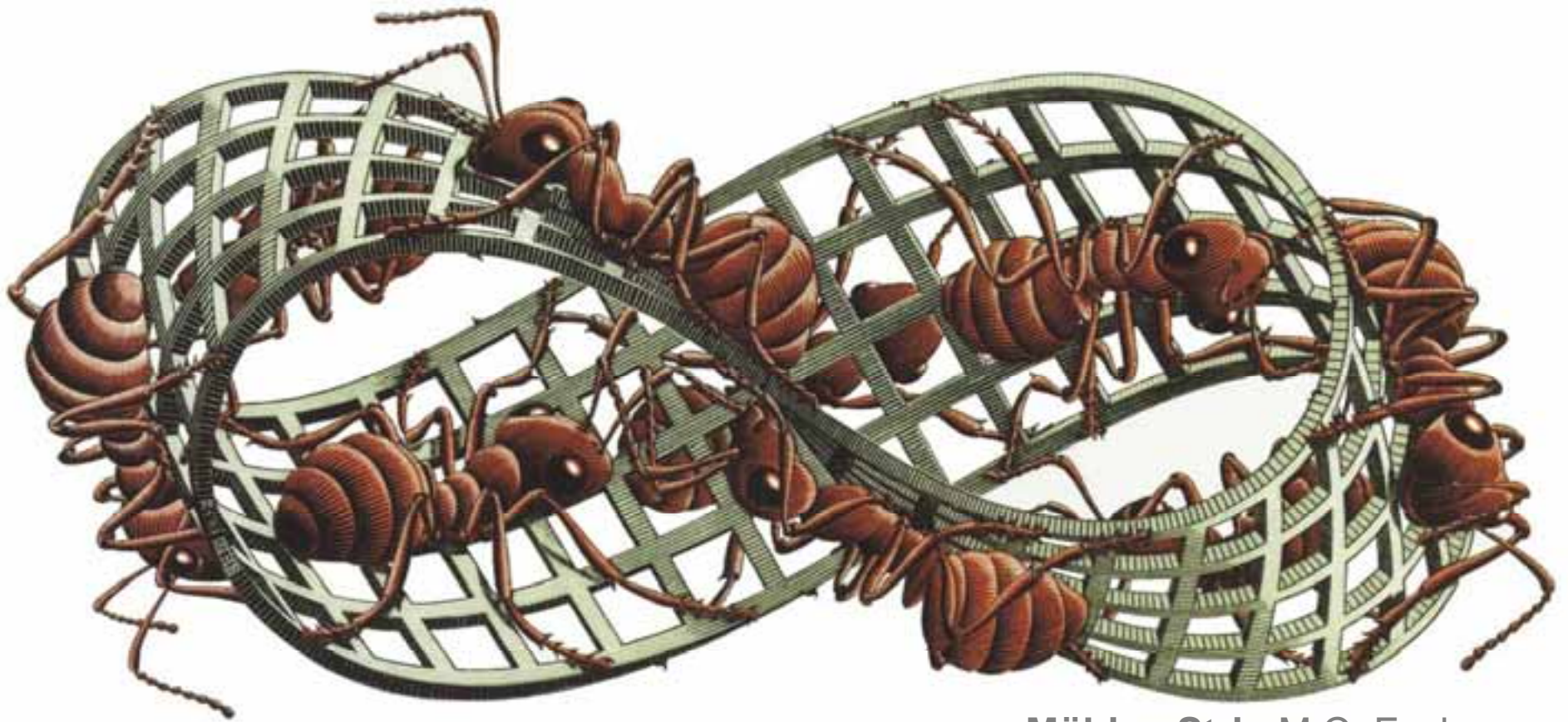


topology



Möbius Strip M.C. Escher

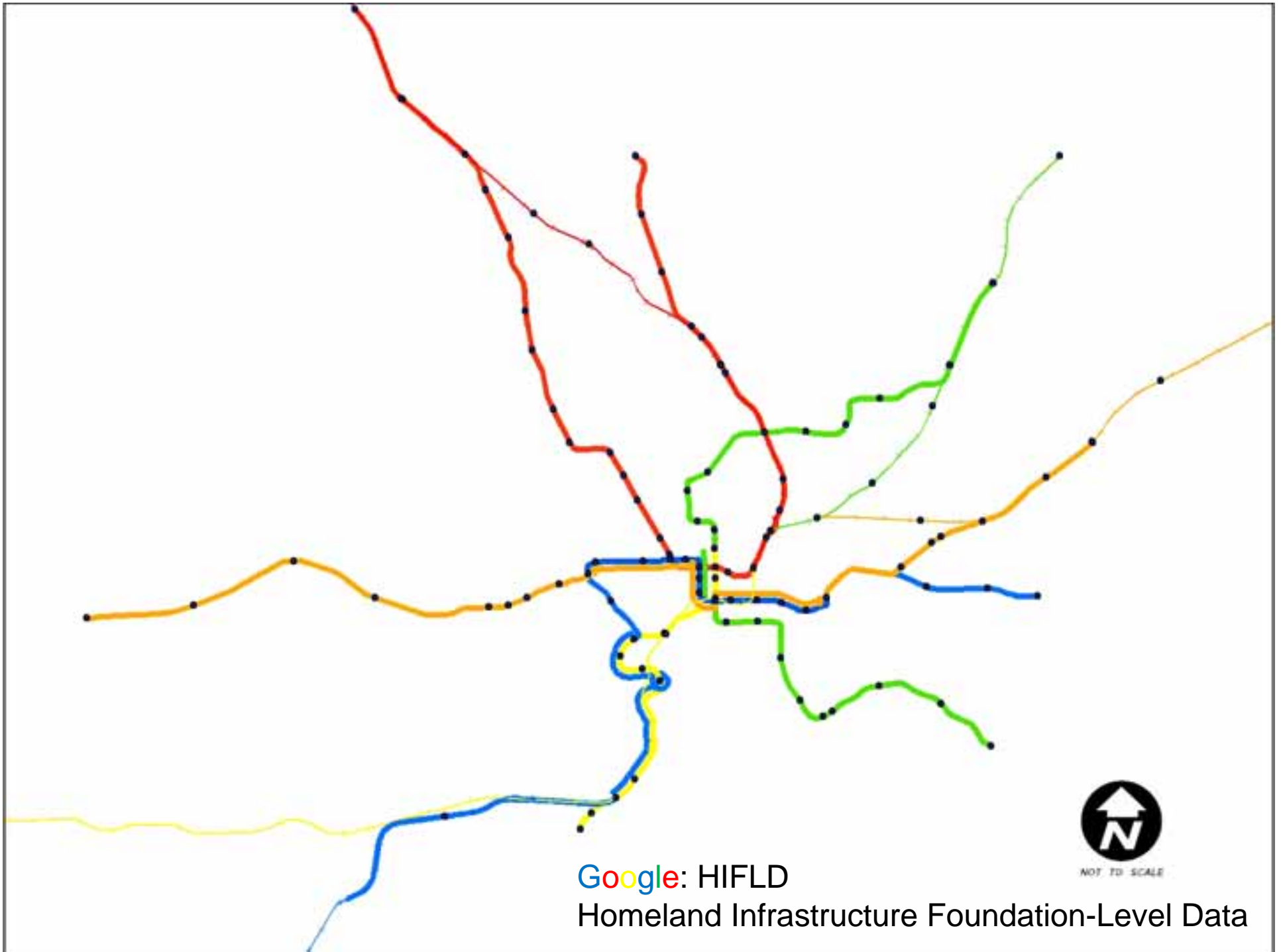
Frederic Max Squires - CTR

United States Coast Guard

Topics

- Explain topology and its related components
- Show how to build a topological relationship in ArcGIS
- Discuss the benefits and drawbacks of topological relationships





What is the Goal of Topology in Geographic Information Systems?

- Connectedness
 - Spatial Analysis
- &
- Database Management

What is the Goal of Topology in MY Geographic Information System?

- Do I want to perform advanced analysis?
- Will I be editing or maintaining this data in any way?

Routing, Directions, and other Spatial Analysis

- By defining what features are connected, it becomes possible to ‘ask’:
 - What is the most direct path, following the connected features, between points *A* and *B*?
 - For instance, obtaining metro directions to the convention center

The goal of topology

Database Structure and Function

- Connected features stay connected even while editing (moving nodes or edges)
- Reduce Number of Points Stored and Retrieved by SDE/Geodatabase
- Snap lower resolution or less critical features to coordinates of more precise data

The goal of topology

Topics

- Explain topology and its related components
- Show how to build a topological relationship in ArcGIS
- Discuss the benefits and drawbacks of topological relationships

Data

- What is the source format of the data?
- Are the projections/coordinate systems of the various data the same?
- Does the data already have a topological relationship that can be exploited?

Metadata

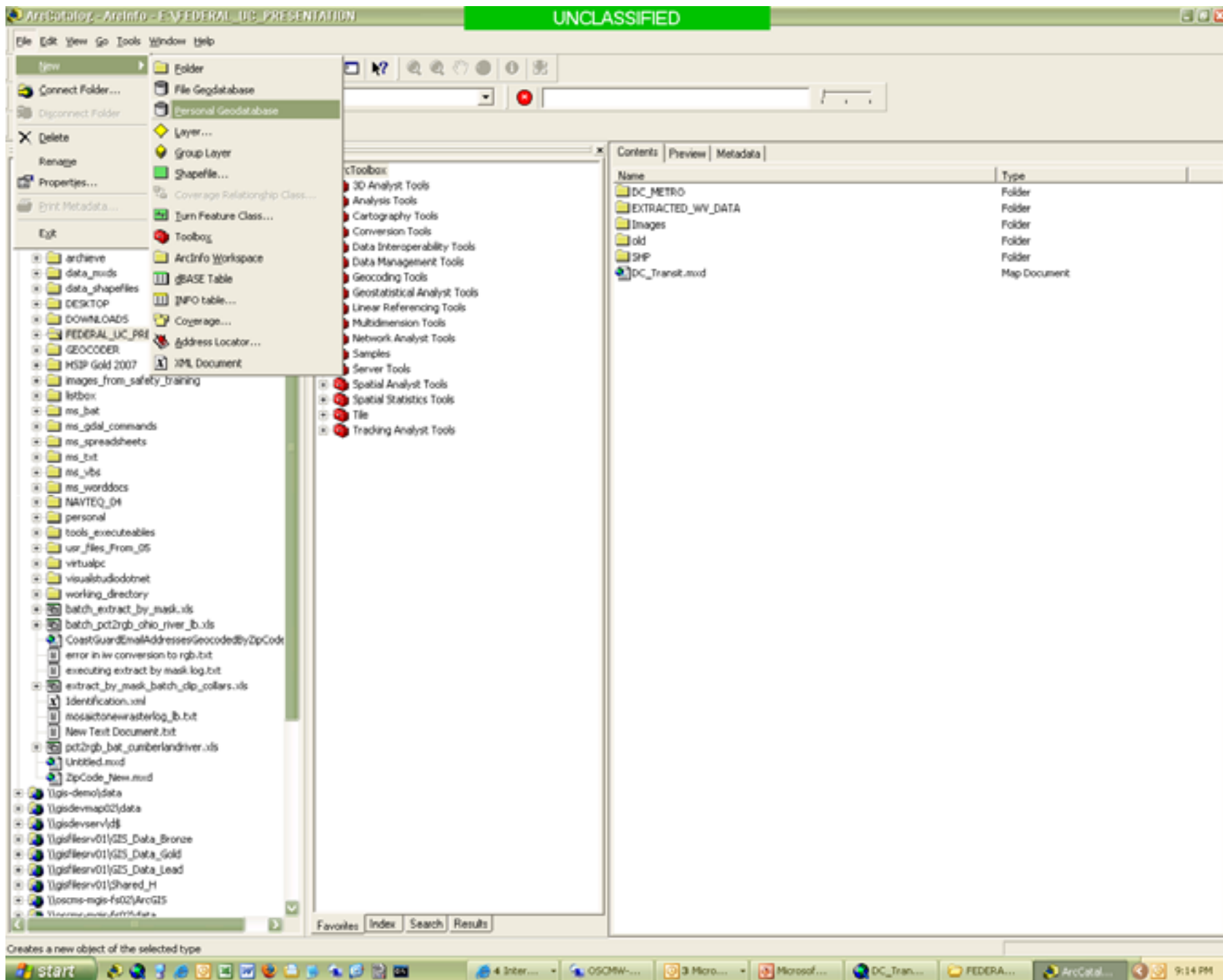
- For what purpose was the data created?
- What is the recommended scale of the data?

