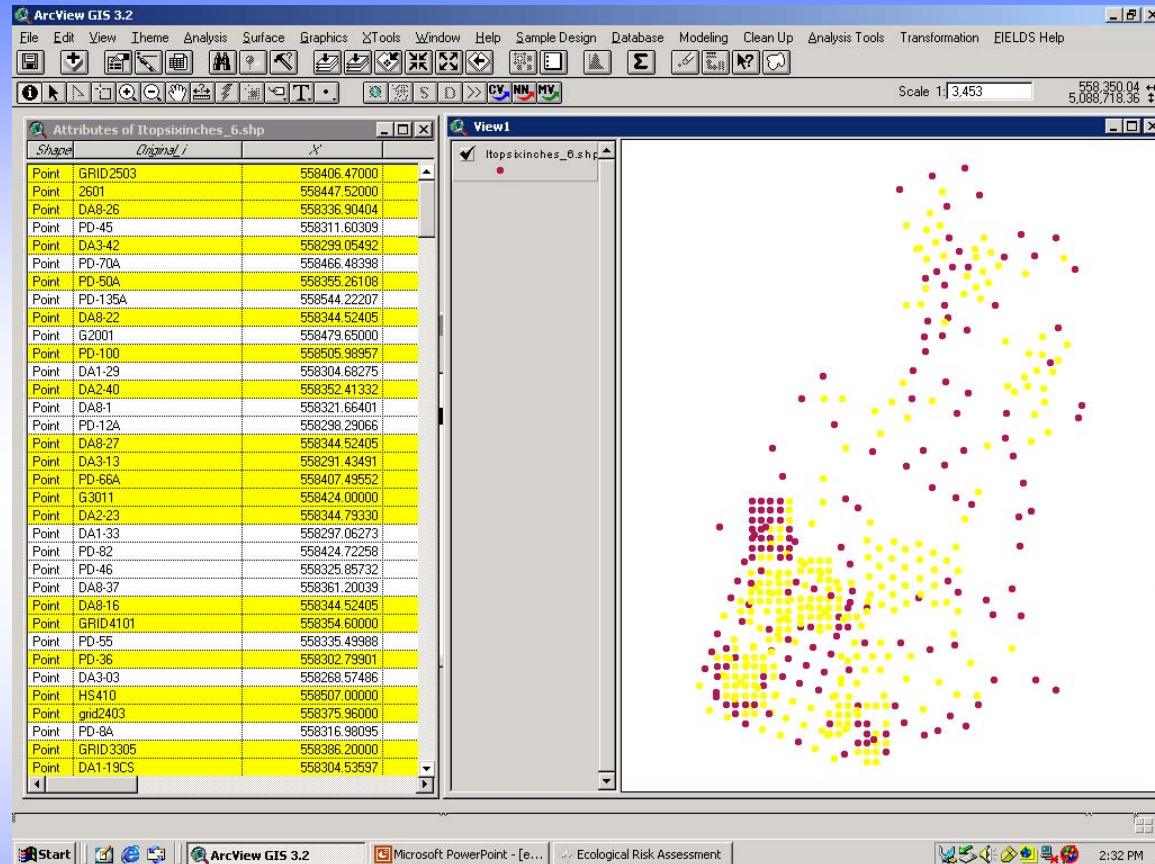
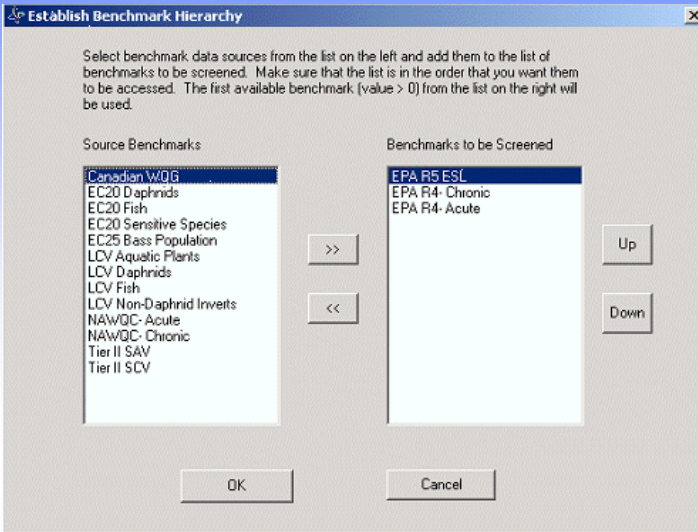
A dialog box titled 'Ecological Risk Assessment' with the text: 'Please select the source(s) to use to calculate risk factors for Surface water samples:'. It contains an 'OK' button.



A dialog box titled 'Ecological Benchmark Screening' with the text: 'Select one of the following choices for conducting an ecological benchmark screening:'. It contains a section 'Benchmark Screening Choices:' with two radio buttons: 'Screen Using One Benchmark Source' (selected) and 'Screen Using a Prioritized List of Benchmark Sources'. Below the first radio button is a dropdown menu showing 'Tier II SAV'. At the bottom are 'OK' and 'Cancel' buttons.

Allows the user to assign risk values on a point by point basis and view the results in ArcView

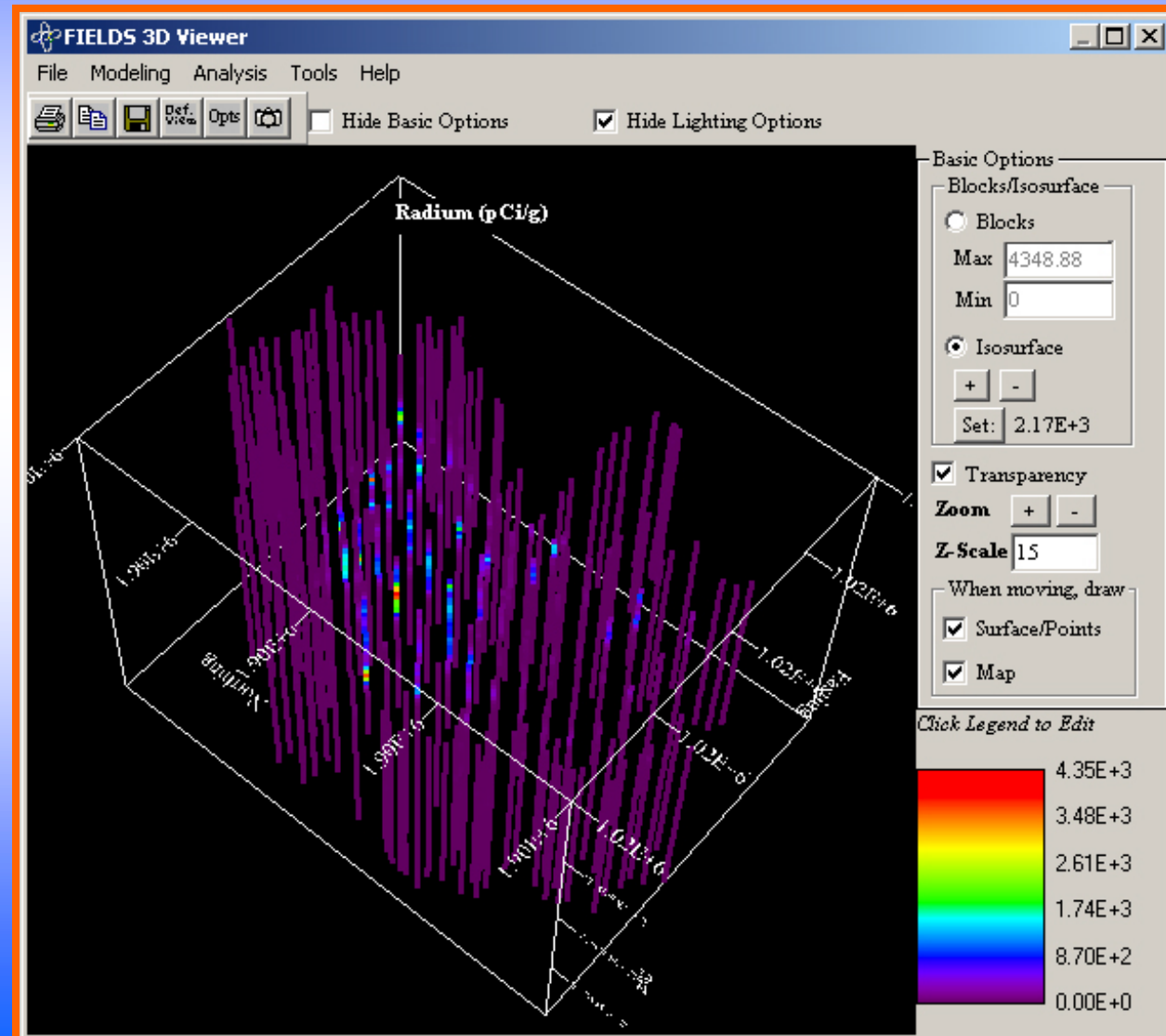
Ecological Risk Assessment



Highlights locations that exceed the selected benchmark

3D Viewer (Beta)