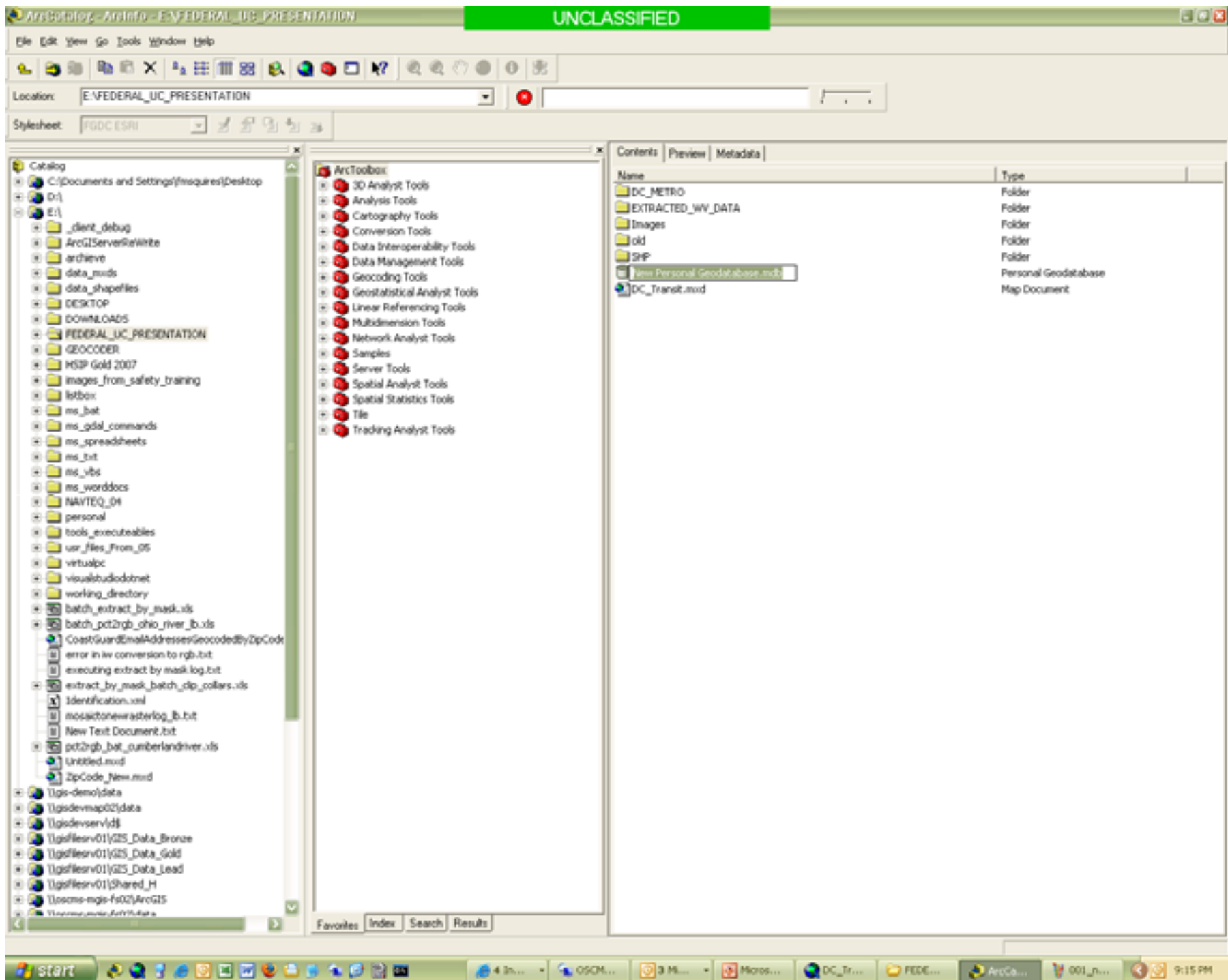
Topological Design

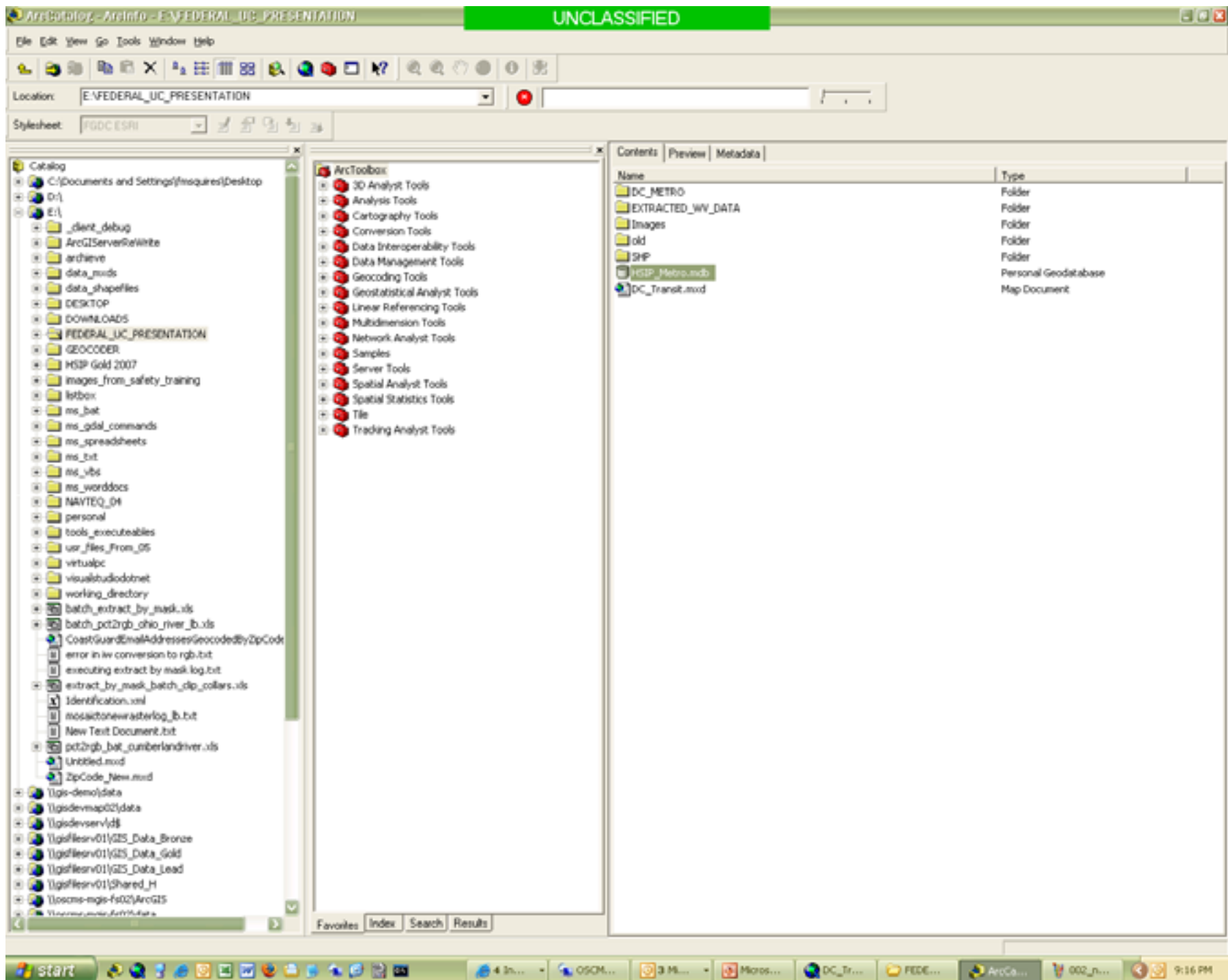
- What features will share geometry?
- Should edits to one feature modify others?
- How will data be organized?
- What topological rules will be followed?
- What is the desired accuracy of the data?

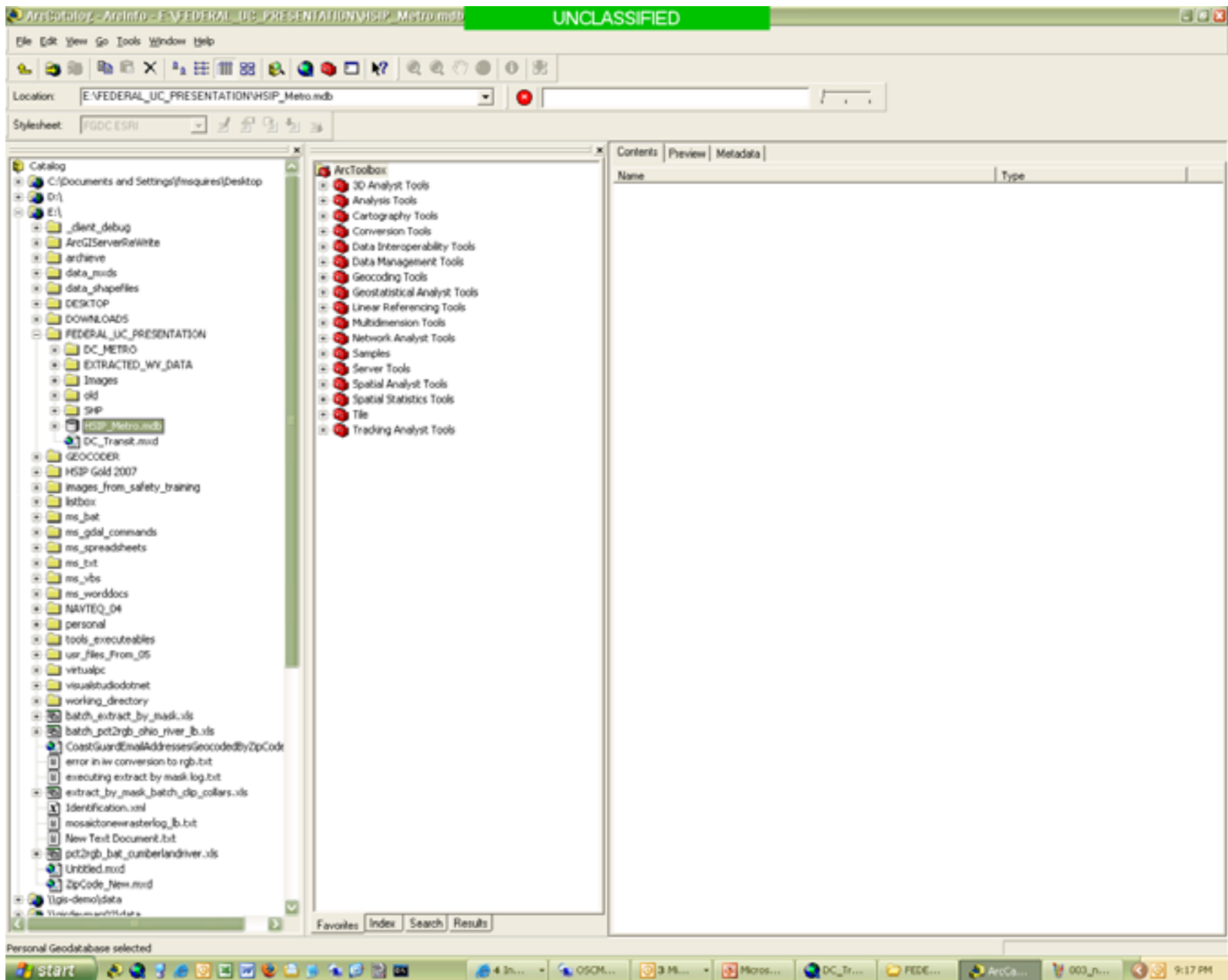
Implementation of Topology

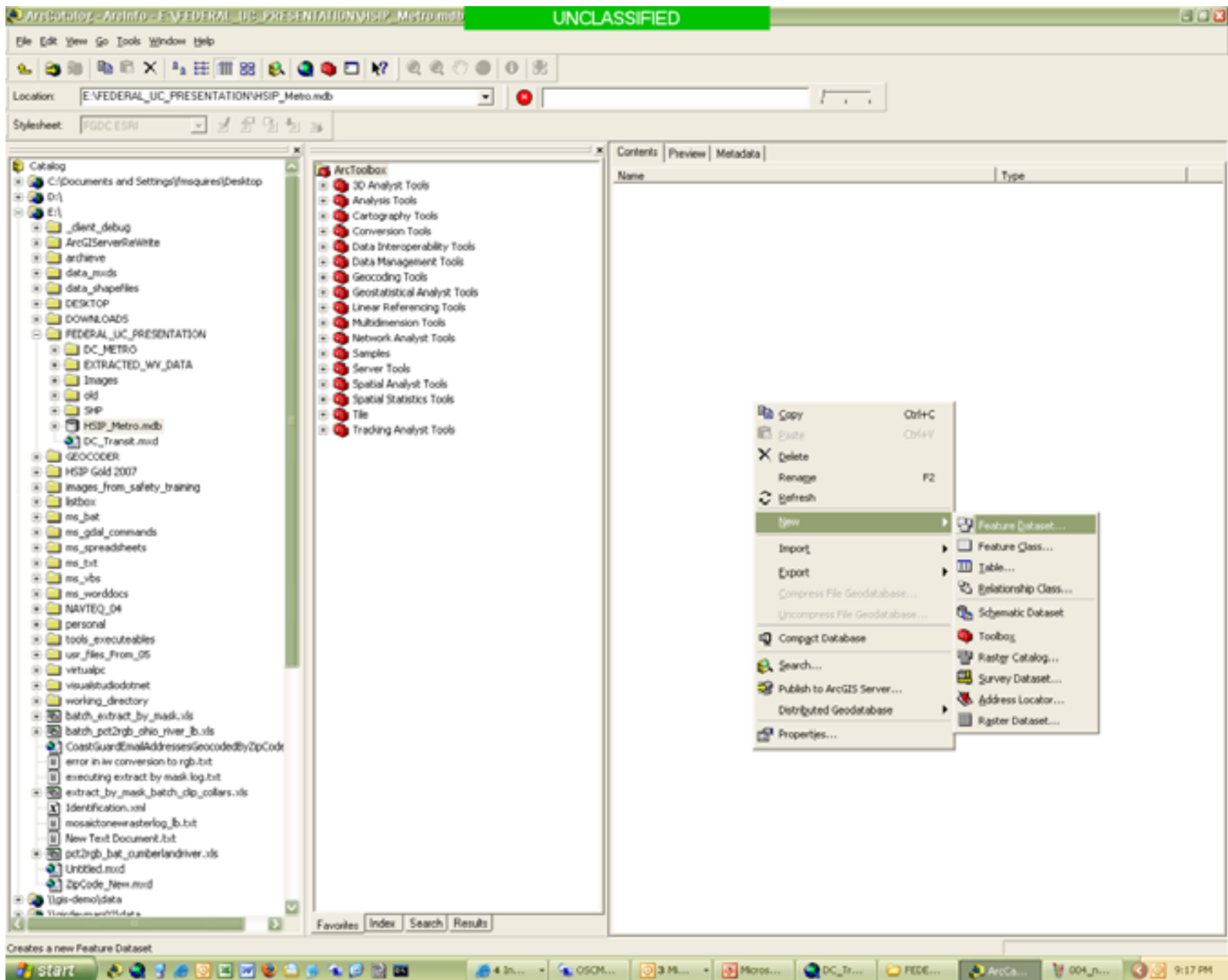
- Build Test Database
- Copy Features to Feature Data Sets
- Implement design
- Validate topology
- Edit features
- Observe output
- Modify design