Created by the
FIELDS and
SADA
development teams



Overview

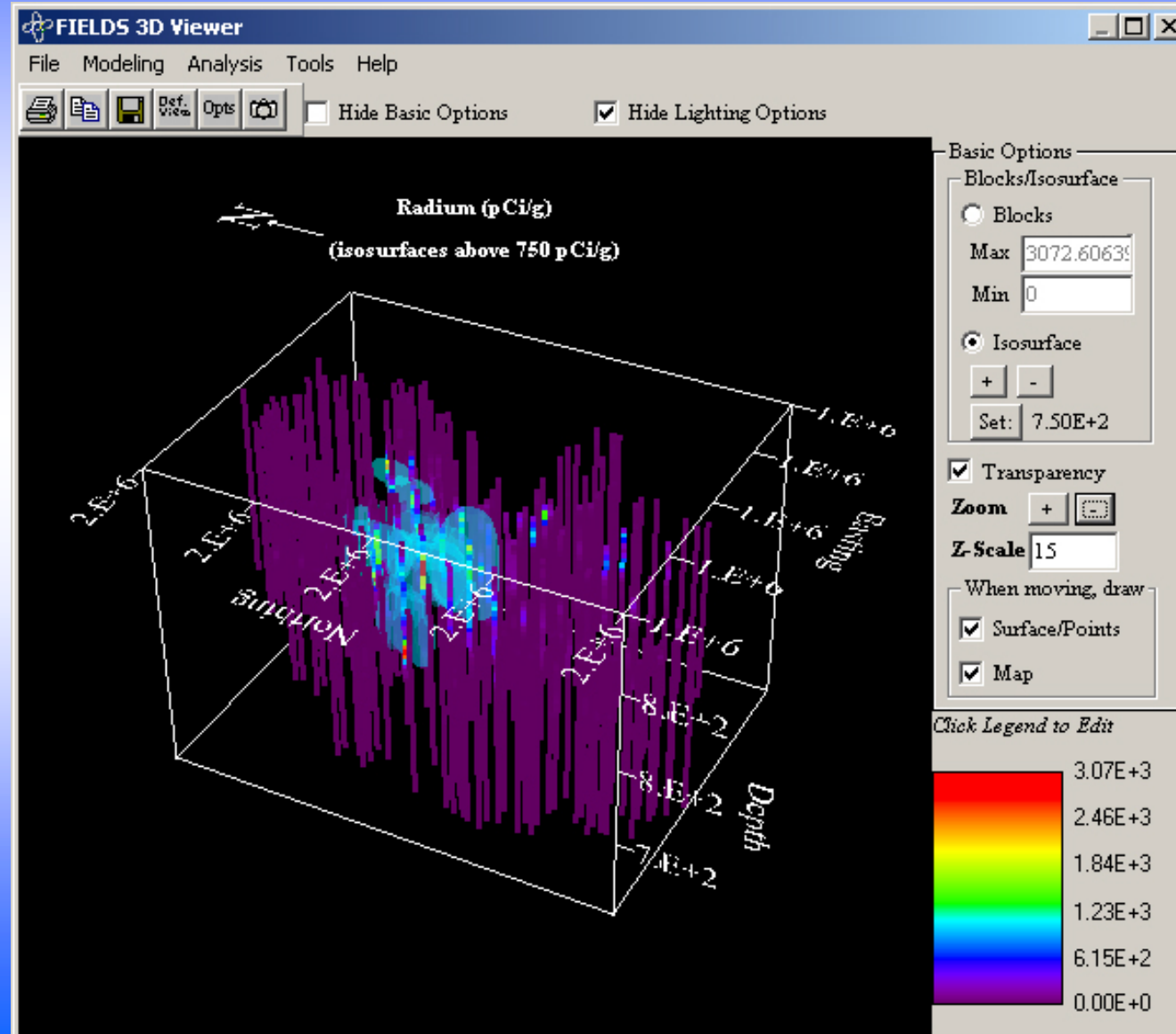
Current Capabilities:

- viewing of point, line, and polygon files
- 3D interpolation (IDW) and viewing of resulting 3D grid as “blocks” or “isosurfaces”
- estimation of volume and mass
- view editing functions (e.g., zoom, transparency, point size)
- import ArcView shapefiles
- import 2D ArcView grid
- 2D Natural Neighbor interpolation
- clipping (top, bottom, and lateral)
- 3D-grid slicing and export to ArcView
- cross-section creation
- polygon builder tool

Modeling

3D IDW grid:

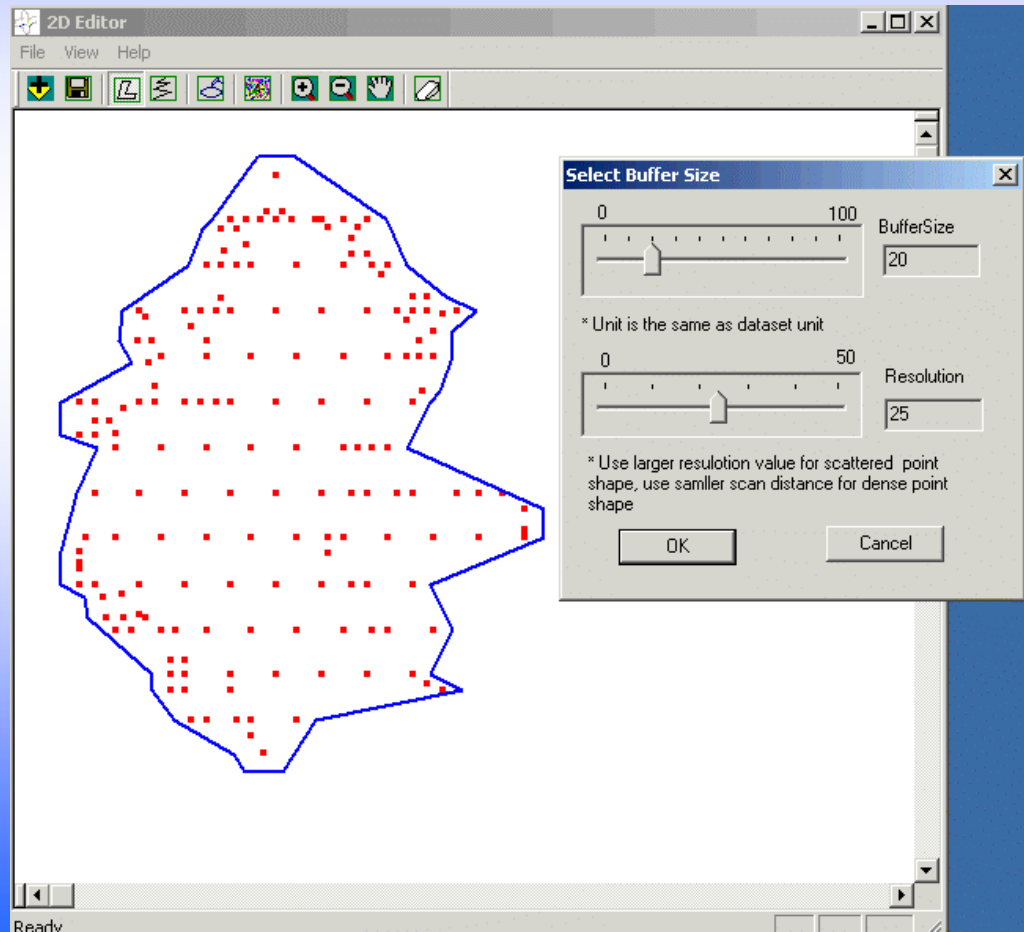
- isosurfaces of interpolated (gridded) Radium values
- original data as points