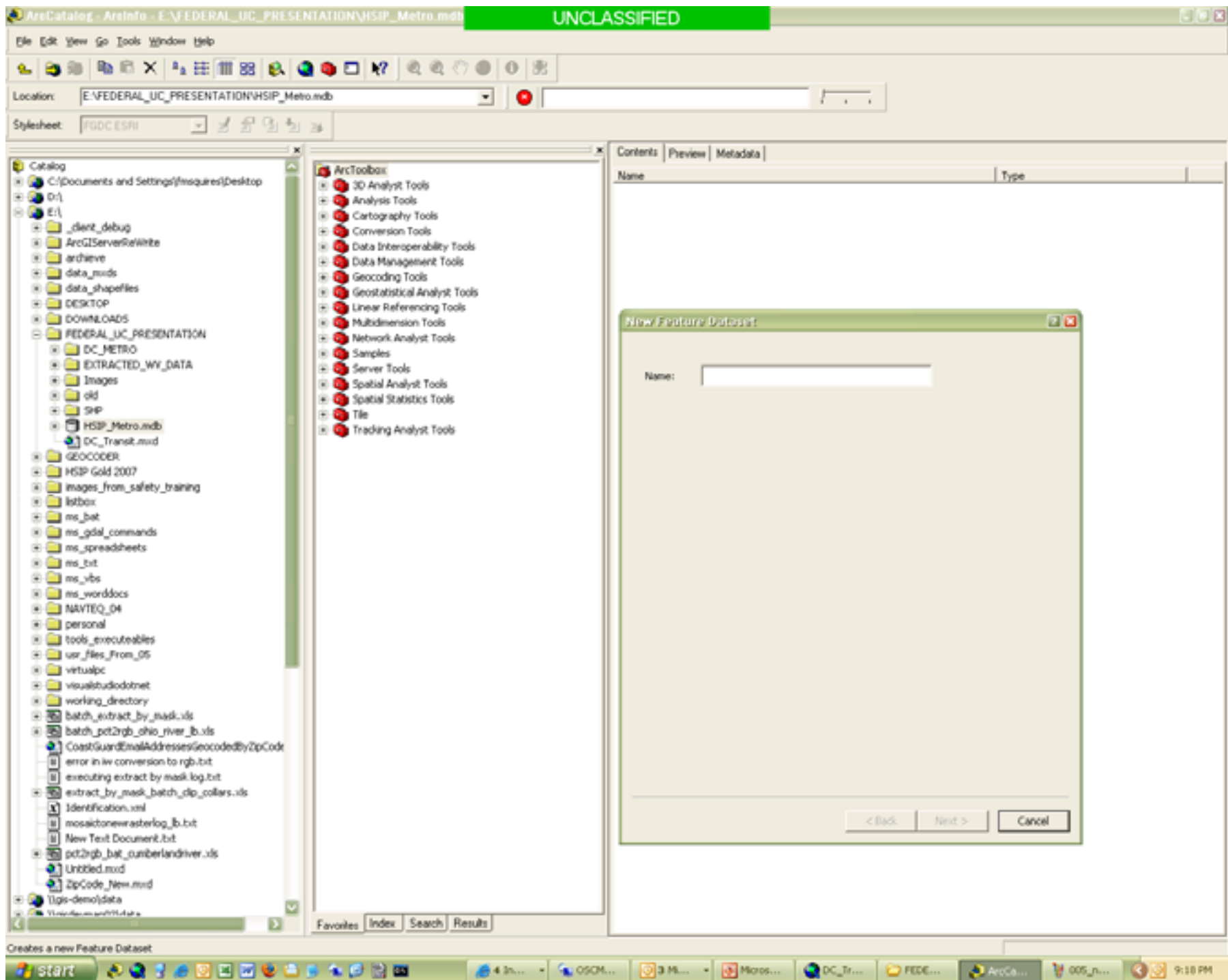


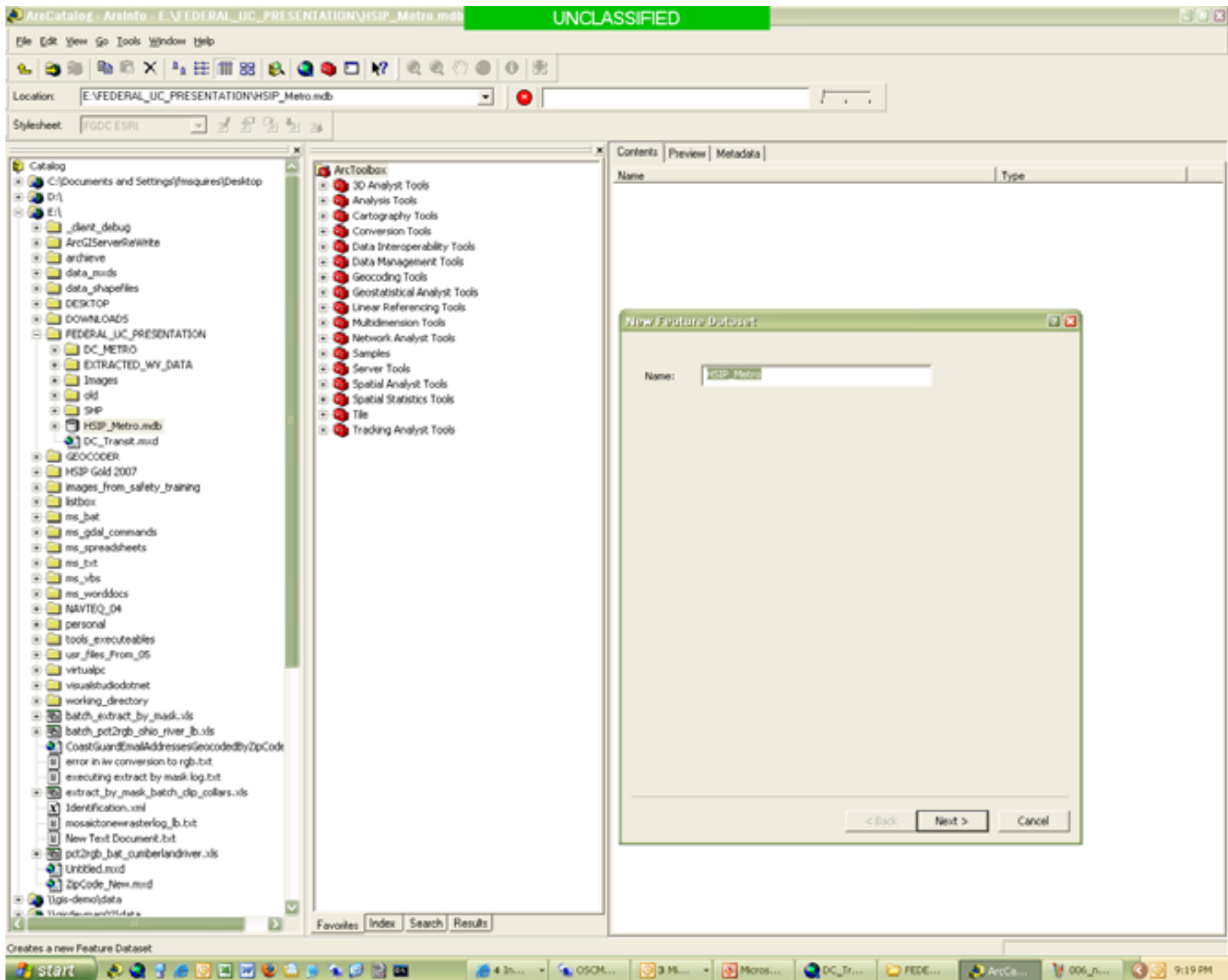


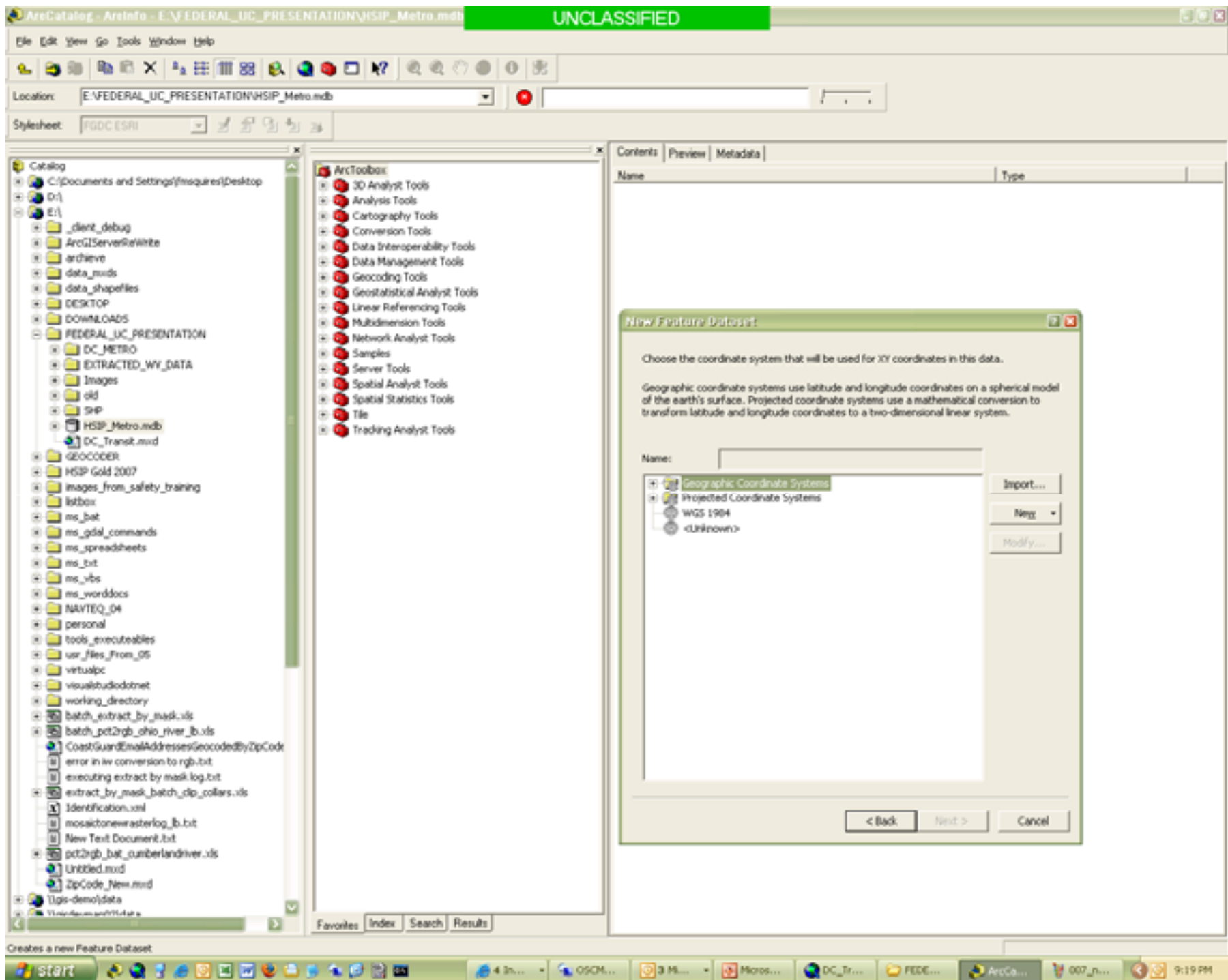


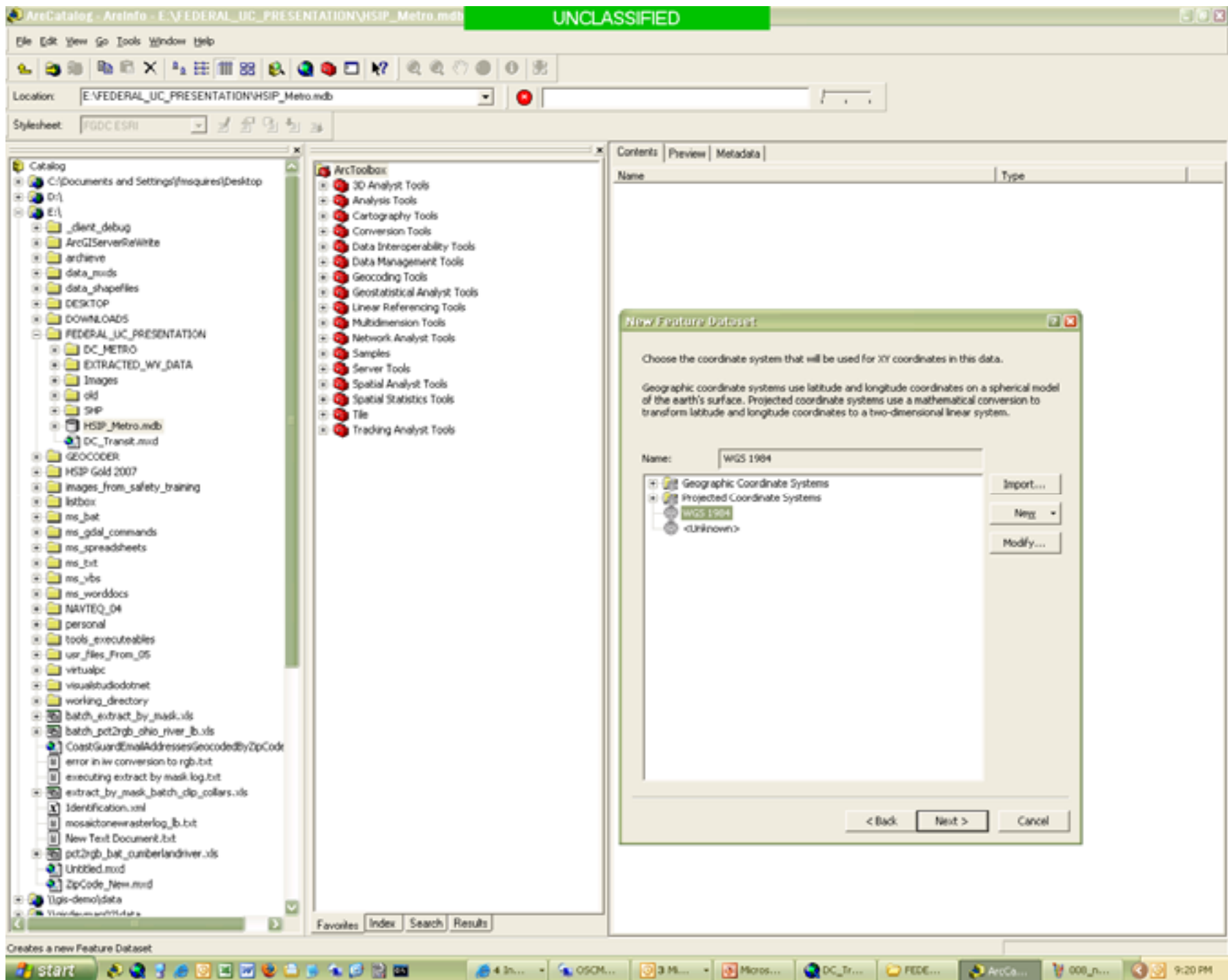