2D Editor

Create Polygon boundary

Used for interpolation constraints



3D Clipping

FIELDS 3D Viewer

File Modeling Analysis Tools Help

3D Inverse Distance Weighting Options Hide Lighting Options

Clip Polygon
Slicing Above 2D Surface Below 2D Surface
Fence Diagram Unclip

deer25x25x1.idw

Basic Options

Blocks/Isosurface

Blocks

Max: 20.001217
Min: 2

Isosurface

+ -
Set: 1.00E+0

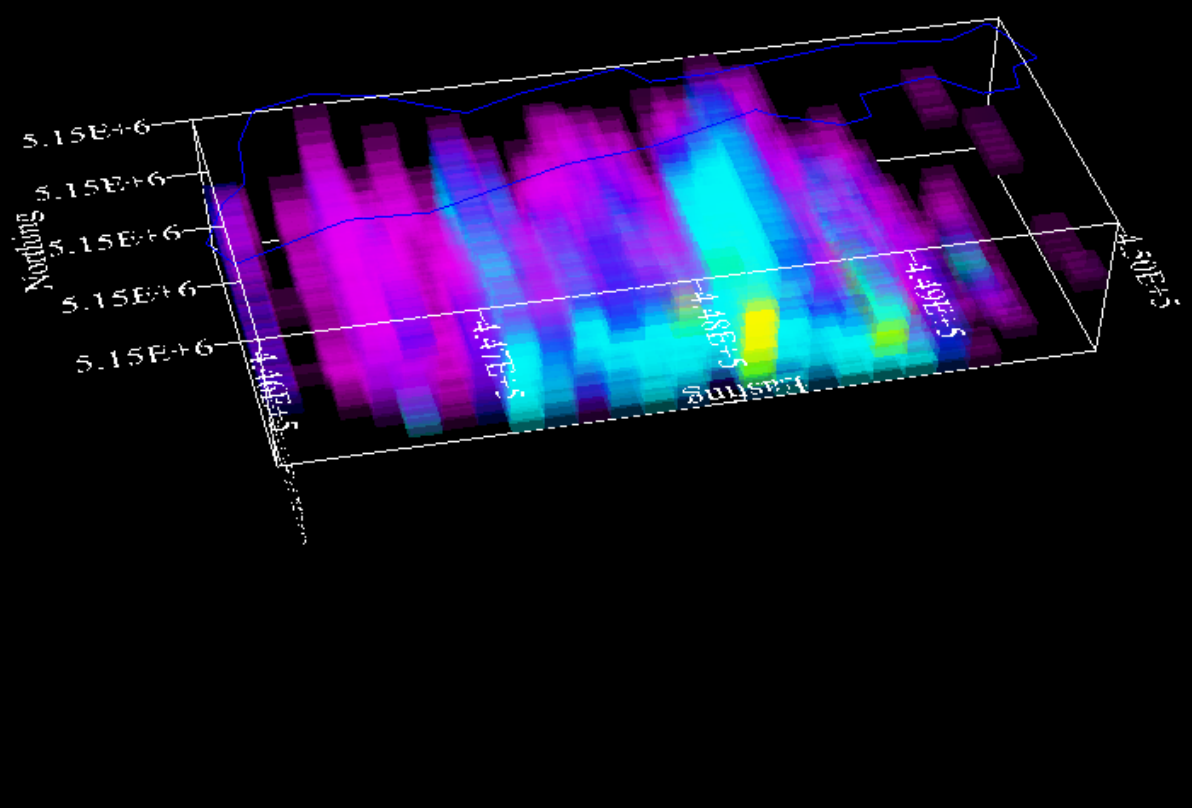
Transparency

Zoom + -
Z-Scale 100

When moving, draw

Surface/Points
 Map

Click Legend to Edit



5.15E+6
5.15E+6
5.15E+6
5.15E+6
5.15E+6

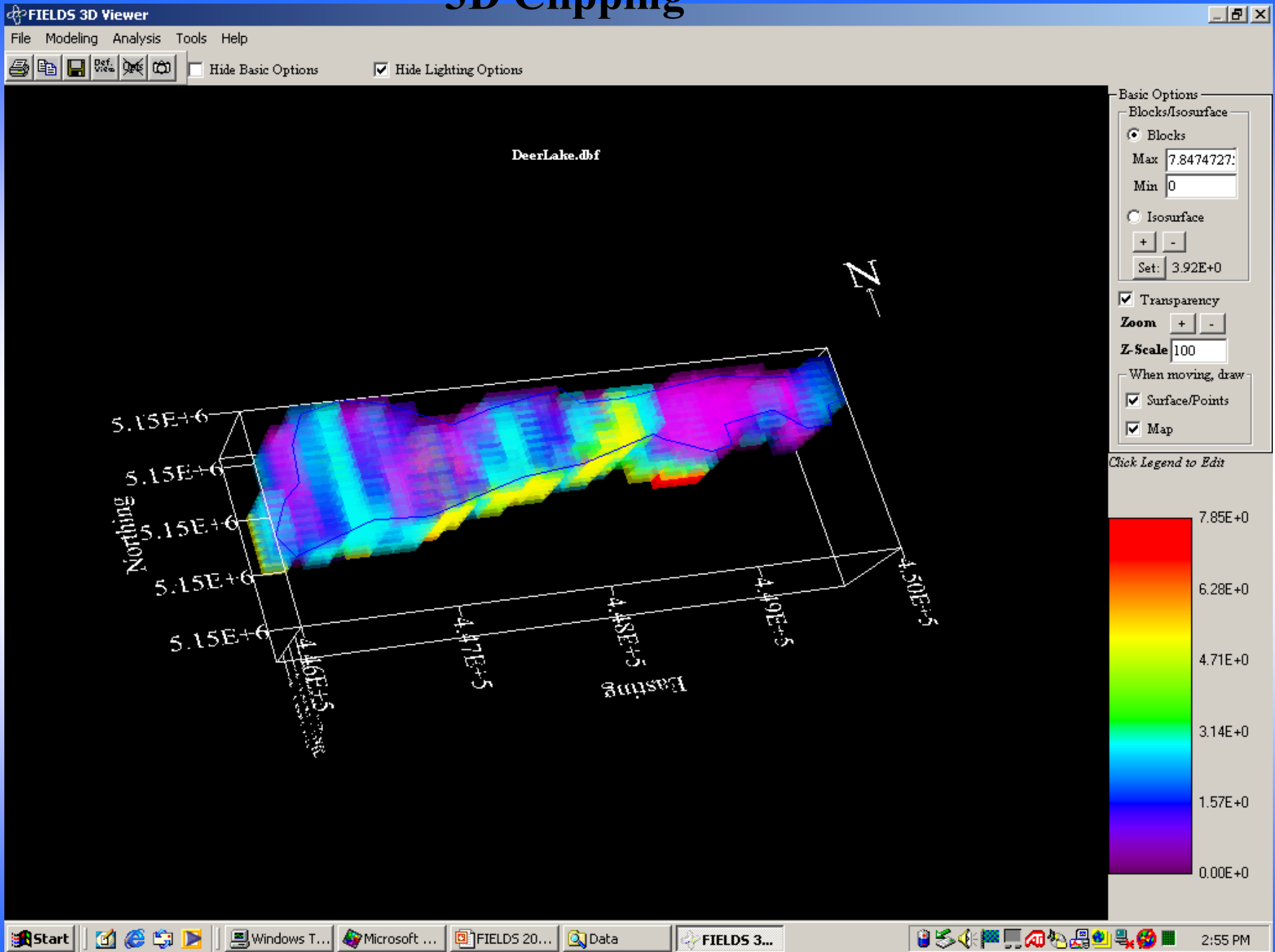
4.47E+5
4.47E+5
4.47E+5
4.47E+5
4.47E+5

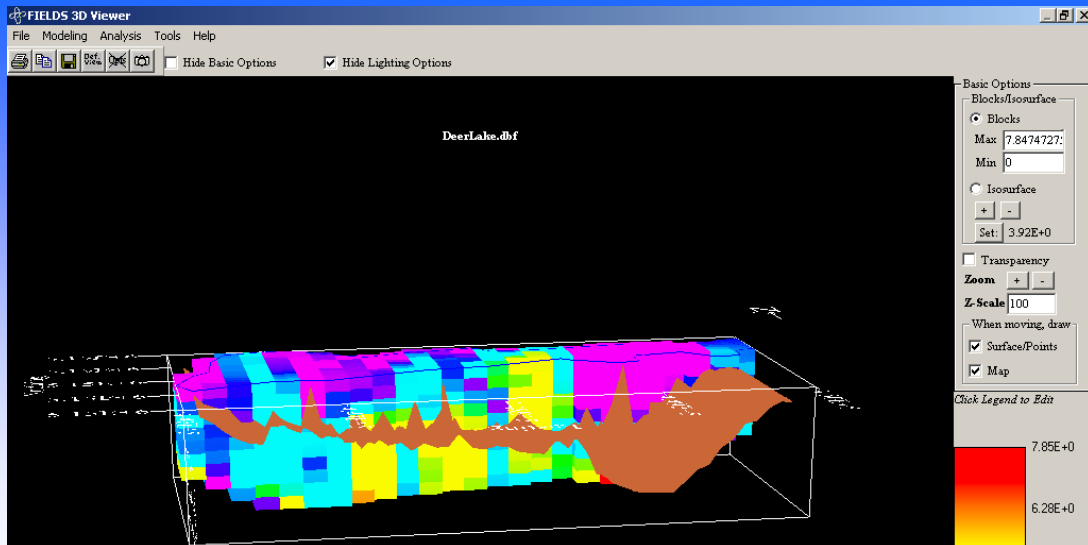
2.10E+5
2.10E+5
2.10E+5
2.10E+5
2.10E+5

2.00E+1
1.60E+1
1.20E+1
8.00E+0
4.00E+0
0.00E+0

Start | Windows T... | Microsoft ... | FIELDS 20... | Data | FIELDS 3... | 2:53 PM

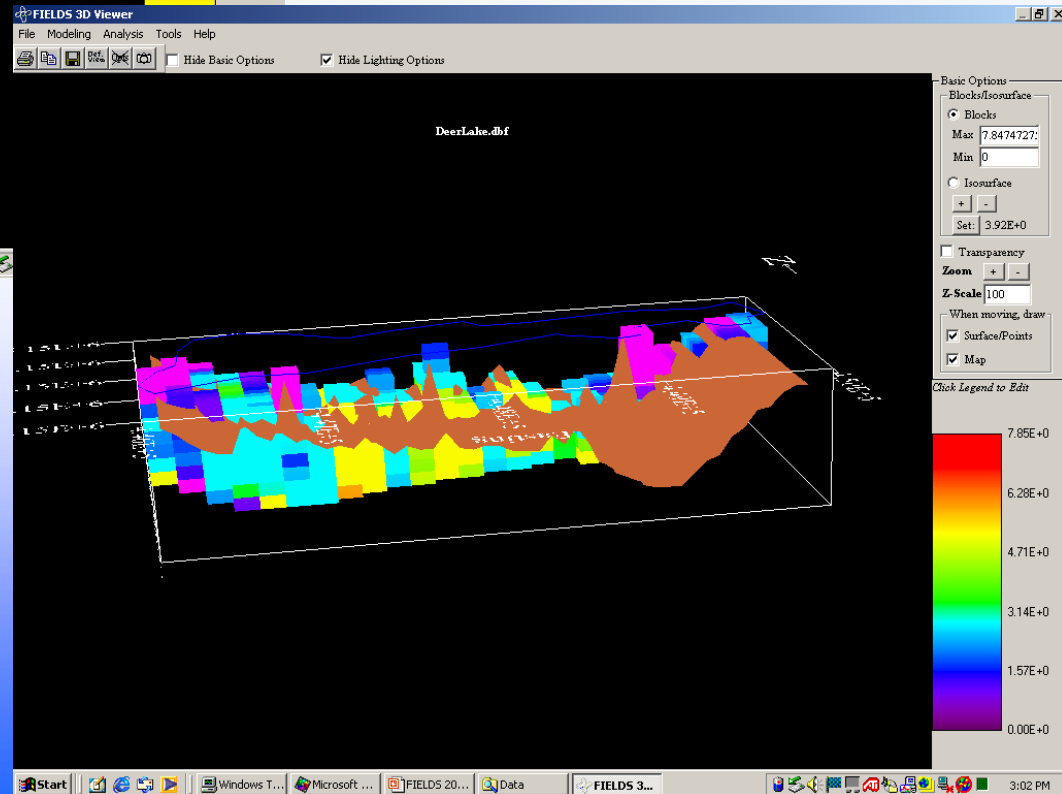
3D Clipping



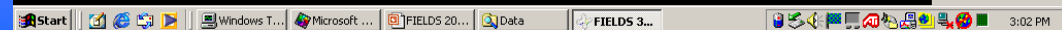


Before top clip

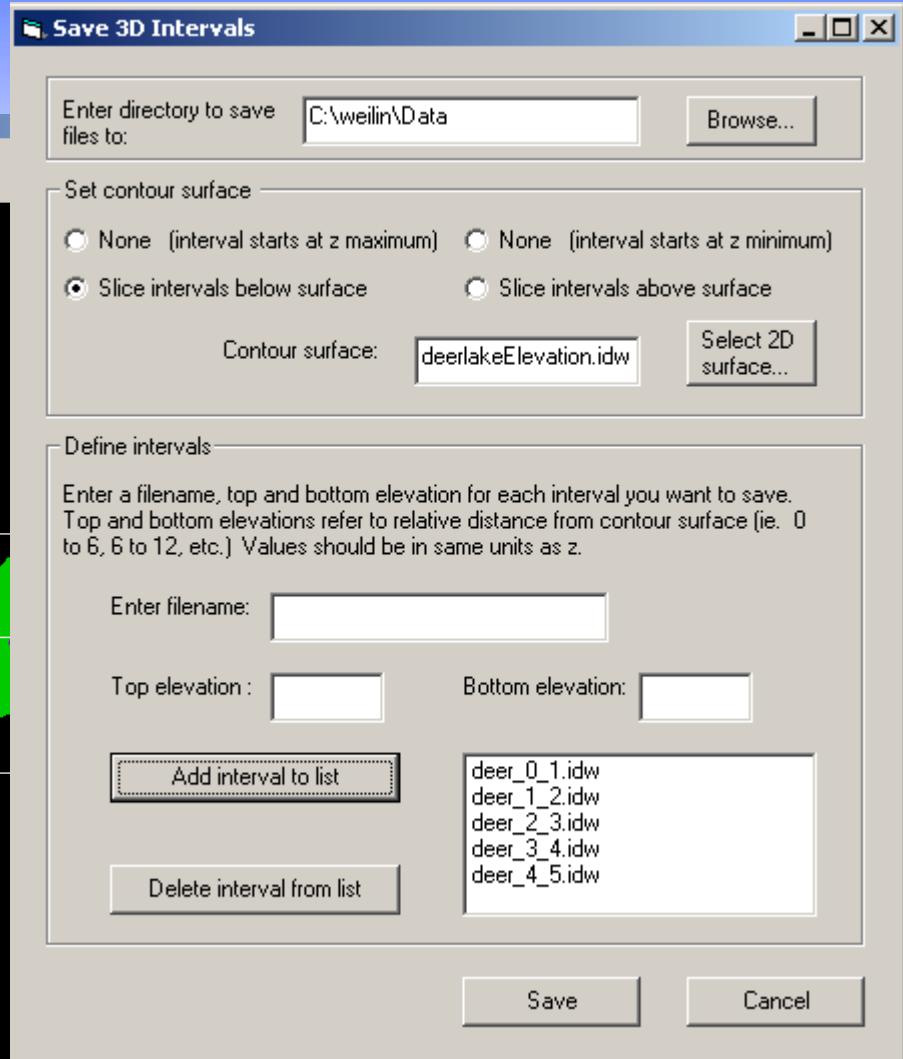
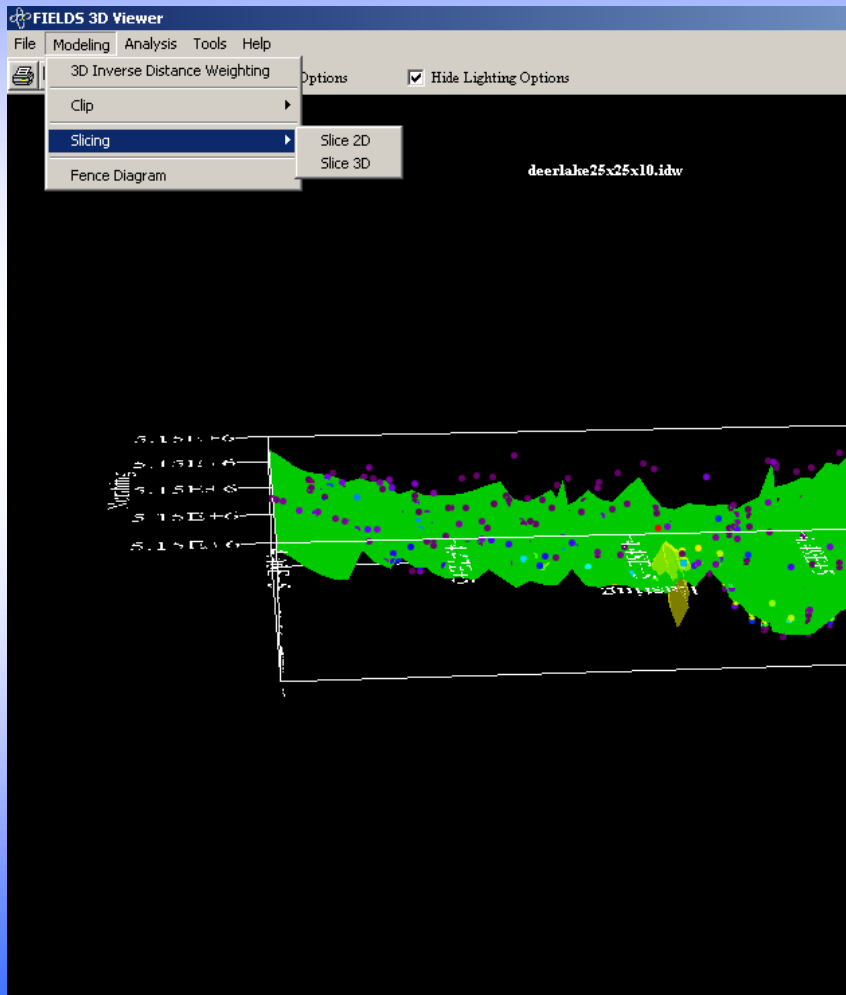
Elevation, aquifer, refusal layer