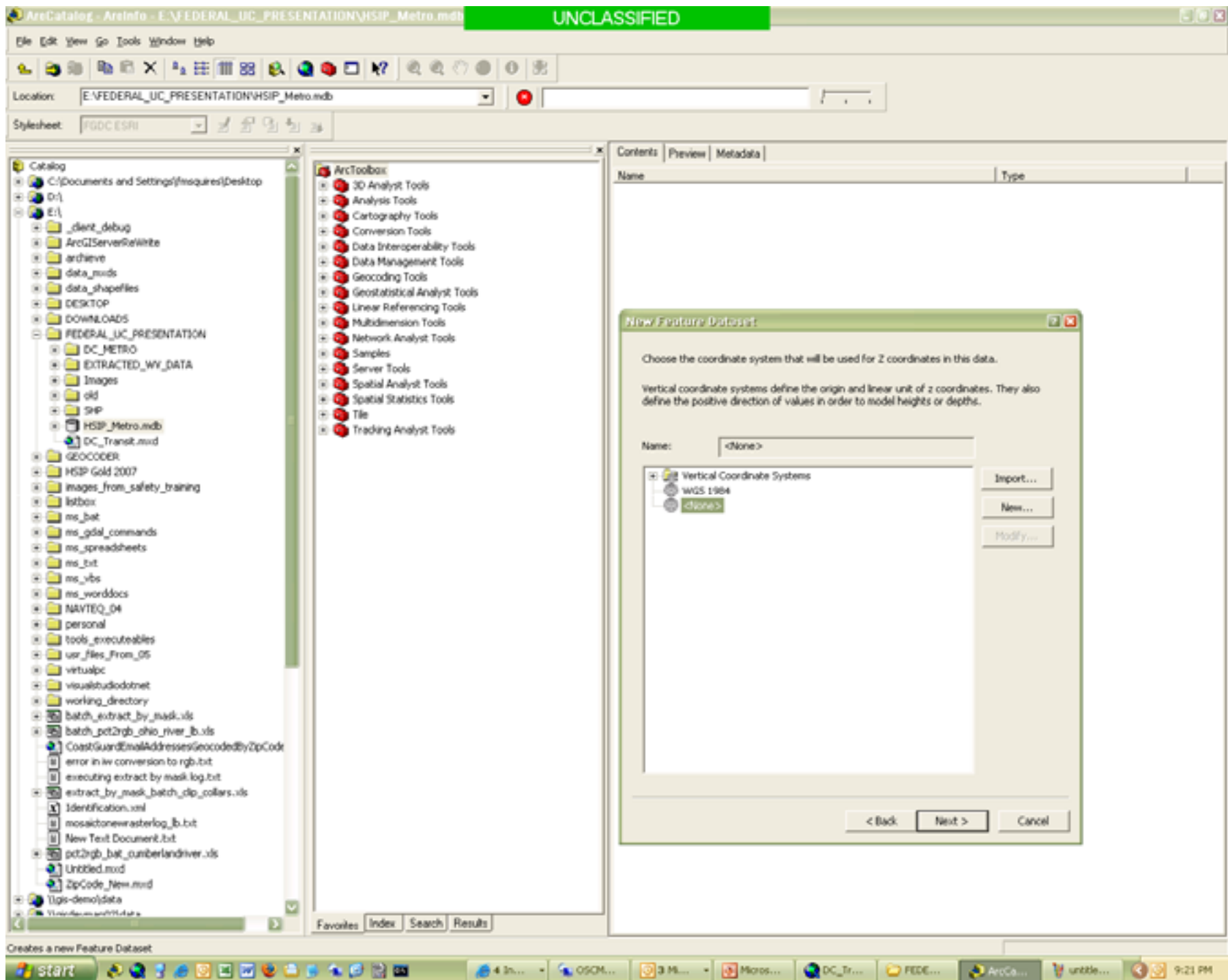


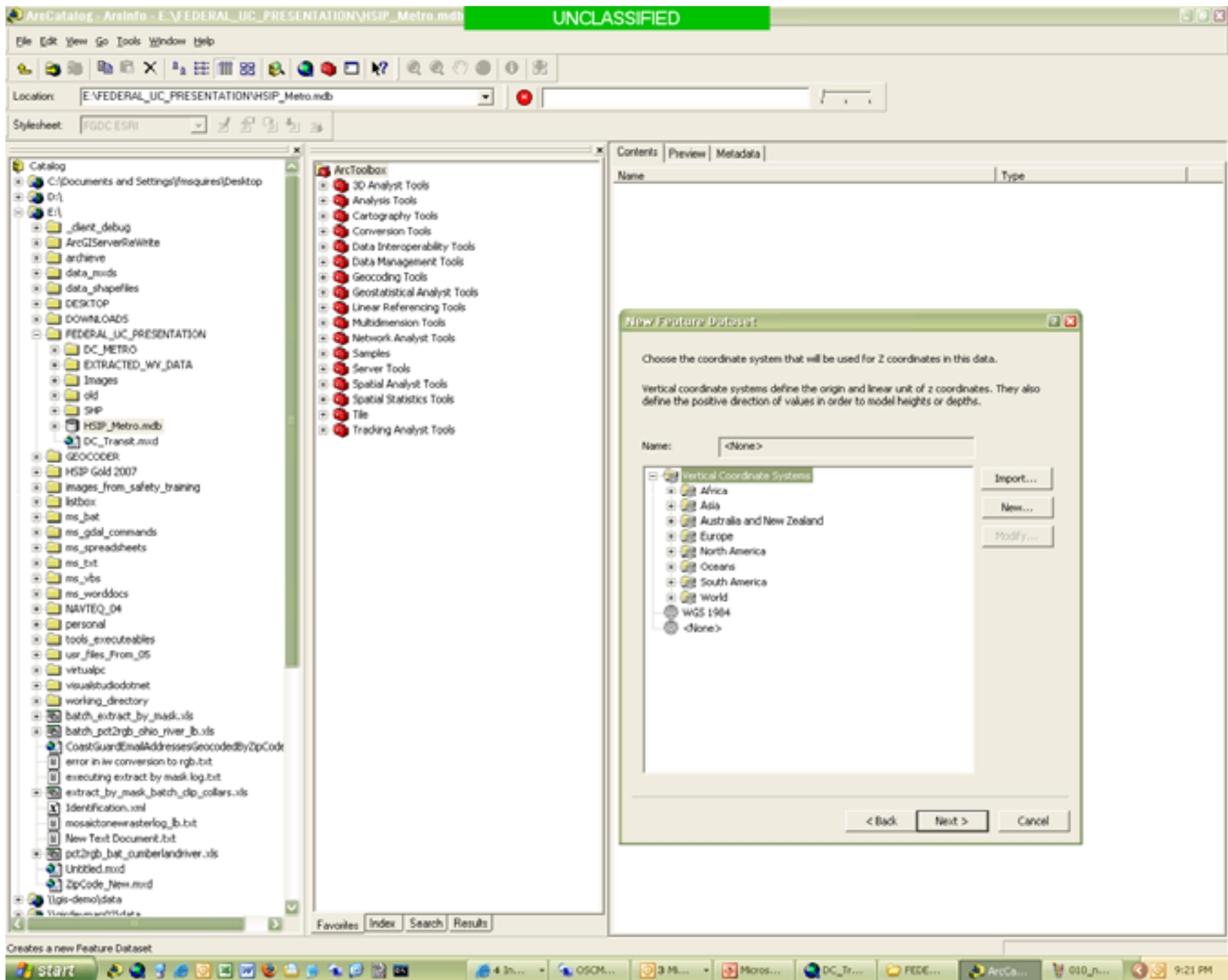


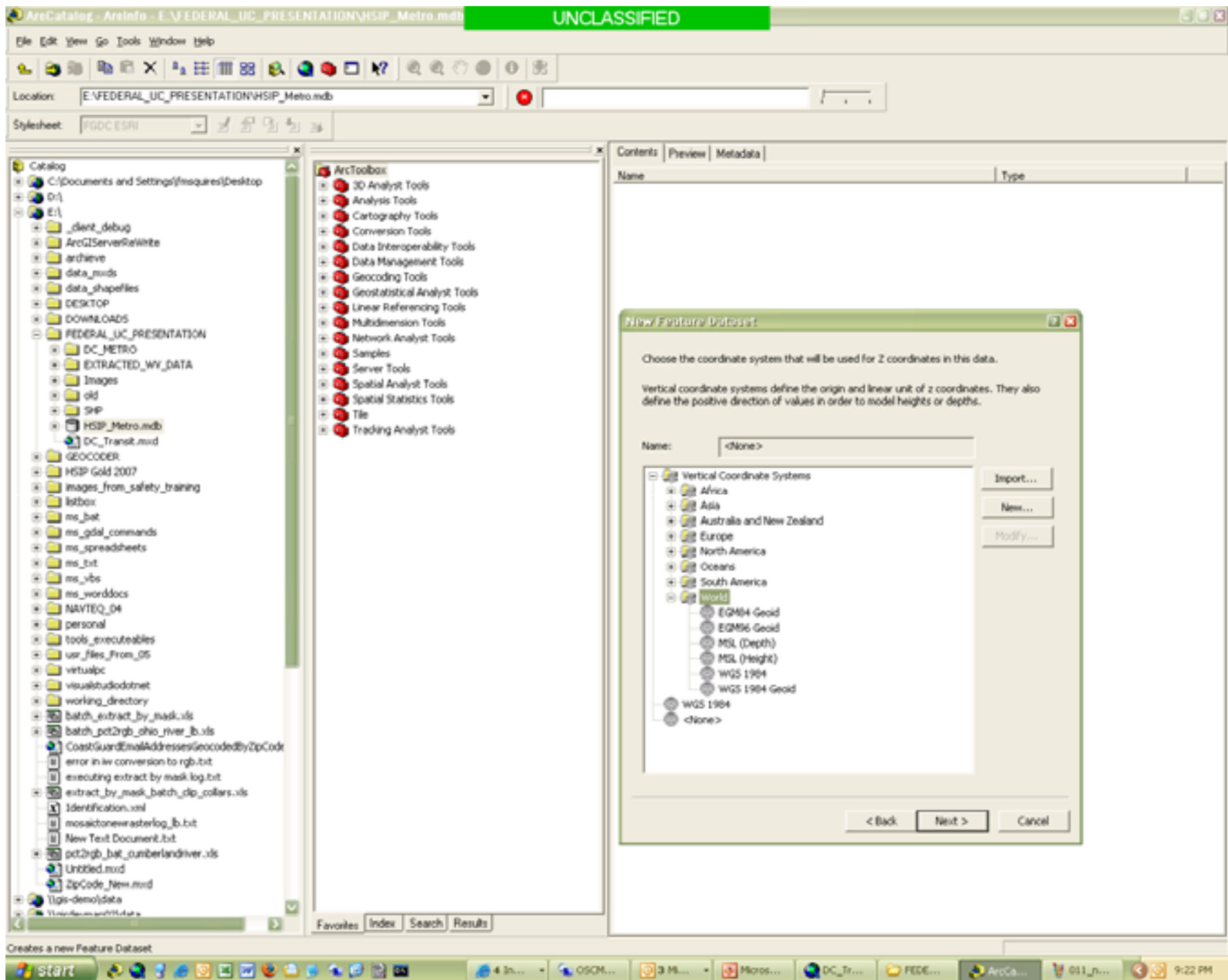


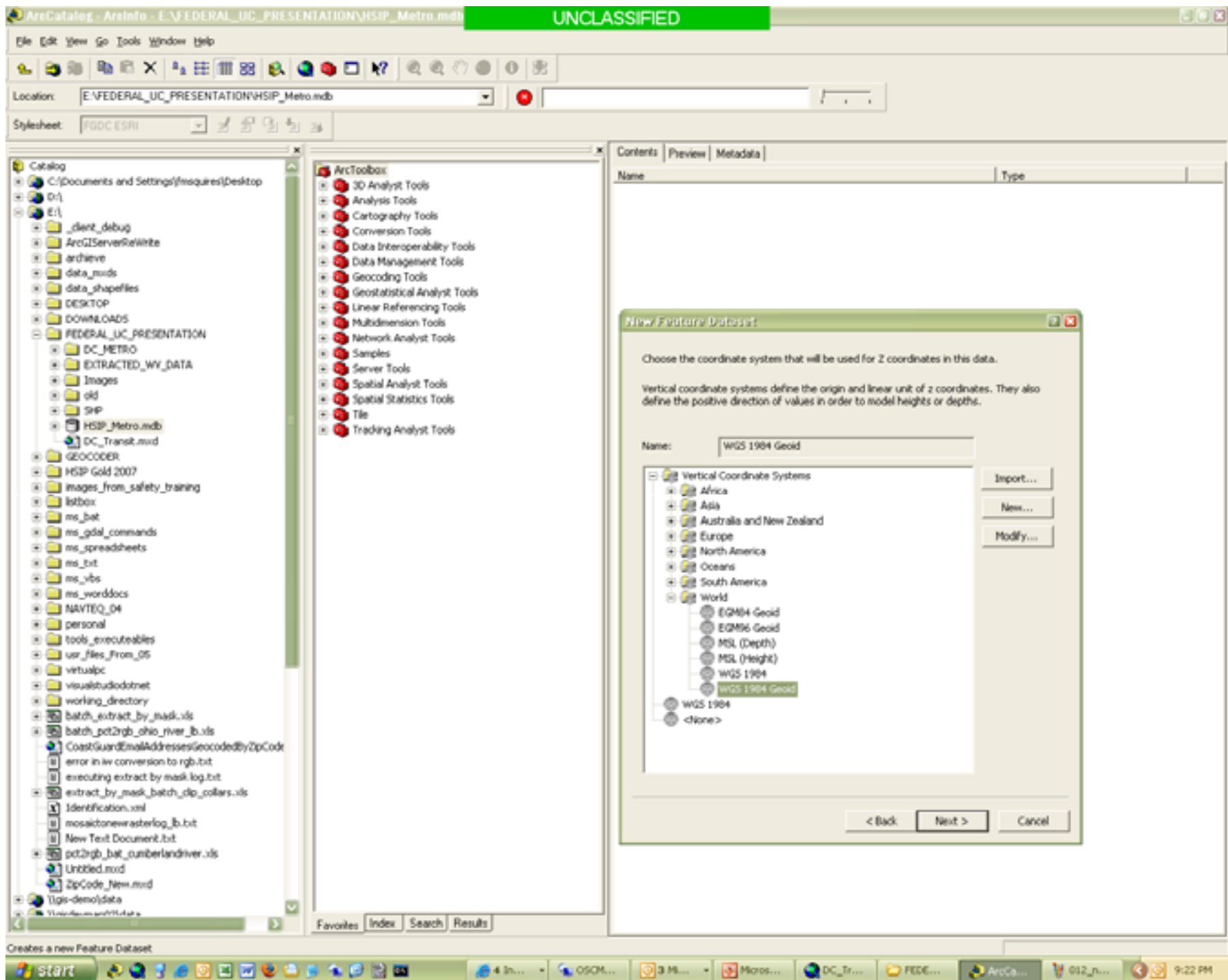


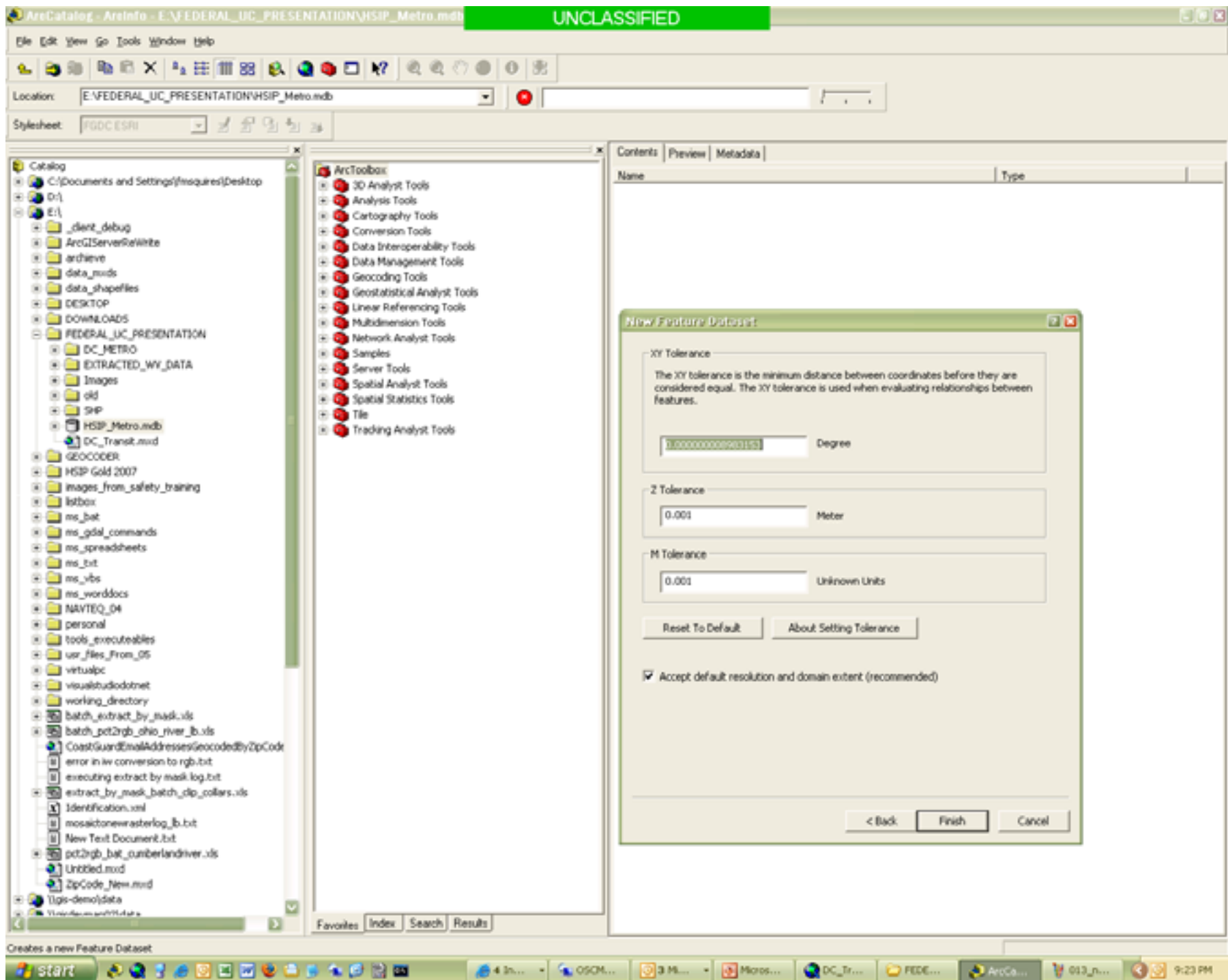


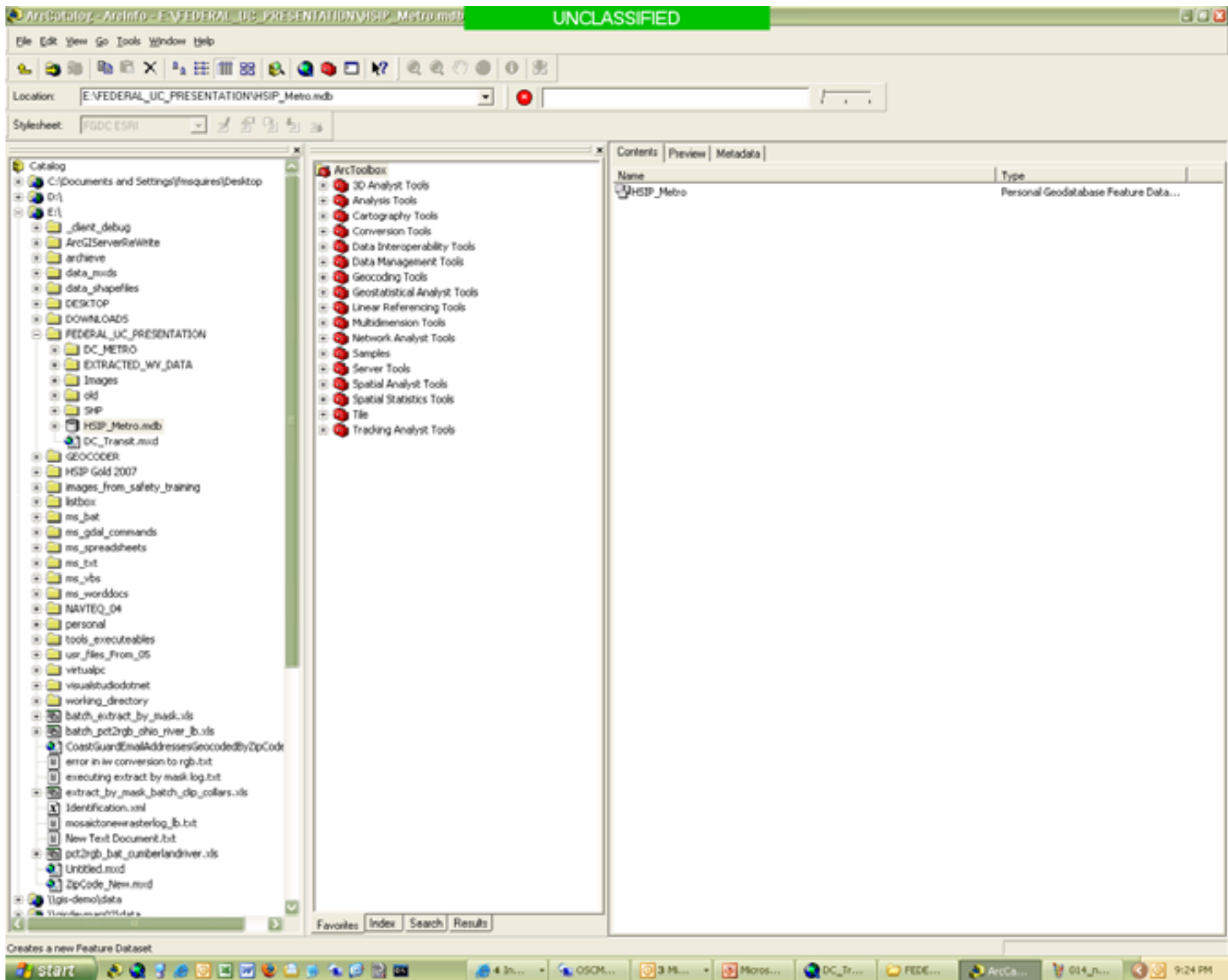


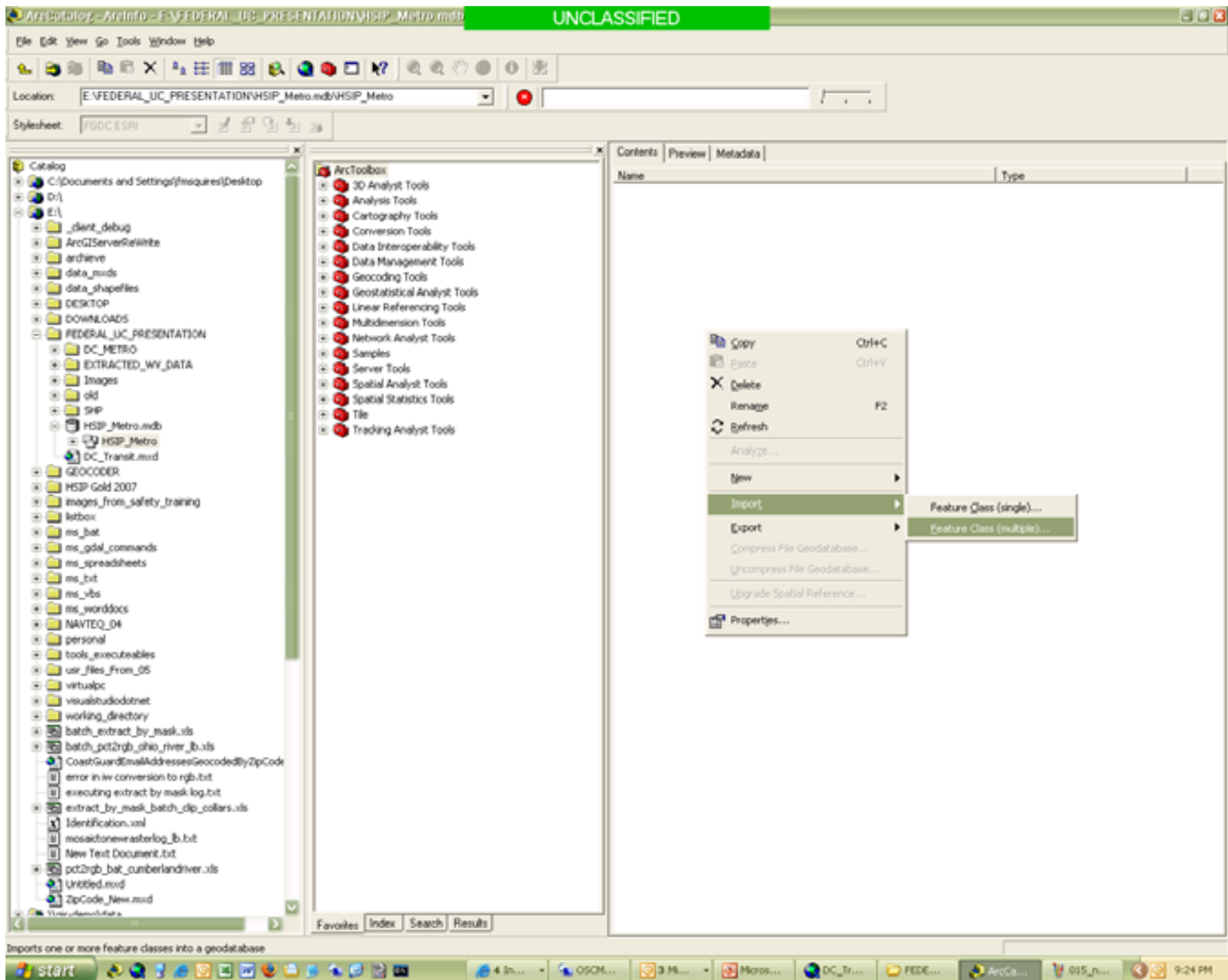


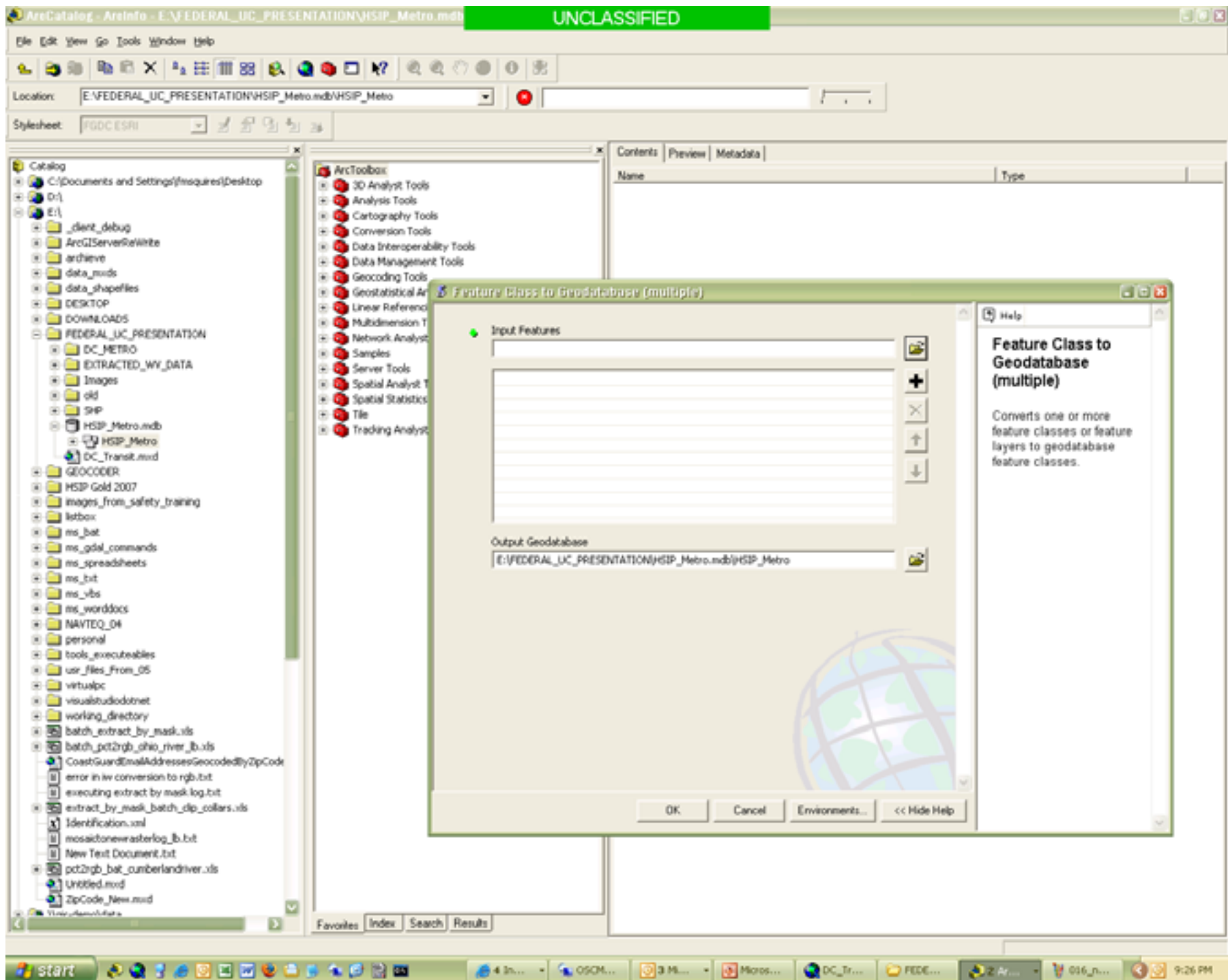