After top clip



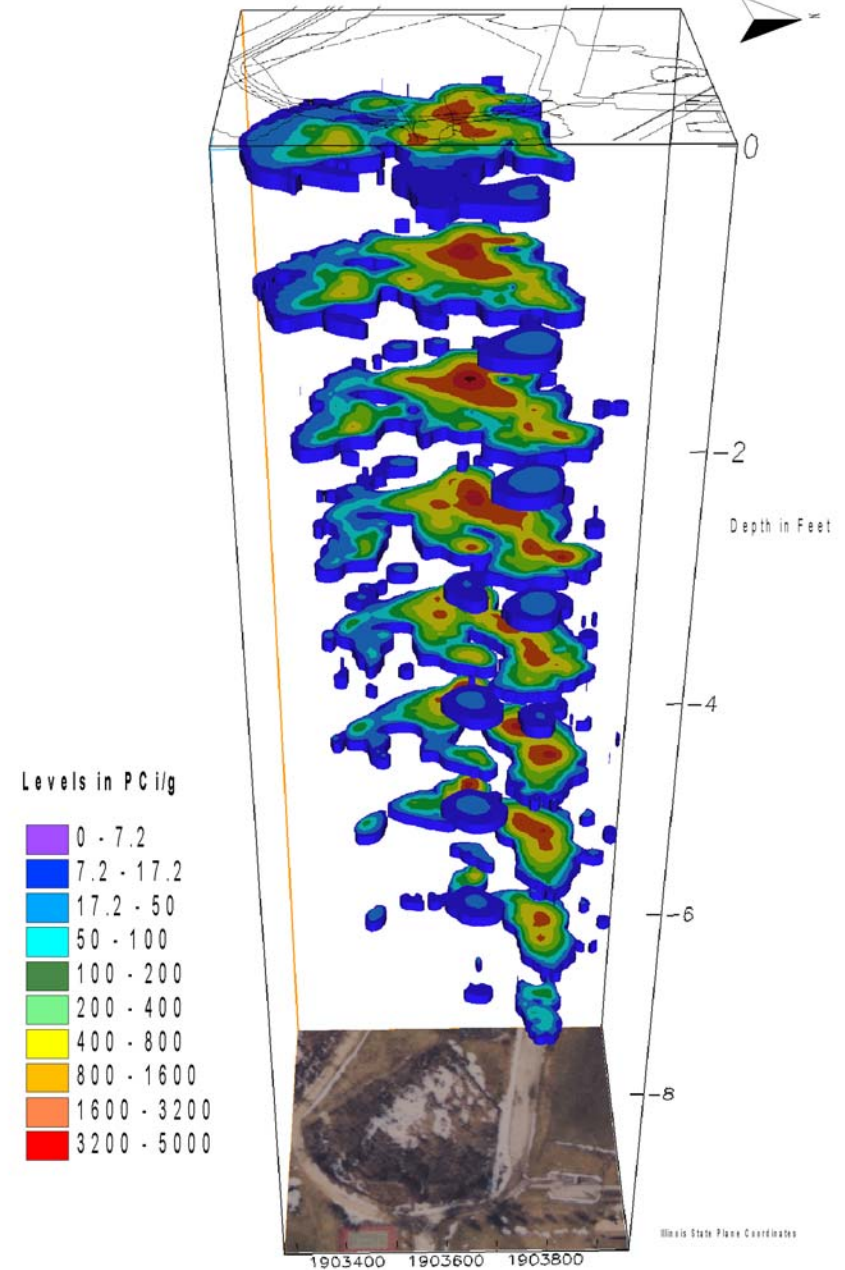
3D Slicing



2D Slices

ArcView ASCII Grids

FIELDS IDW format



FIELDS Tools: Download

Web address:

www.epa.gov/region5fields



Software Documentation and Verification

- Funded by OERR (\$160,000 FY01)
- Internal
 - FIELDS & SADA
 - System Test Plans
 - System error documentation and fixes
 - Program documentation
- External Peer Review Agency Process

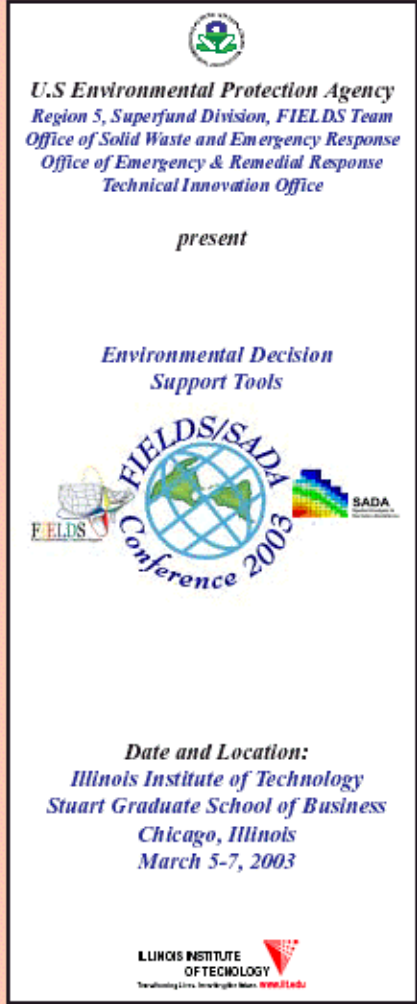
FIELDS 2002 Development

- External Peer Review in Progress
 - Completion next week
 - Purdue University (Dr. Bernie Engel)
 - Modeling, analysis, and 3D viewer
 - Dr. John Kern (statistician)
 - Sample design
 - Modeling Tools
 - Altech Environmental
 - Modeling and Analysis Tools
 - 3D Viewer
 - Amy Mucha
 - Human Health and Eco Risk Modules

FIELDS 2003 Conference

“Environmental Decision Support Tools”

- March 5th – 7th, 2003 in Chicago
 - Web registration
 - www.epa.gov/region5fields
 - Two four hour training sessions
 - FIELDS
 - SADA
 - Visual Sample Plan
 - FormsII Lite (sample chain of custody)
 - Storet
 - Query Manager



The poster is for the FIELDS/SADA Conference 2003. At the top, it features the U.S. Environmental Protection Agency logo and the text: "U.S. Environmental Protection Agency, Region 5, Superfund Division, FIELDS Team, Office of Solid Waste and Emergency Response, Office of Emergency & Remedial Response, Technical Innovation Office". Below this, it says "present" and "Environmental Decision Support Tools". The central graphic is a globe with "FIELDS/SADA Conference 2003" written around it, accompanied by logos for FIELDS, SADA, and a rainbow. At the bottom, it provides the "Date and Location: Illinois Institute of Technology, Stuart Graduate School of Business, Chicago, Illinois, March 5-7, 2003". The Illinois Institute of Technology logo is at the very bottom.

U.S. Environmental Protection Agency
Region 5, Superfund Division, FIELDS Team
Office of Solid Waste and Emergency Response
Office of Emergency & Remedial Response
Technical Innovation Office

present

Environmental Decision
Support Tools

FIELDS/SADA
Conference 2003

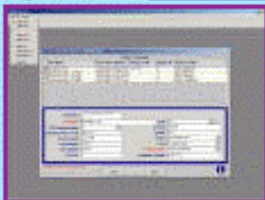
Date and Location:
Illinois Institute of Technology
Stuart Graduate School of Business
Chicago, Illinois
March 5-7, 2003

ILLINOIS INSTITUTE
OF TECHNOLOGY
Transforming Lives. Strengthening Nations. www.iit.edu

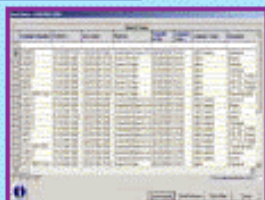


FORMS II Lite is a software application developed by EPA OERR's Analytical Operations/Data Quality Center (AOC) to assist samplers with generating their sample documentation. FORMS II Lite is a wizard-like Windows-based application used for generating bottle and tag labels; generating Chain of Custody (COC) forms; tracking samples from

field to laboratory; facilitating electronic capture of sample information into databases; and exporting data electronically as .dbf or .txt files. Users can use the software to enter information associated with documenting sampling activities such as site and project; sampling team members; analyses to be performed; location, matrix, date and time collected; sample and tag numbers; laboratories receiving samples; and Sample shipments. More information about using FORMS II Lite may be found at <http://dvnncsdao1.dvn.com/f2lite>.