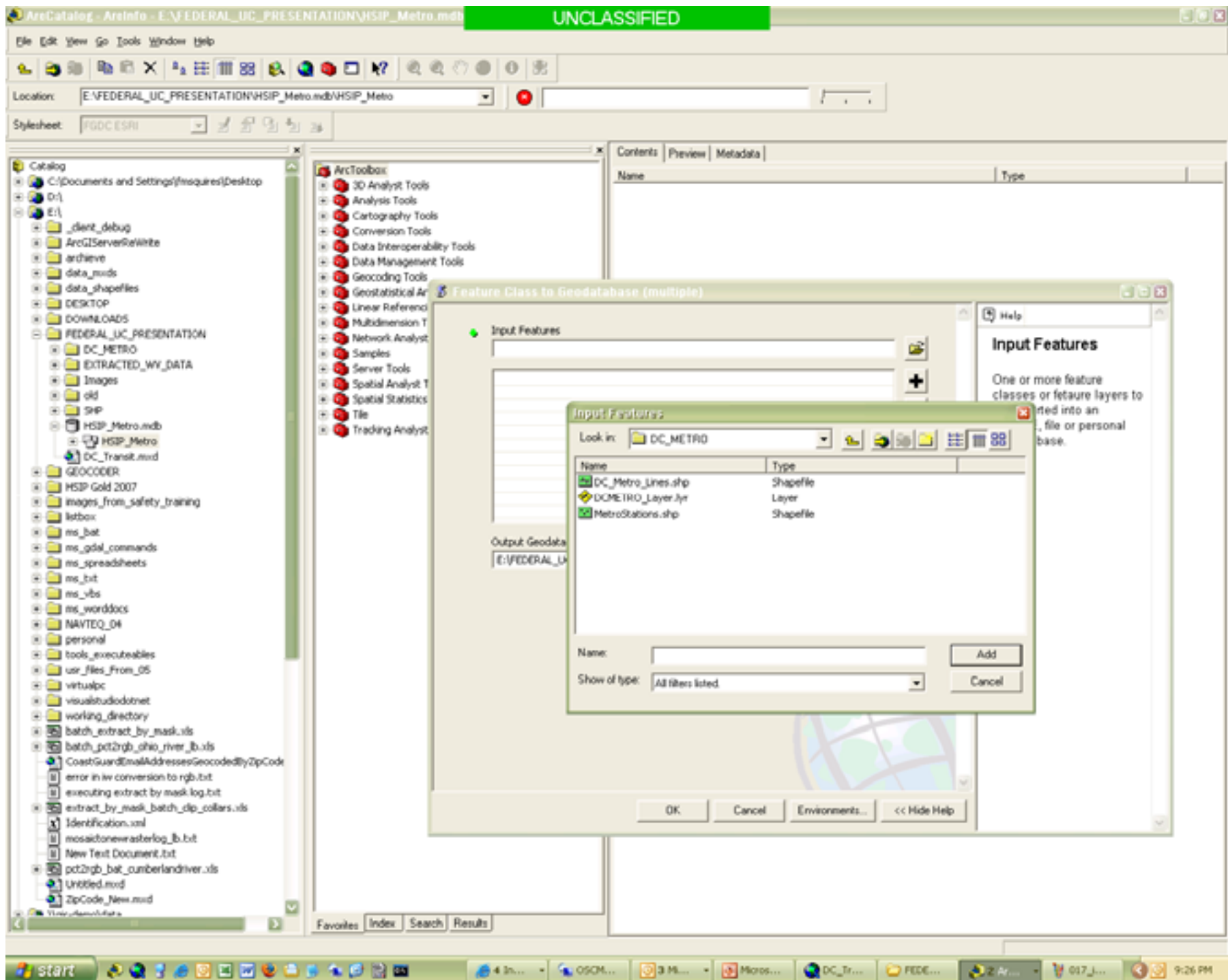


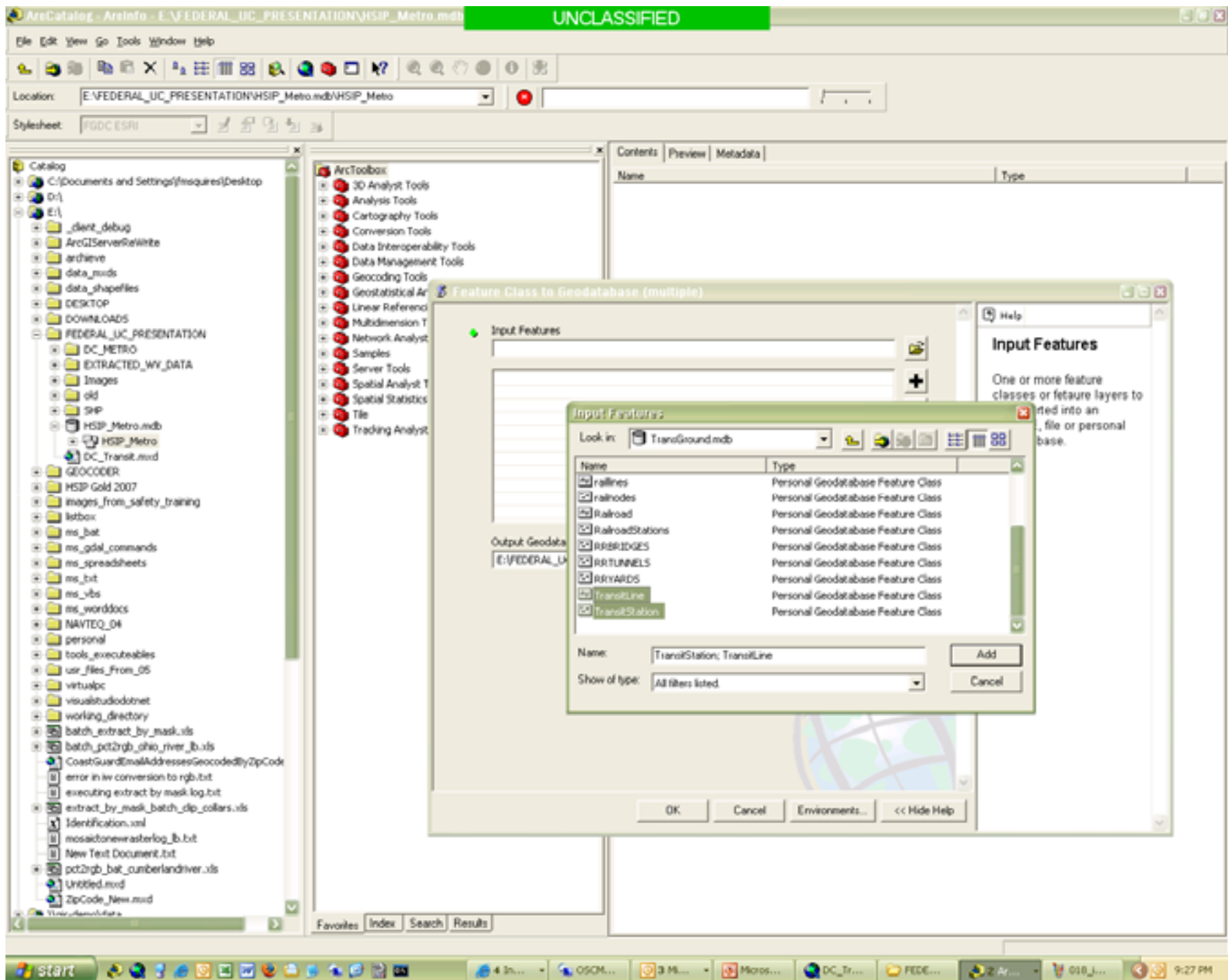


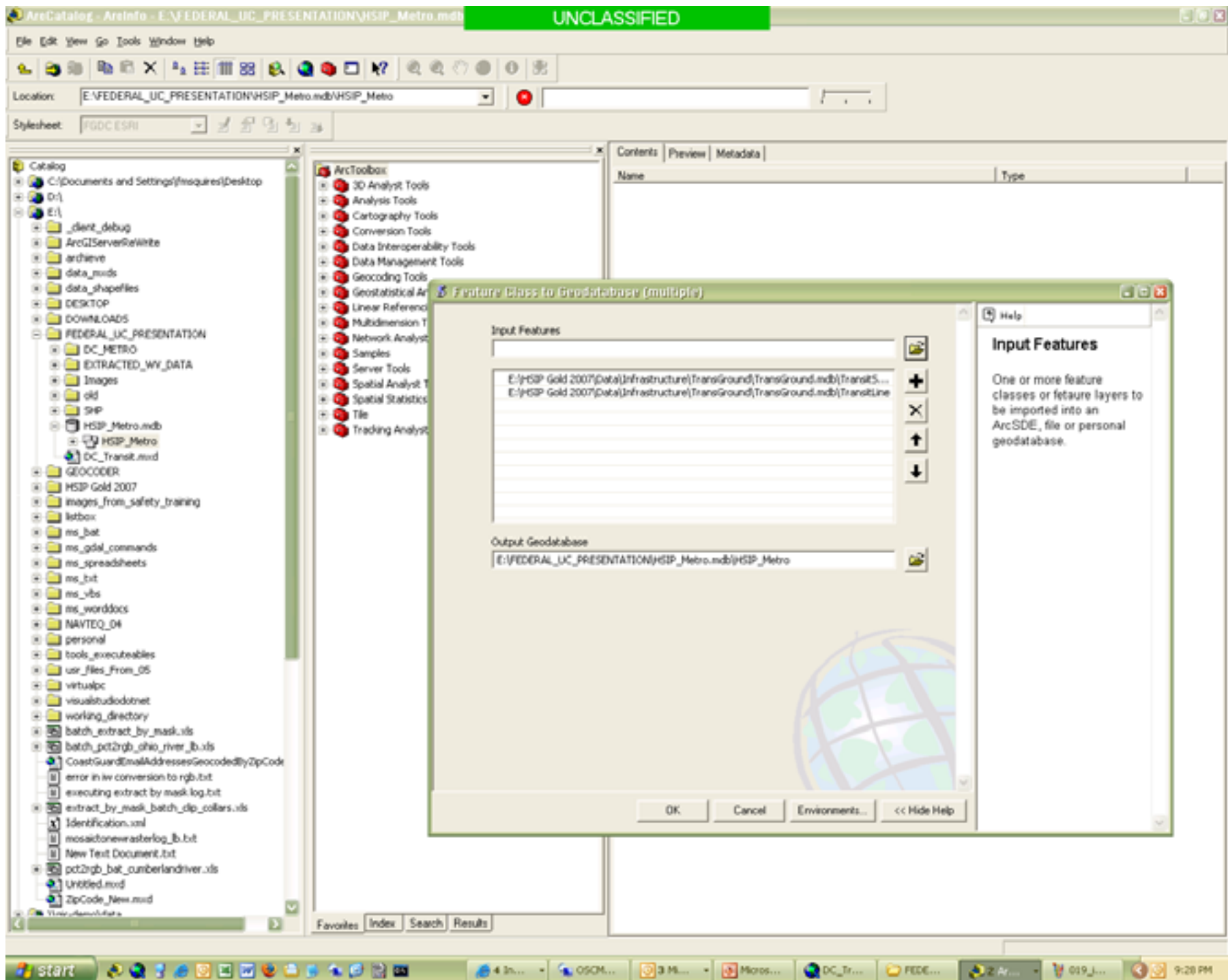


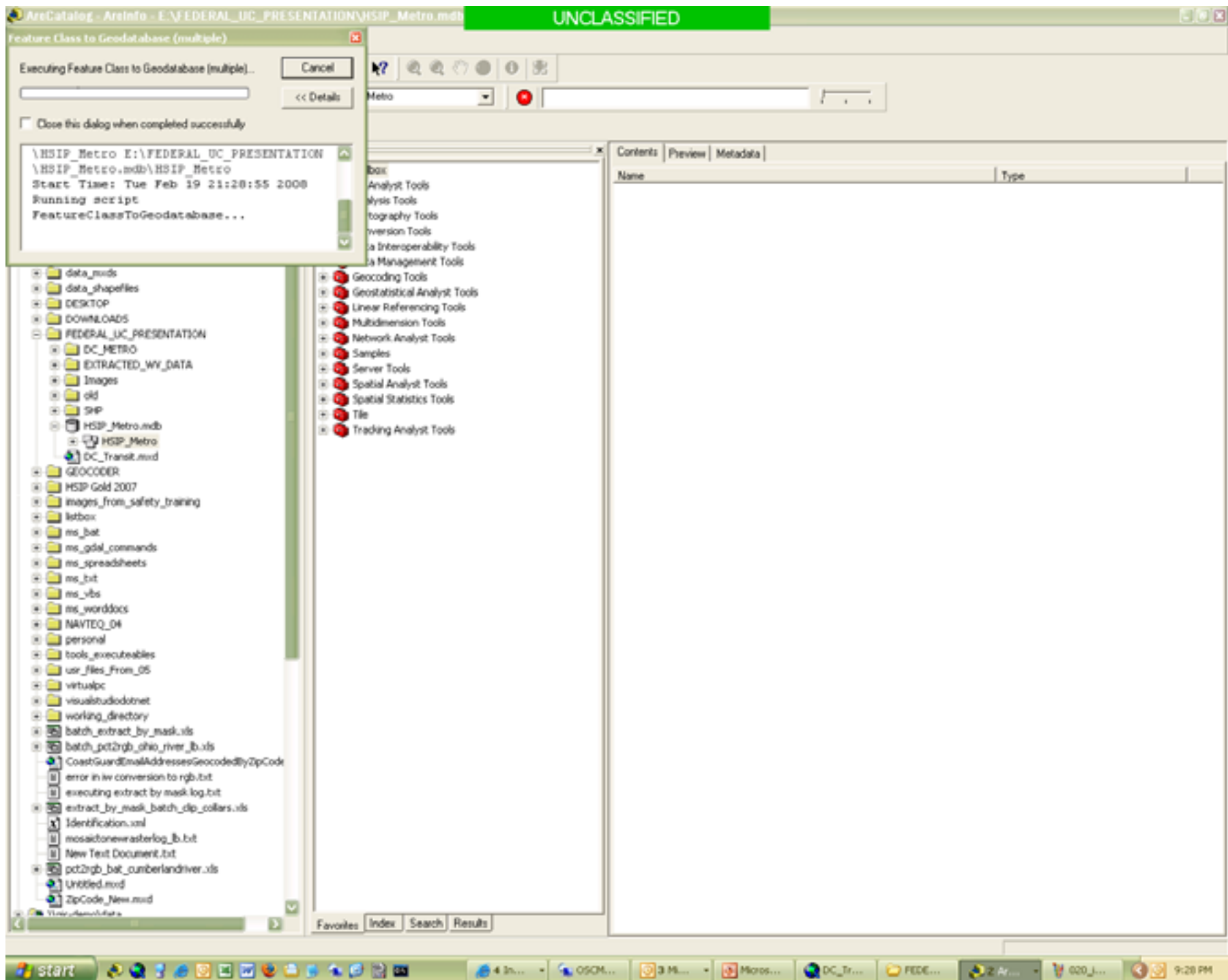


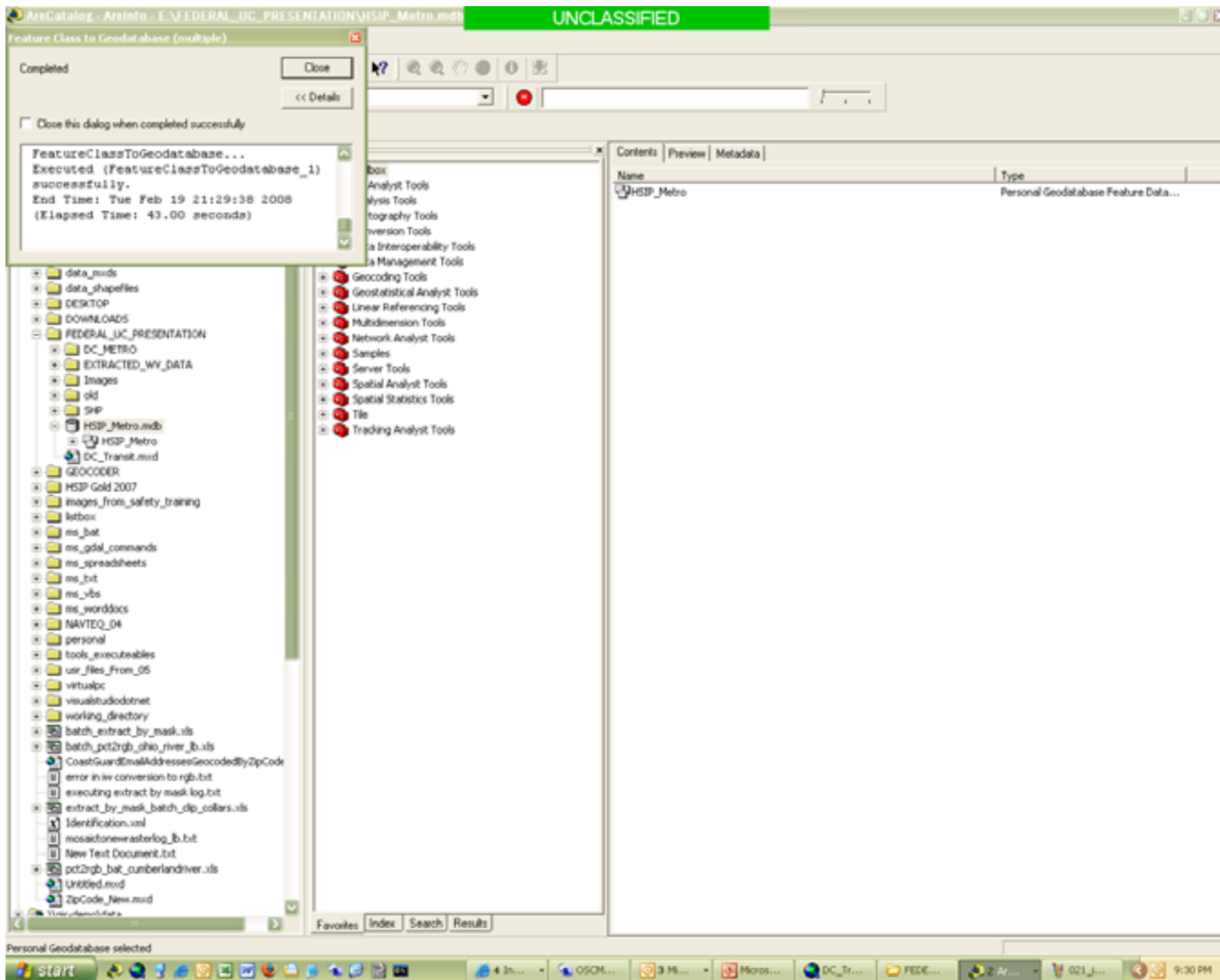


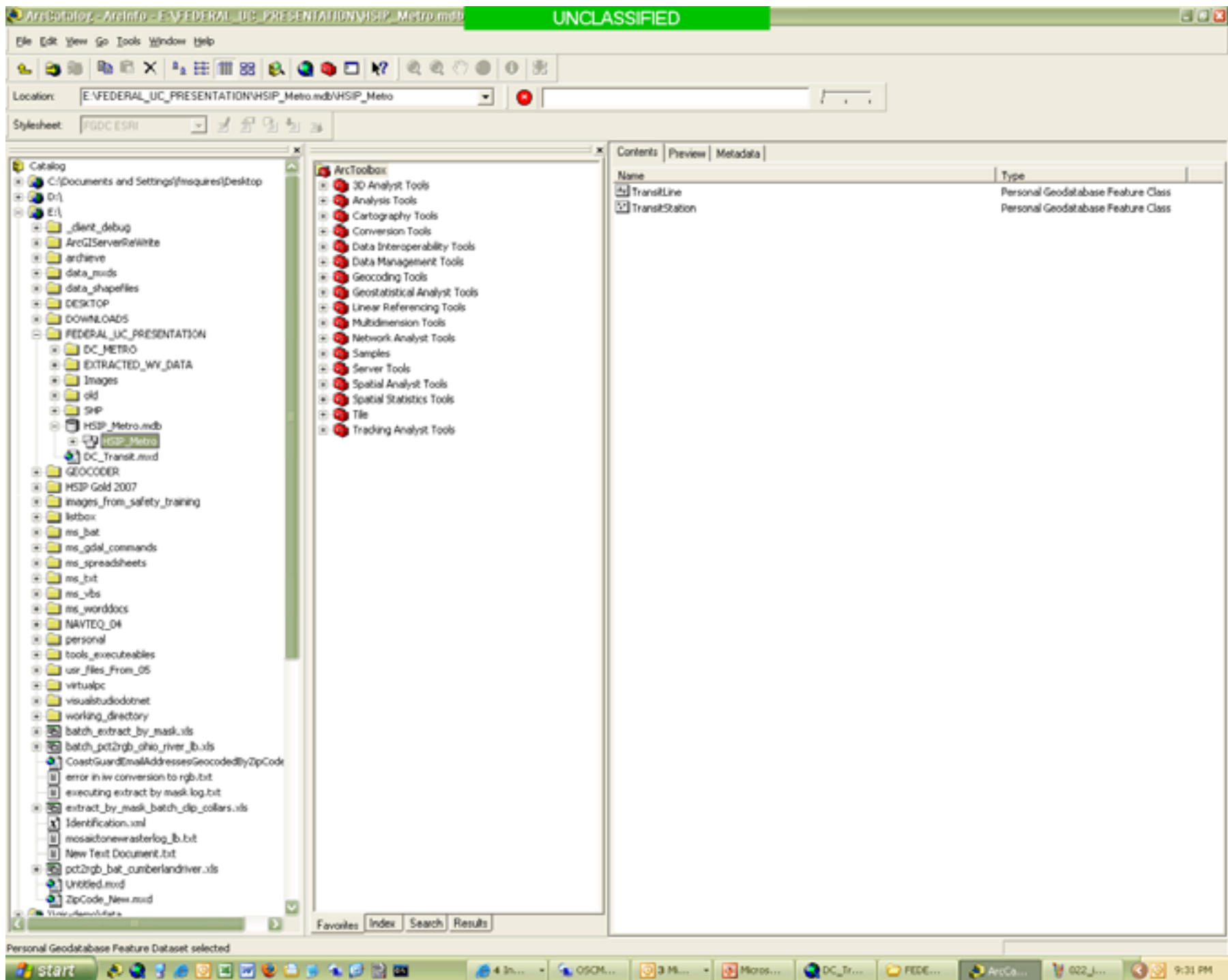


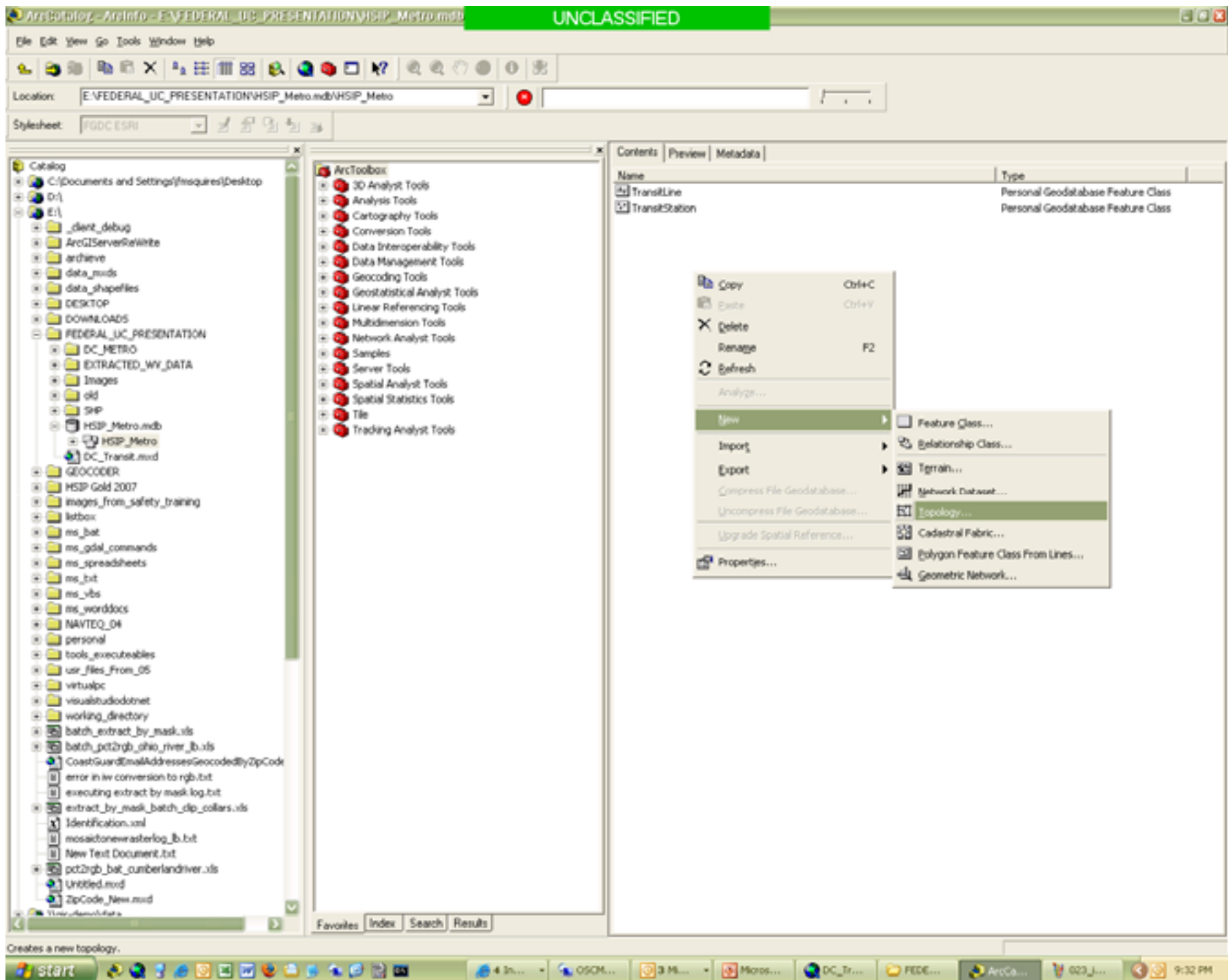


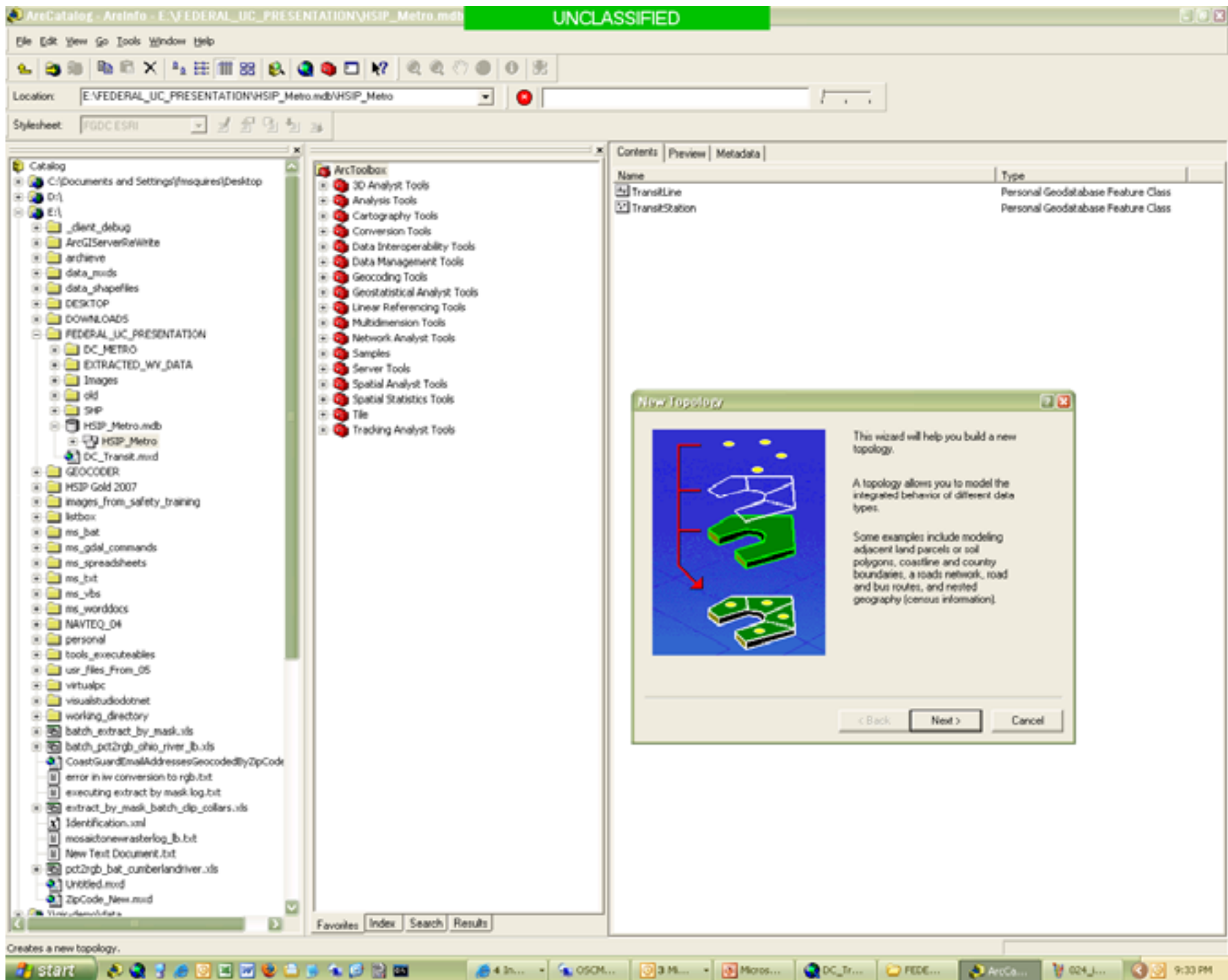


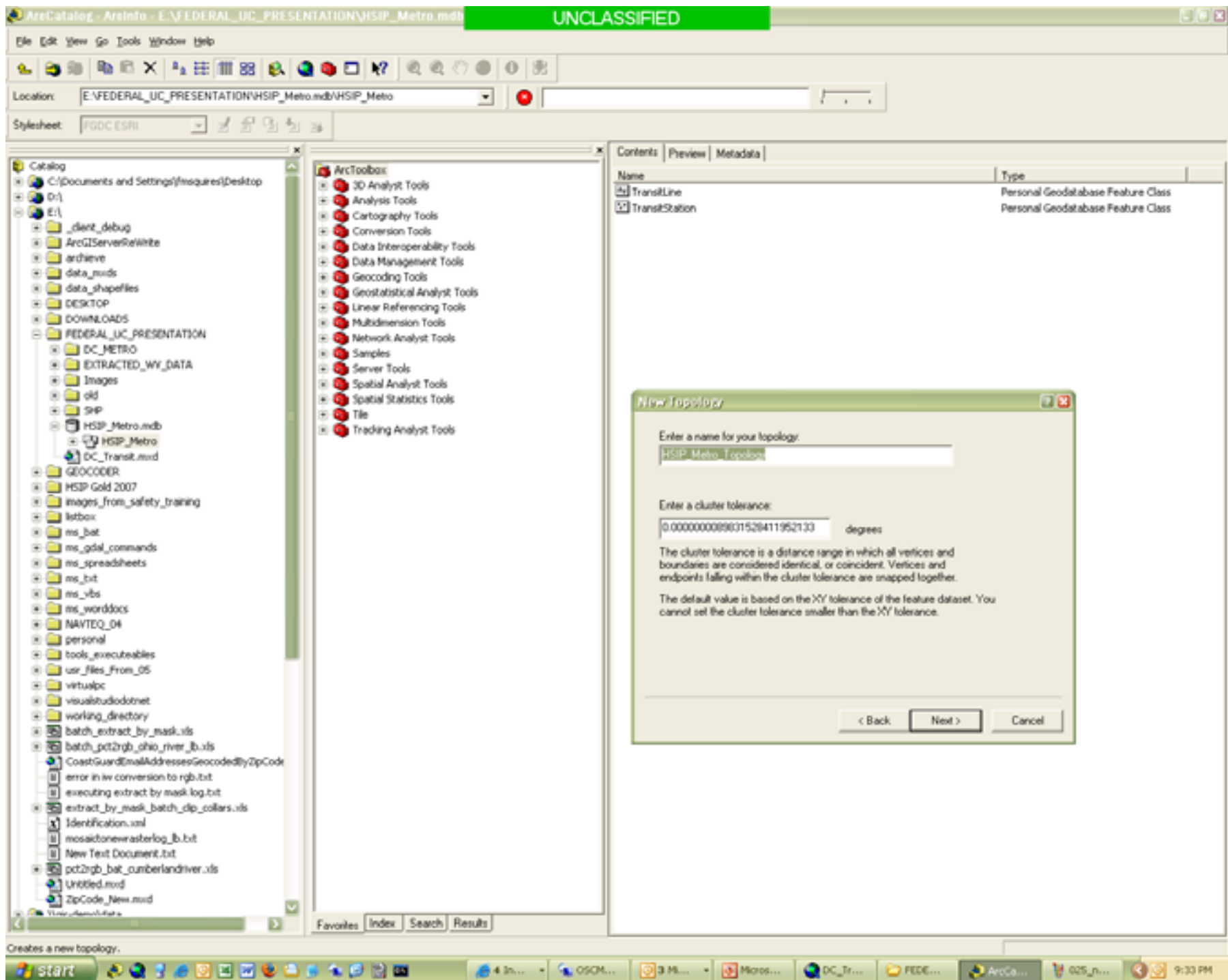