FORMS II Lite enables users to document sampling events by entering information in steps.



FORMS II Lite provides users with a QuickView function that allows users to view data as they progress through the program and to track data entered during the sampling event. Users can sort, filter, and rearrange the columns to create a view that best fits their needs.



FORMS II Lite allows users to print the Chain of Custody forms and/or export the associated data to a file, once all data for a site has been recorded.



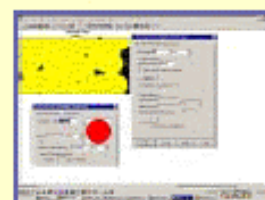
Query Manager is a database program, developed by NOAA's Office of Response and Restoration, that can be used to access sediment chemistry, sediment toxicity, and tissue chemistry data from the relational database for individual watersheds. Query manager uses its structured file system to organize data from multiple sources into a consistent, compatible form. Users can select from a menu of queries that sort and analyze the data in a variety of ways to produce output tables. The selected data can be immediately displayed on maps using MARPLOT (Mapping Application for Response, Planning, and Local Operational Tasks) and/or the output tables from the queries can be saved in a variety of formats for use with other mapping software (e.g., ArcView) or other applications (e.g., spreadsheets, statistic packages, word processors). Query manager also integrates several common Sediment Quality Guidelines (SQGs) that can be used as toxicological benchmarks to screen for potential ecological risks due to contaminated sediment exposure. Users may select among various SQGs to generate queries that contrast selected sediment data by various approaches. More information about Query manager can be found at <http://response.restoration.noaa.gov/>



Visual Sample Plan (VSP) provides tools for defining an optimal, technically defensible sampling scheme for characterization or validation. VSP is applicable for any two-dimensional sampling plan including surface soil, building surfaces, water bodies, geophysical transects, or other similar applications. VSP is a highly interactive and visual tool tailored to the environmental professional who values cost effectiveness, simplicity, accuracy, and defensible methods. VSP helps the user select the right type, quality, and quantity of data required to support confident decisions and directly supports the implementation of the Data Quality Objectives (DQO) process. VSP is available free of charge and can be downloaded from <http://dco.pnl.gov/vsp>.



VSP Sequential In-Field Sampling Results



Performance of Geophysical Meandering Sampling for UXO



VSP Quad View Showing Map, Report, Performance Graphs, and Sample Coordinates



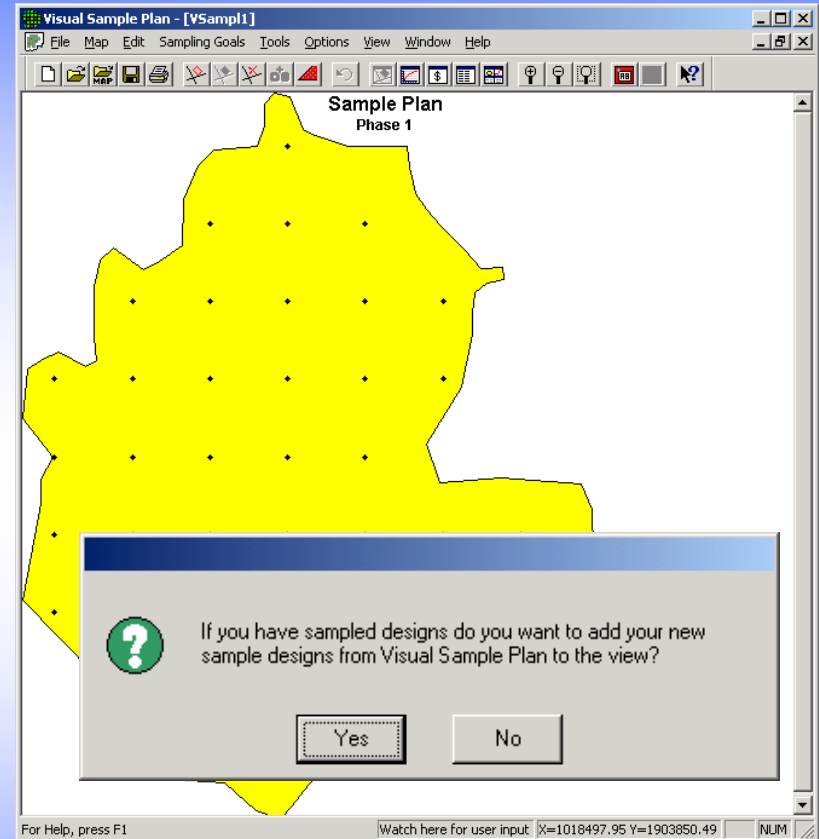
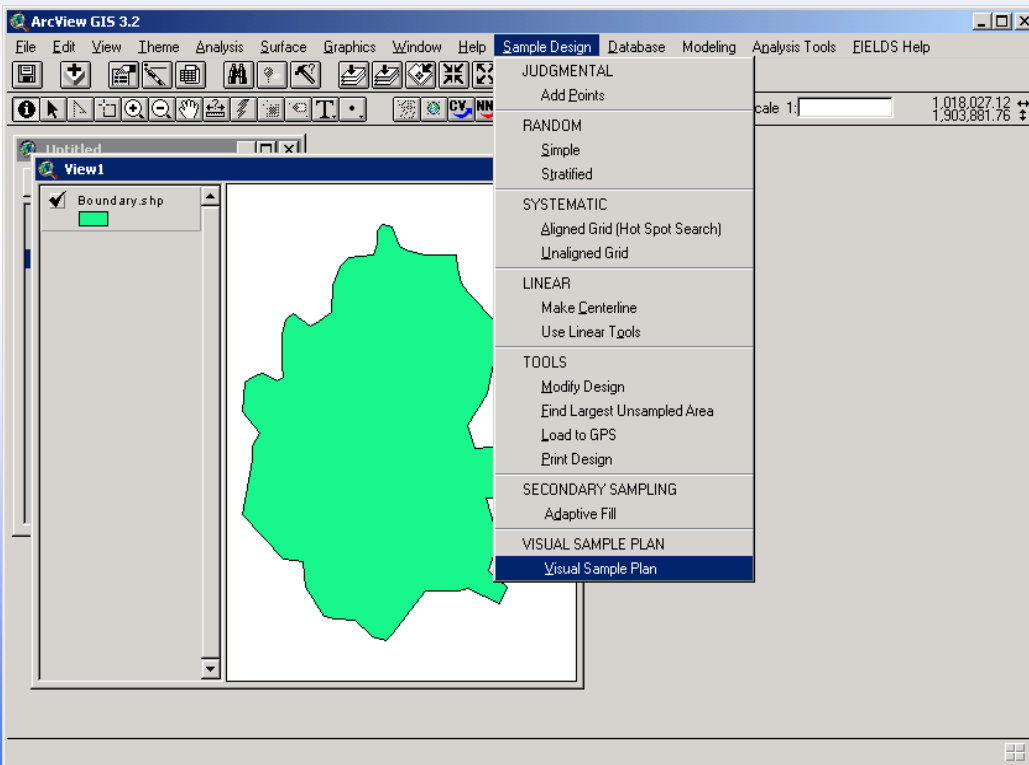
STORET (short for STOrage and RETrieval) is the U.S. Environmental Protection Agency (EPA) largest computerized environmental management data system. STORET is a repository for water quality, biological, and physical data collected by federal, state and local agencies, Indian Tribes, volunteer groups, academics, and many others since 1999, along with older data that has been properly documented and migrated from the Legacy Data Center (LDC). Each sampling result in STORET is accompanied by information on where the sample was taken (latitude, longitude, state, county, Hydrologic Unit Code and a brief site identification); when the sample was gathered; the medium sampled (e.g., water, sediment, fish tissue); name of the organization that sponsored the monitoring; why the data was gathered; sampling and analytical methods used; the laboratory used to analyze the samples; the quality control checks used when sampling, handling the samples, and analyzing the data; and the personnel responsible for the data. More information on STORET database can be found at <http://www.epa.gov/STORET/>.

Current & Future FY02/03

- Integration of VSP and Forms II Lite
- Radial/Nested sample designs
- River straightening algorithm
- Auto-documentation
- GIS data centralization
- Training Center
- Web-based FIELDS Help
 - Software and methods walkthrough

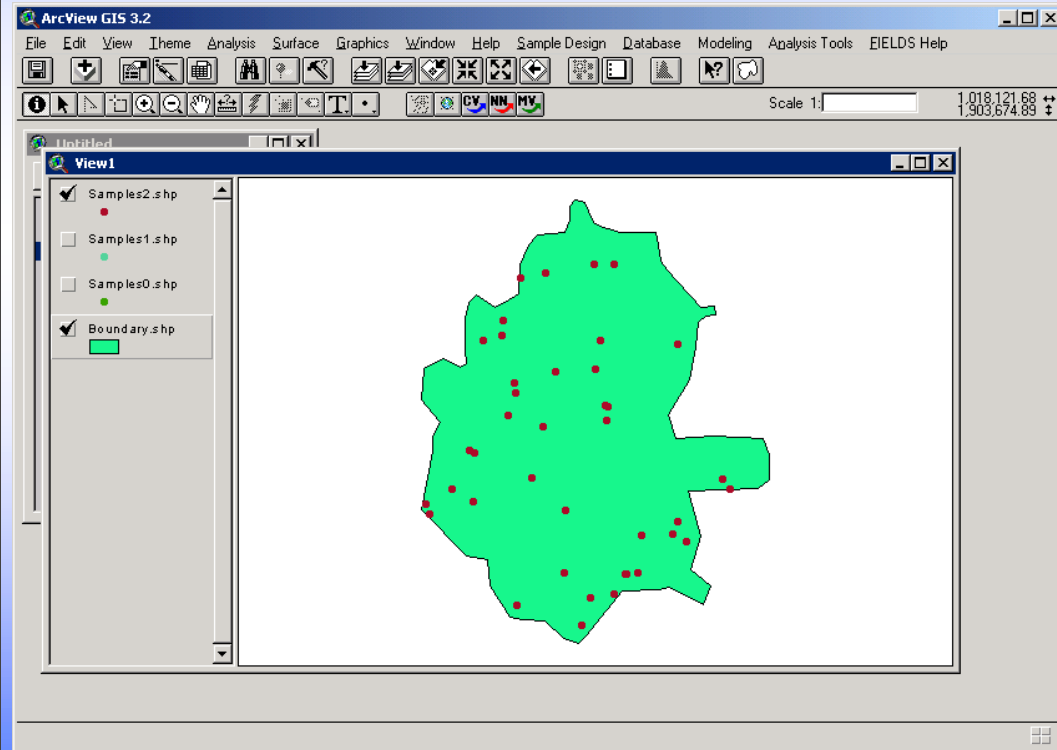
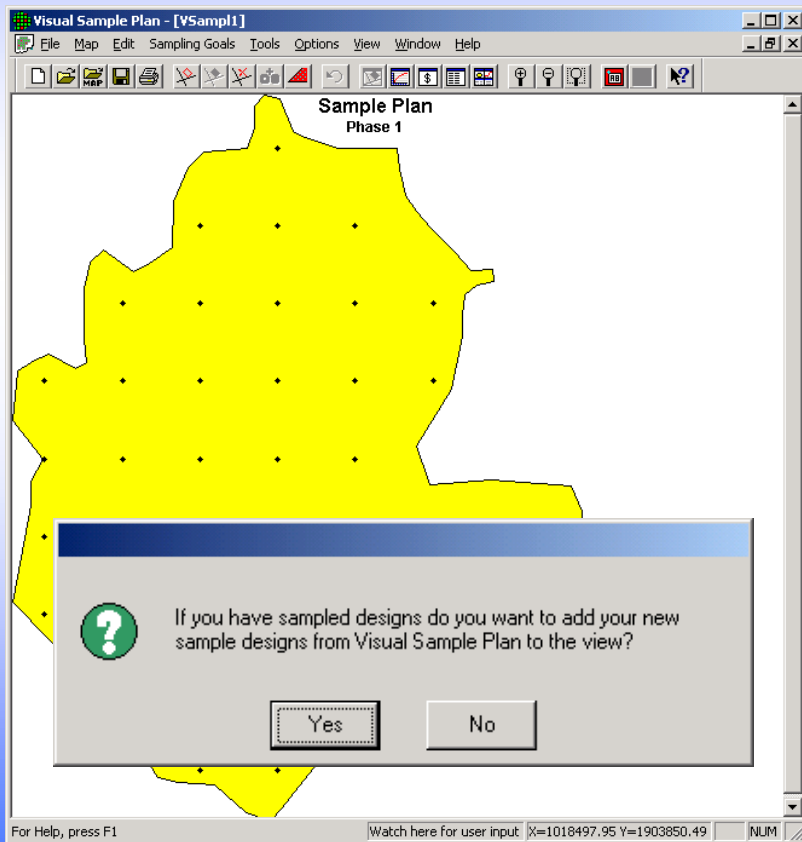
Current & Future FY02/03

- Integration of VSP



Current & Future FY02/03

- Integration of VSP

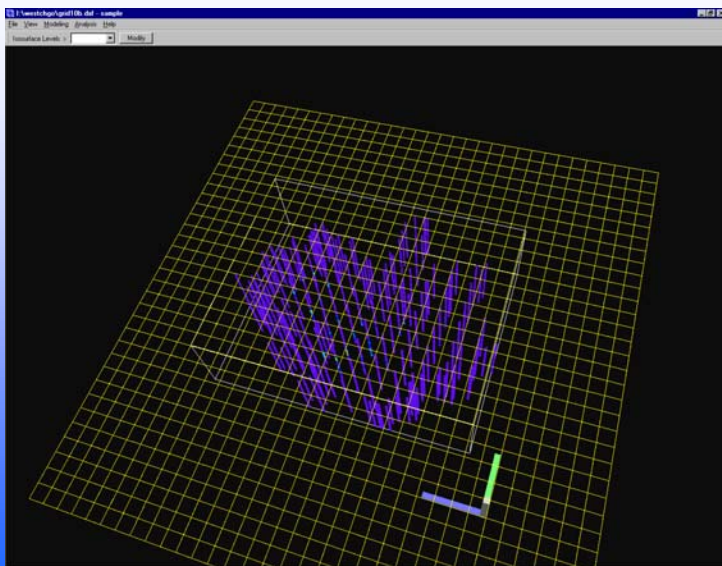
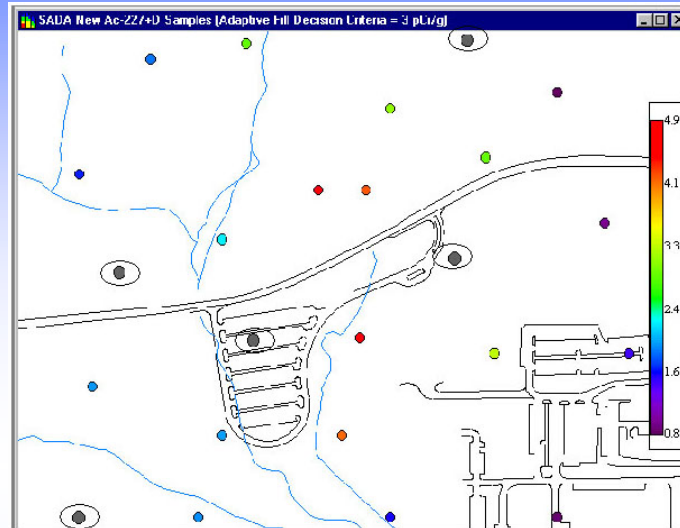


Additional Sampling Modules

Radial numbering

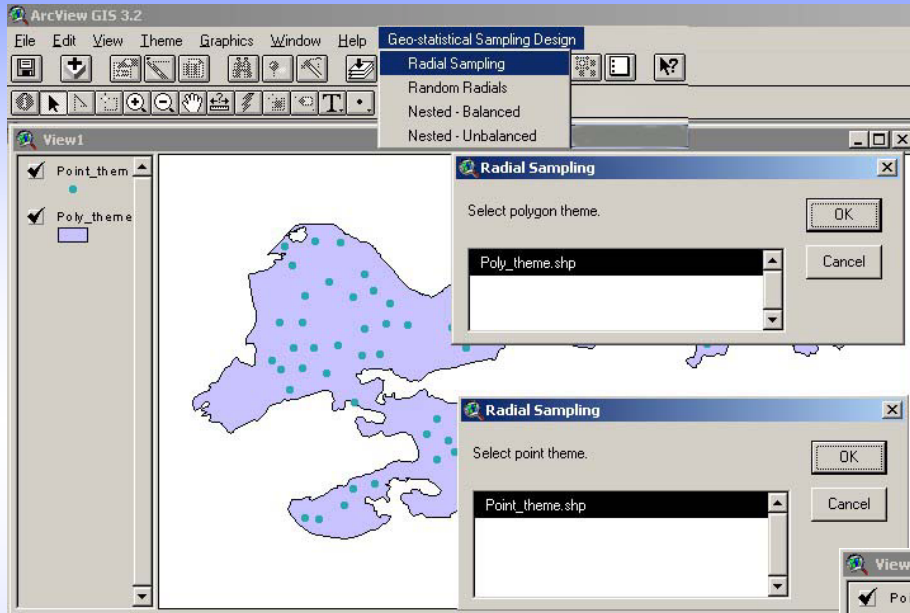


Adaptive Fill
(SADA)



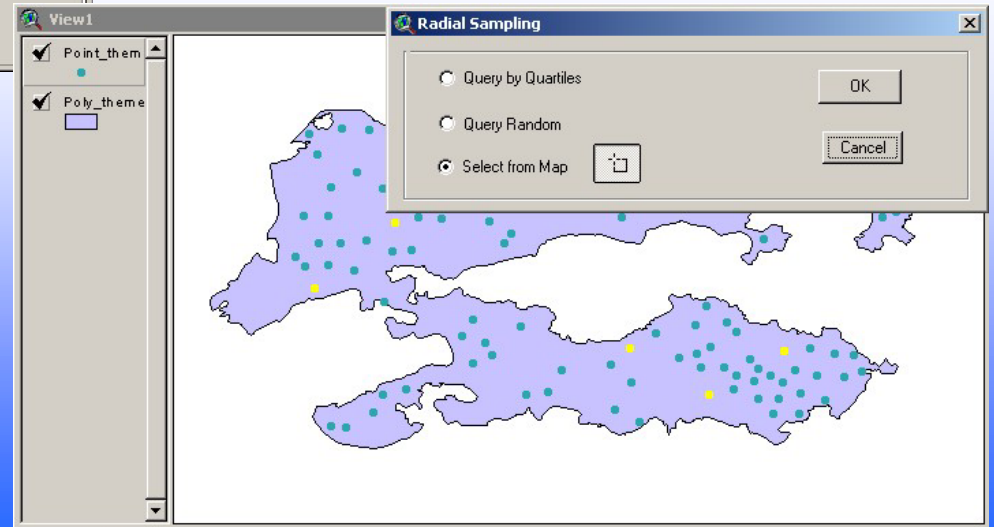
3D Sample Design

Sample Design (Beta)

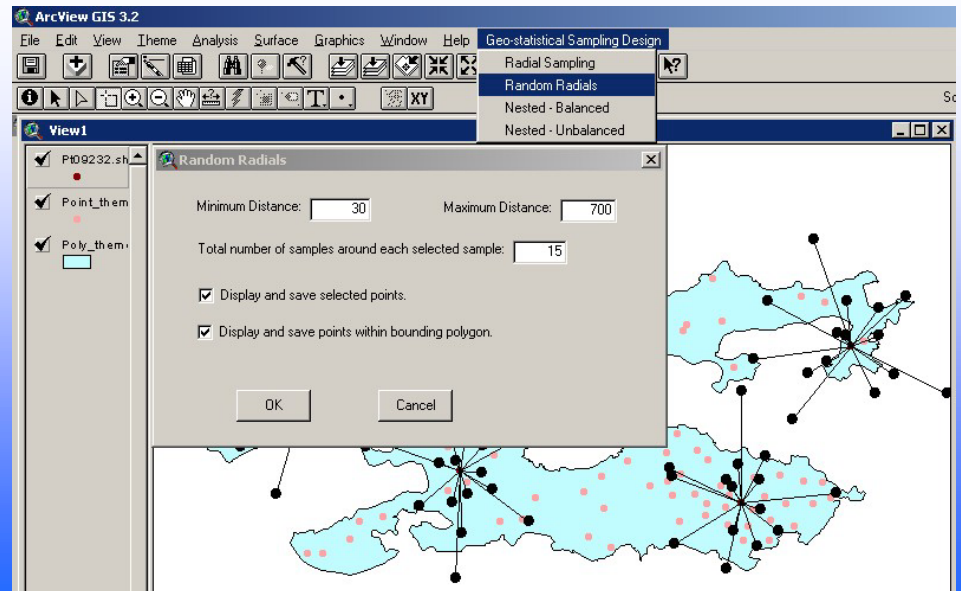
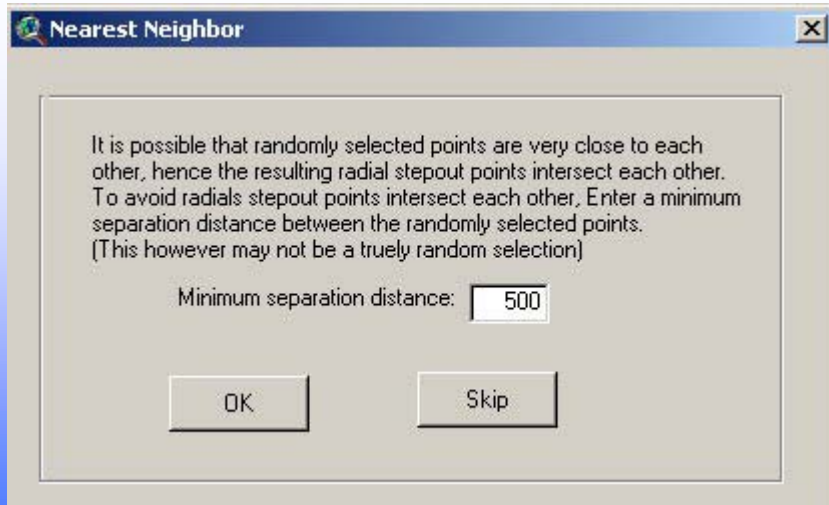
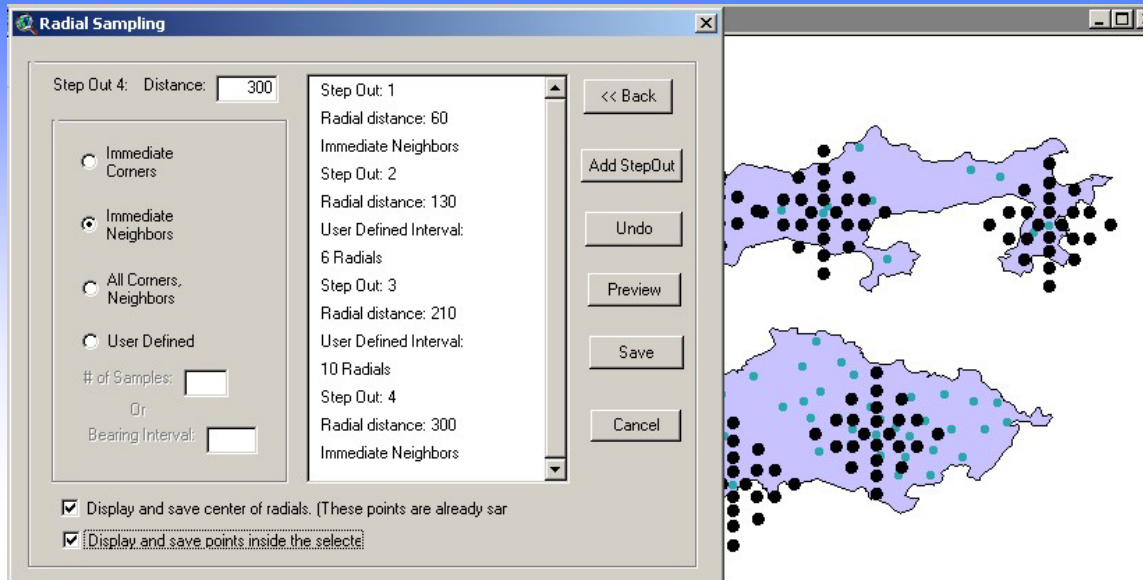


- Radial sample design for geo-statistical analysis

- Select points from the view



Sample Design (Beta)



Auto-documentation

- Document all parameters used for analysis
 - Benefits
 - Repeatability
 - Standardization
 - Defendable

SADA

The image shows two overlapping windows from the SADA software. The top window is titled 'Update Reports' and contains a 'Select a Report' dropdown menu with 'EcoTest.html' selected. Below this is a section titled 'Components of Current Result' with a list of checkboxes, all of which are checked: Result, 3-D Result, GIS Files, Grid Specs, Geospatial Parameters, Correlation Models, Variography, Data, Decision Parameters, Risk Models, Scenario, Toxicology, Polygon, and Ascii R. An 'Add to F' button is visible at the bottom of this window.

The bottom window is titled 'Report - C:\SADA\MyReport\MyReport.html'. It displays a table with three columns and three rows of data: 27200, 22380, and 2.03. Below the table, the text 'Visible GIS Layers' is followed by two file paths: 'C:\AllRobertsFiles\Official SADA Development\SADA_2Roads.dxf' and 'C:\AllRobertsFiles\Official SADA Development\SADA_2Water.dxf'. Below these paths is the text 'Risk = Intake SF'. Further down, there is a mathematical equation:
$$Rad\ Soil\ Ingestion\ Intake\ (pCi) = C_w \cdot CF_b \cdot EF \cdot FI \cdot ED \cdot IR$$
 and another equation:
$$CF_b = 10^{-3} \frac{g}{mg}$$
. At the bottom of the window, there is a section titled 'Soil Residential Ingestion' followed by a table:

Scenario Parameters	Units	Symbol	Value
Adult Body Weight	kg	BWa	70
Adult Exposure Duration	yr	EDa	24
Adult Ingestion Rate	mg/day	IRa	200

Centralization of GIS Data

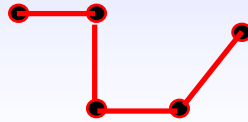
- Centralization of FIELDS GIS/non GIS data into a Spatial Oracle server.
 - Eliminate data redundancy
 - Data can be shared by the Region/s
 - Stored in a format that allows for advanced queries

Conversion of High level to Primitive GIS Data

GIS (mapping) data



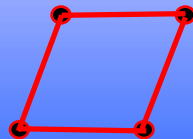
Line string



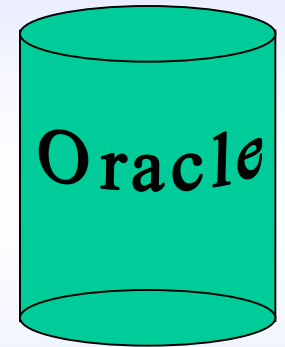
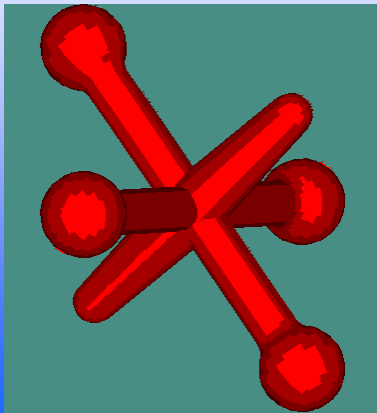
Point



Polygon



CAD data



FY03 National Center

- Software Support
- Training
 - Establish a regional support network
 - Regions, states, and tribes
- Custom Programming

Current & Future

- Tool migration to 3D Tools/Viewer
 - Geostatistics (kriging, variogram tools)
 - Sample Designs
 - Modeling & Analysis tools
- Migration from ArcView 3.x to ArcGIS 8.1

Spatial Analysis and Decision Assistance Version 3.0

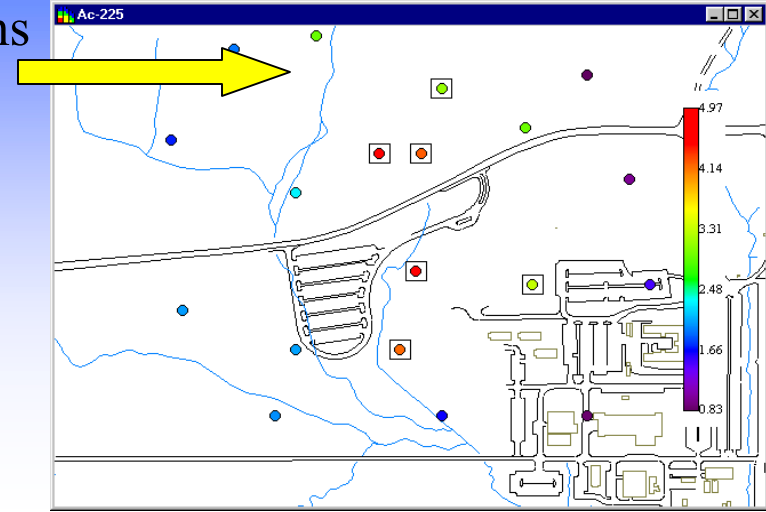
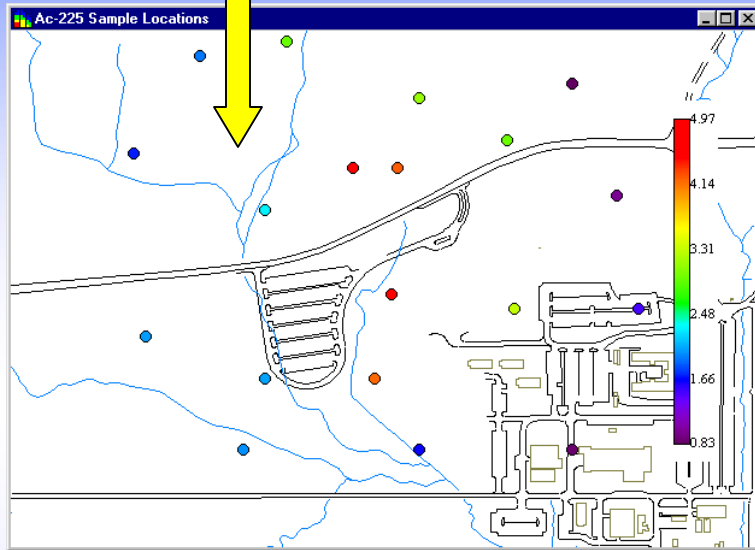
Windows based freeware designed to integrate scientific models with decision and cost analysis frameworks in a seamless, easy to use environment.

- Visualization
- Statistical Analysis
- Geospatial Interpolation
- Geospatial Uncertainty Analysis
- Human Health Risk Assessment
- Ecological Risk Assessment
- Custom Analysis
- Area of Concern Frameworks
- Cost Benefit Analysis
- Secondary Sampling Design

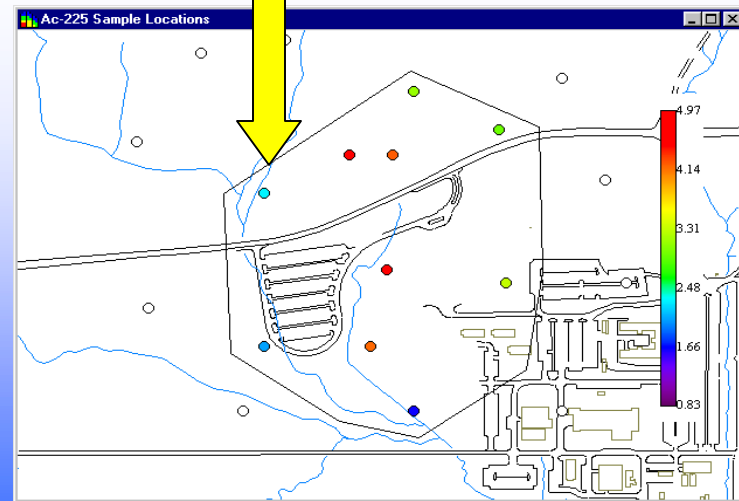
SADA has been supported by both the DOE and EPA and recently the NRC. SADA has had about 4000 downloads from the website.

Spatial Data Screens

Data Plot/GIS Overlays



Polygon Selection/Cutaways



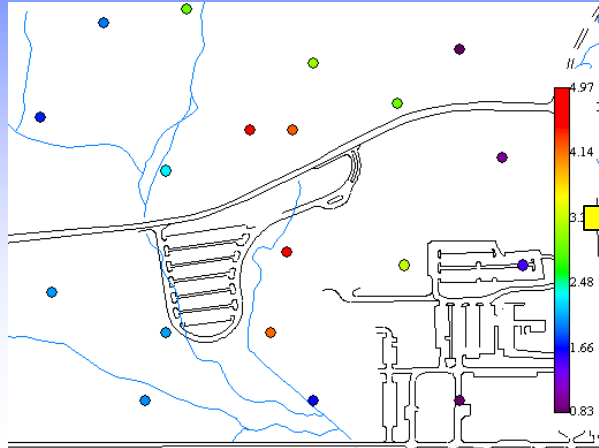
Statistics

Statistics

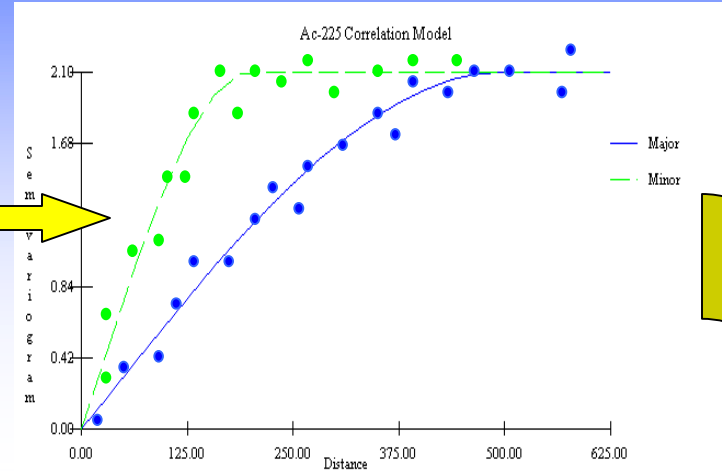
Options Format

Name	CAS Number	Mean	Variance	Number of Data
Ac-225	14265851	3.4	1.3	10
Beryllium and compou	7440417	75.6	640.9	10
Arsenic, Inorganic	7440382	8.3	6.	10

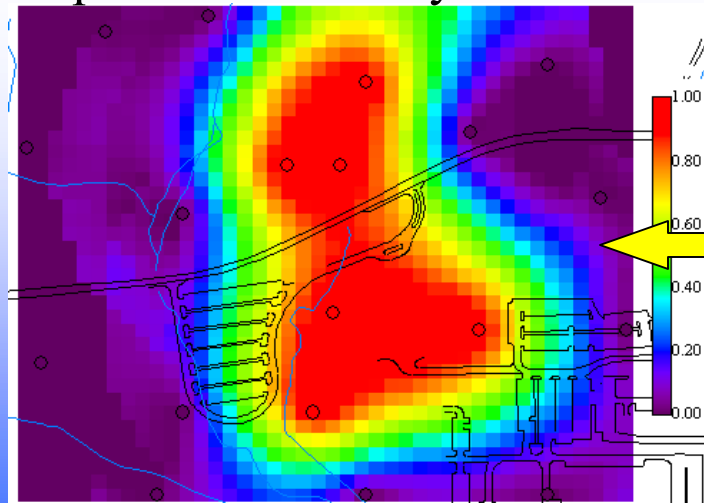
Begin with the data



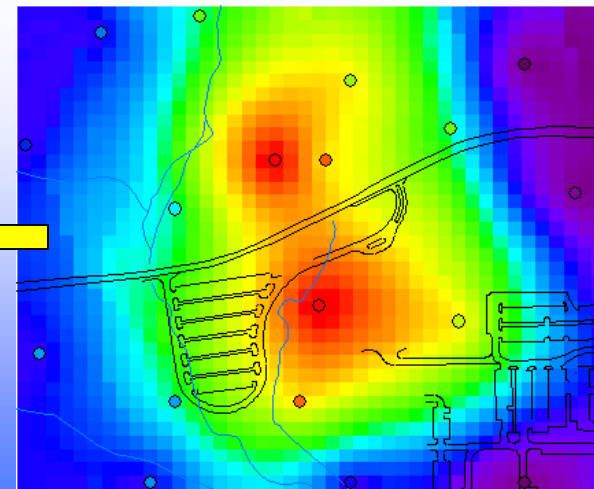
Model Spatial Covariance



Spatial Uncertainty



Spatial Estimation



Long term plans for SADA

1. Maintain SADA as a free software product.
2. Provide training and support to SADA users.
3. Continue development of SADA in several key areas.
4. Keep current functions and models up to date with latest guidance and scientific advances.
5. Provide annual SADA releases.
6. Continue exchanging ideas and components with FIELDS.

Maintain SADA as a free software product.

SADA is free to anyone and can be downloaded from the website.

SADA is stand alone software and requires no additional software purchases.

SADA has had over 4000 downloads to date.

Provide Training and Support To Users

SADA Website - overview, documentation, downloadable documents, links to relevant sites.

SADA Listserv - users can post questions to the newsgroup and query past discussions about various topics.

SADA Email - users can post a question or problem directly to us from the software itself.

FIELDS/SADA Conference - training and general talks

SADA Training Course at UTK - would provide quarterly training classes on campus. Facilities are already available on an as needed basis.

Continued Development (currently)

3D Sample Design - expand current 2d and 3d sample capabilities to reflect more realistic 3d sampling scenarios in both initial and secondary designs.

Risk Assessment - add human health risk updates as well as expand ecological modeling functions.

Geospatial Characterization Advances - improve key geostatistical functions that serve as the basis for many SADA models.

Visualization and GIS - improve and add new features to SADA's current 2d and 3d visualization functions.

Statistical Analysis - broaden SADA's repertoire of statistical functions including nonparametric methods, hypothesis testing, etc.

FIELDS Compatability - Continue sharing developed modules with FIELDS.

FIELDS Team

Cost Assessment FY 2002

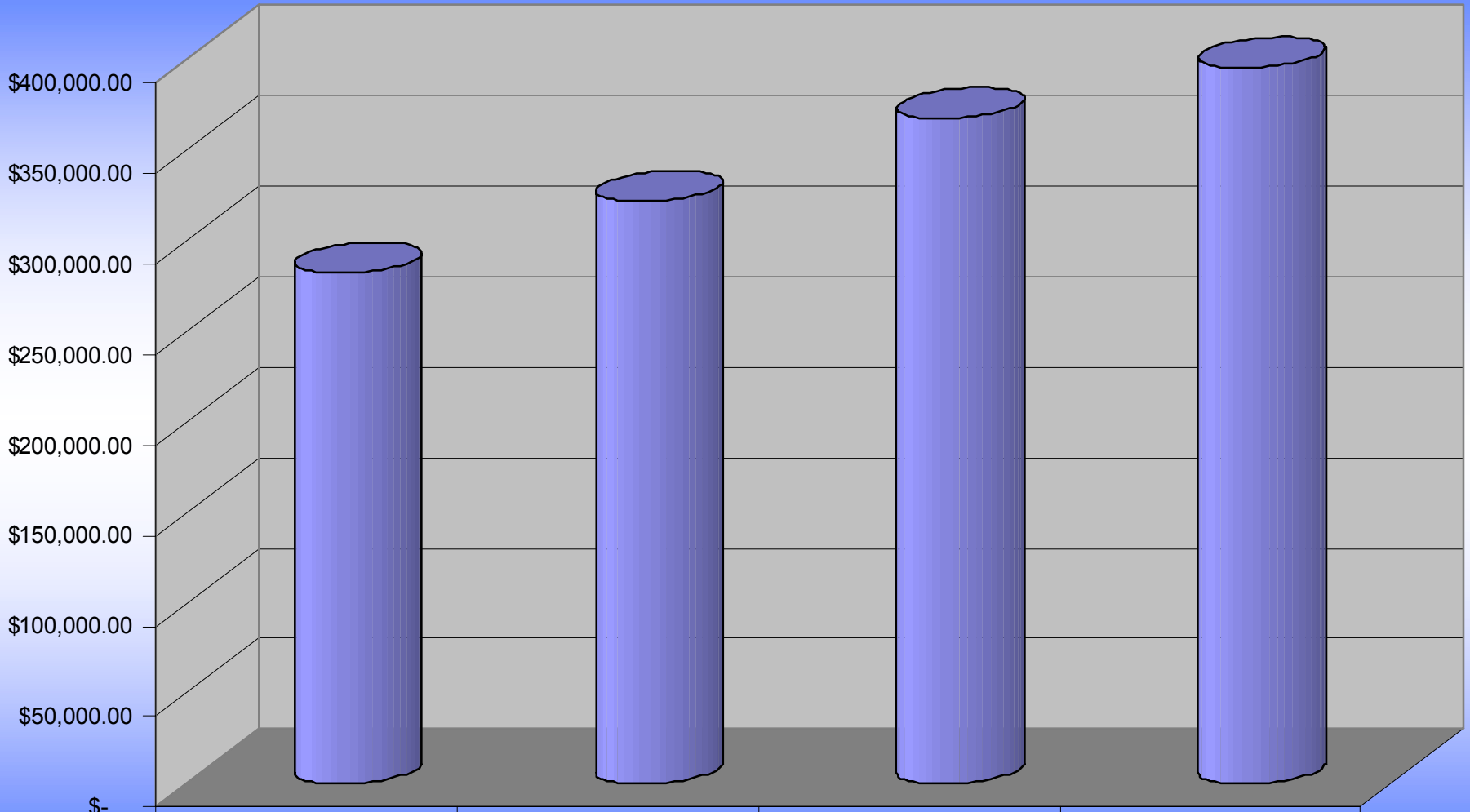
METHODOLOGY

- Establish a formal cost tracking system
- Analyze information to develop cost estimates
- Compare FIELDS costs to costs of traditional contractor services

FIELDS Team Activities Tracked

- Administration
- Marketing
- Training & Development
- System Development
- Team Hardware, Software, Equipment Support & Maintenance
- General Office Duties
- Project Related Activities
- Travel

Chart 3.0 Comparison of Total Project Expenses



Resource Group	Fields Team	Tetra Tech (ttemi)	CH2M Hill	Roy Weston
	\$281,793.68	\$321,218.70	\$367,084.60	\$394,975.83