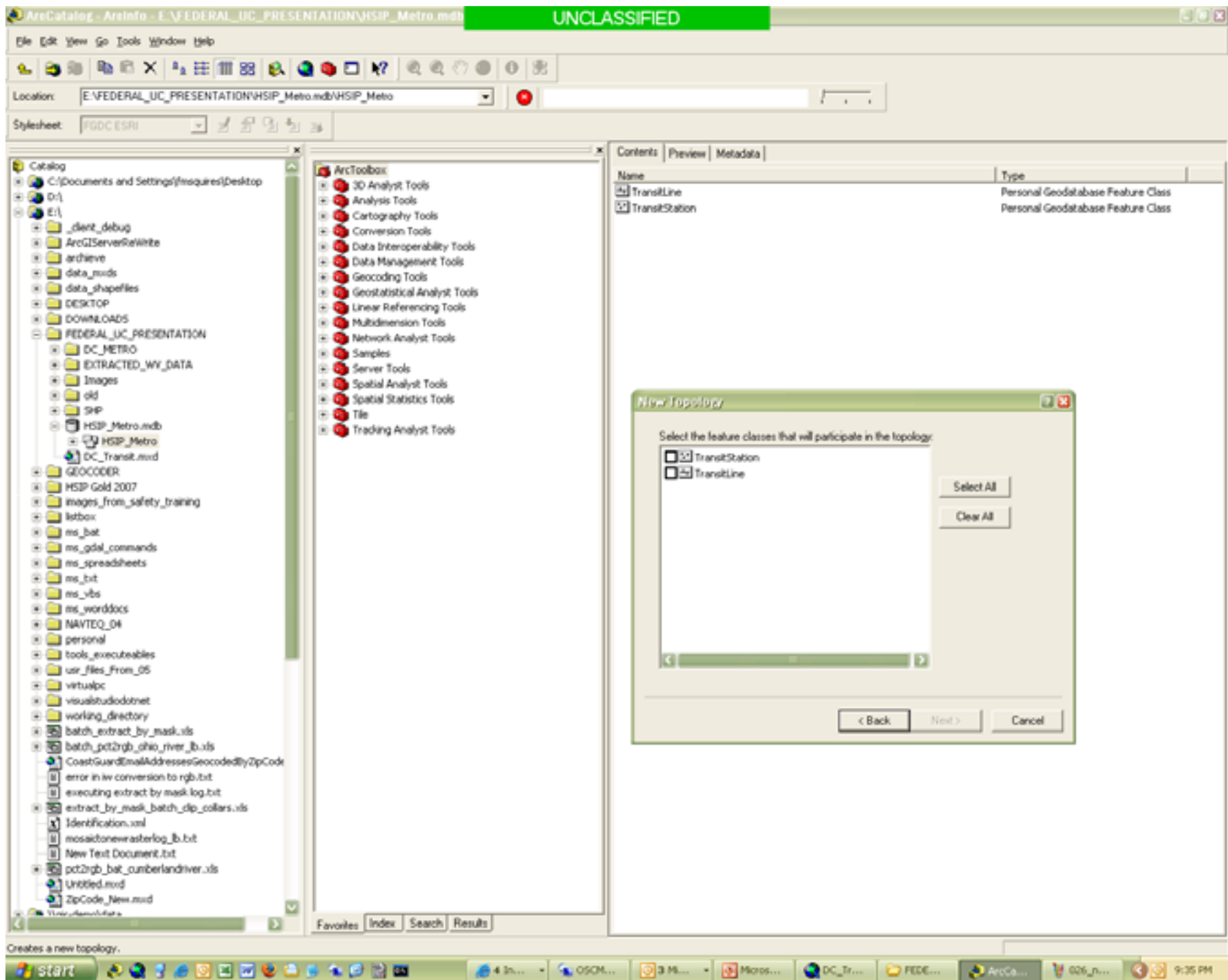


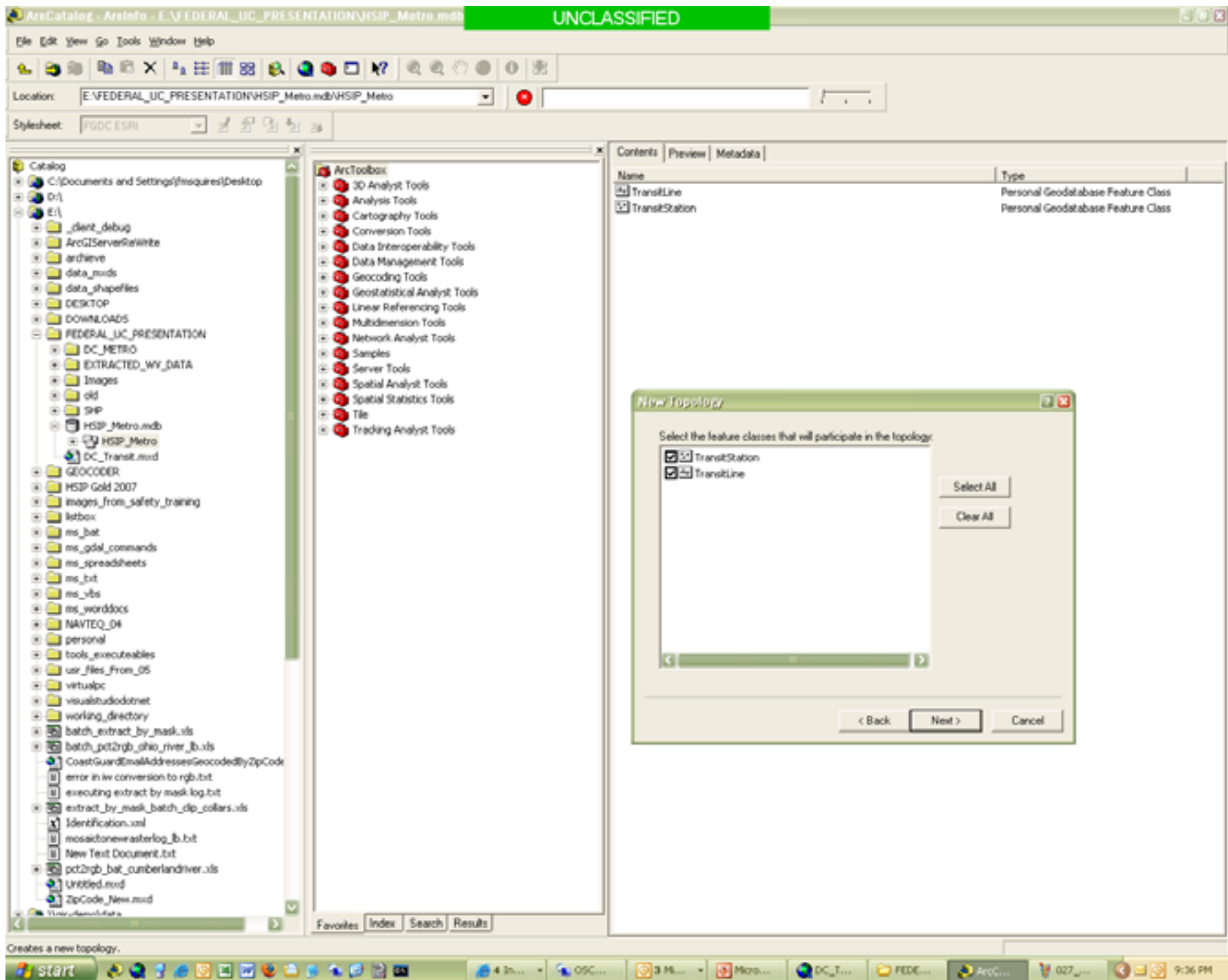


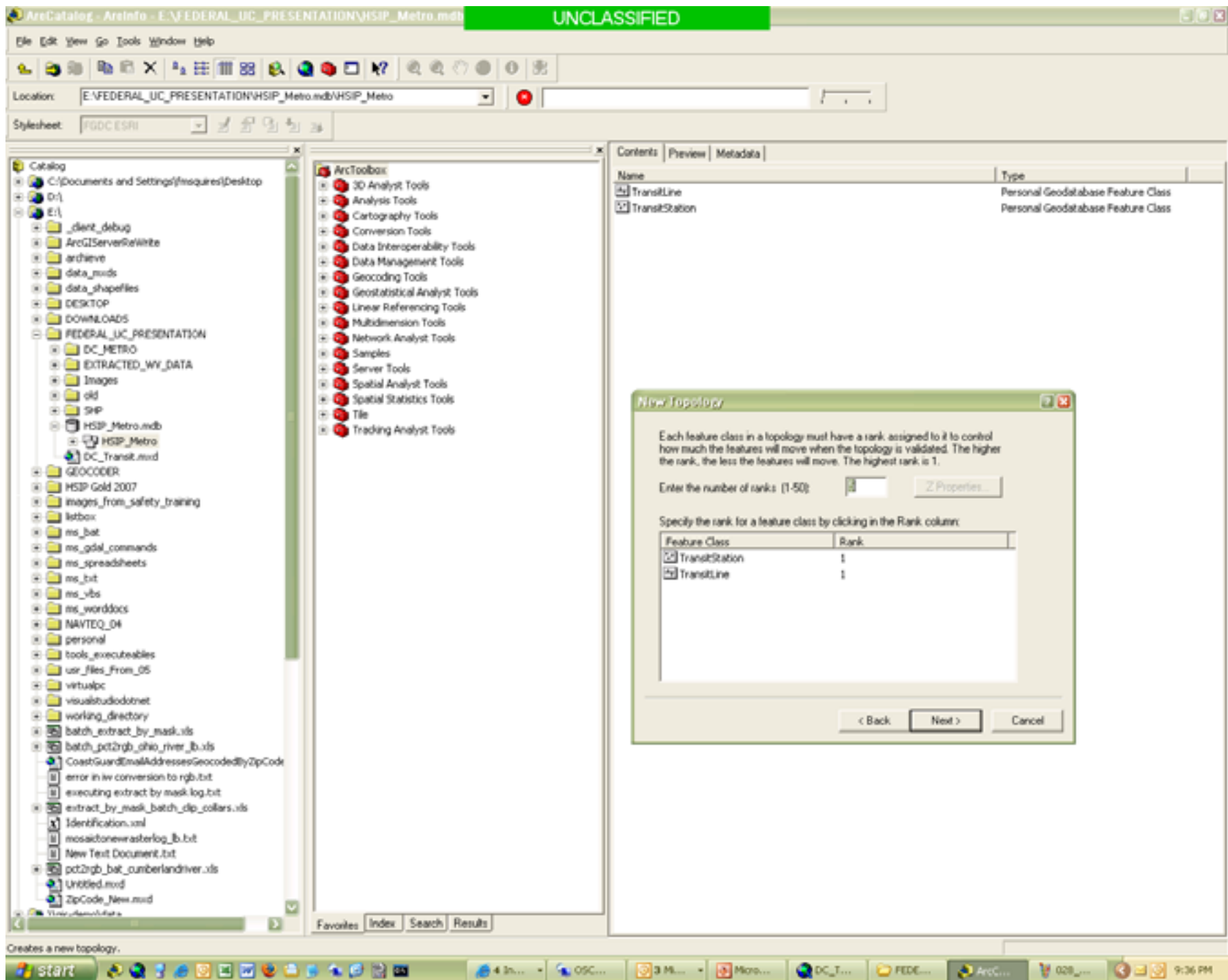


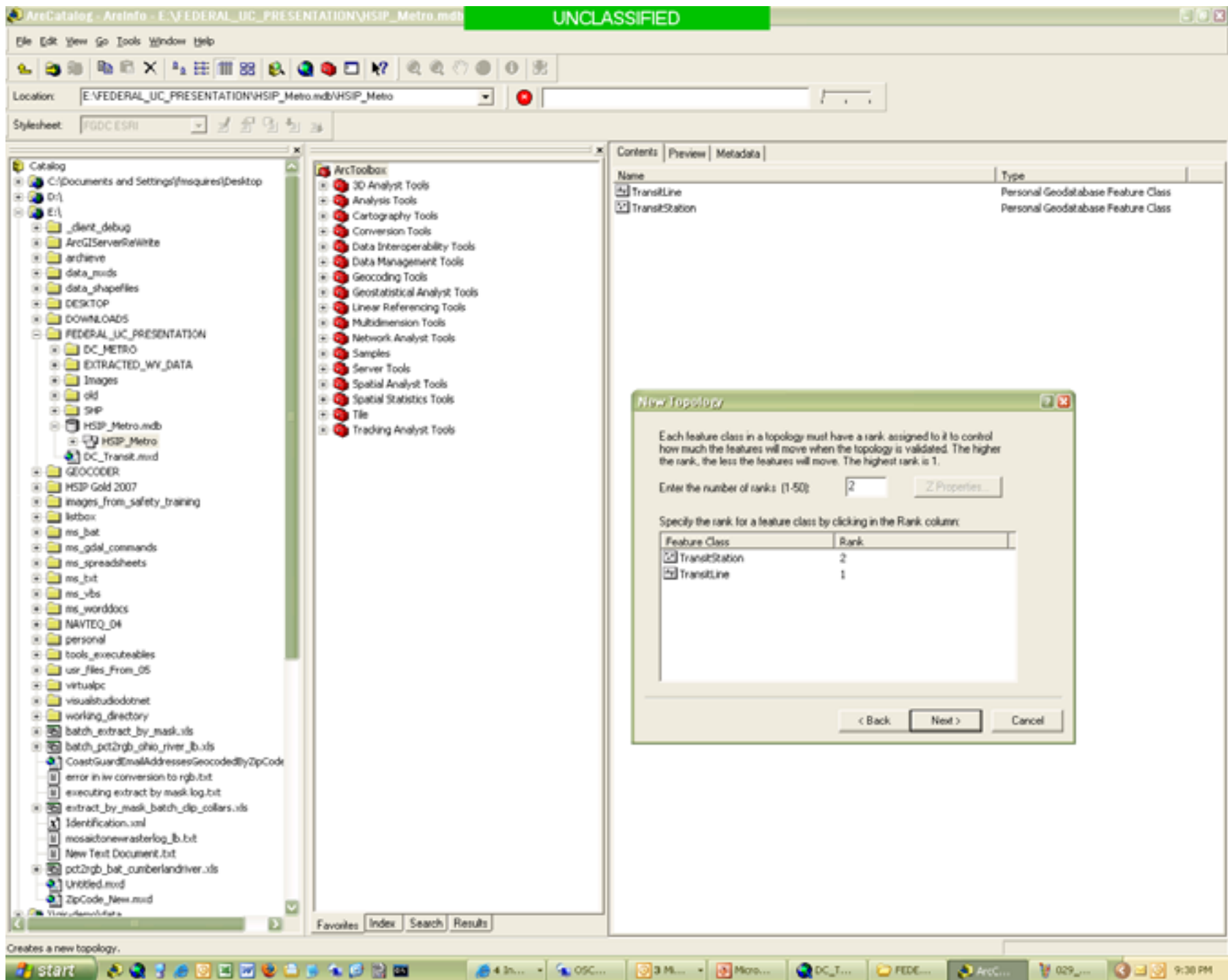


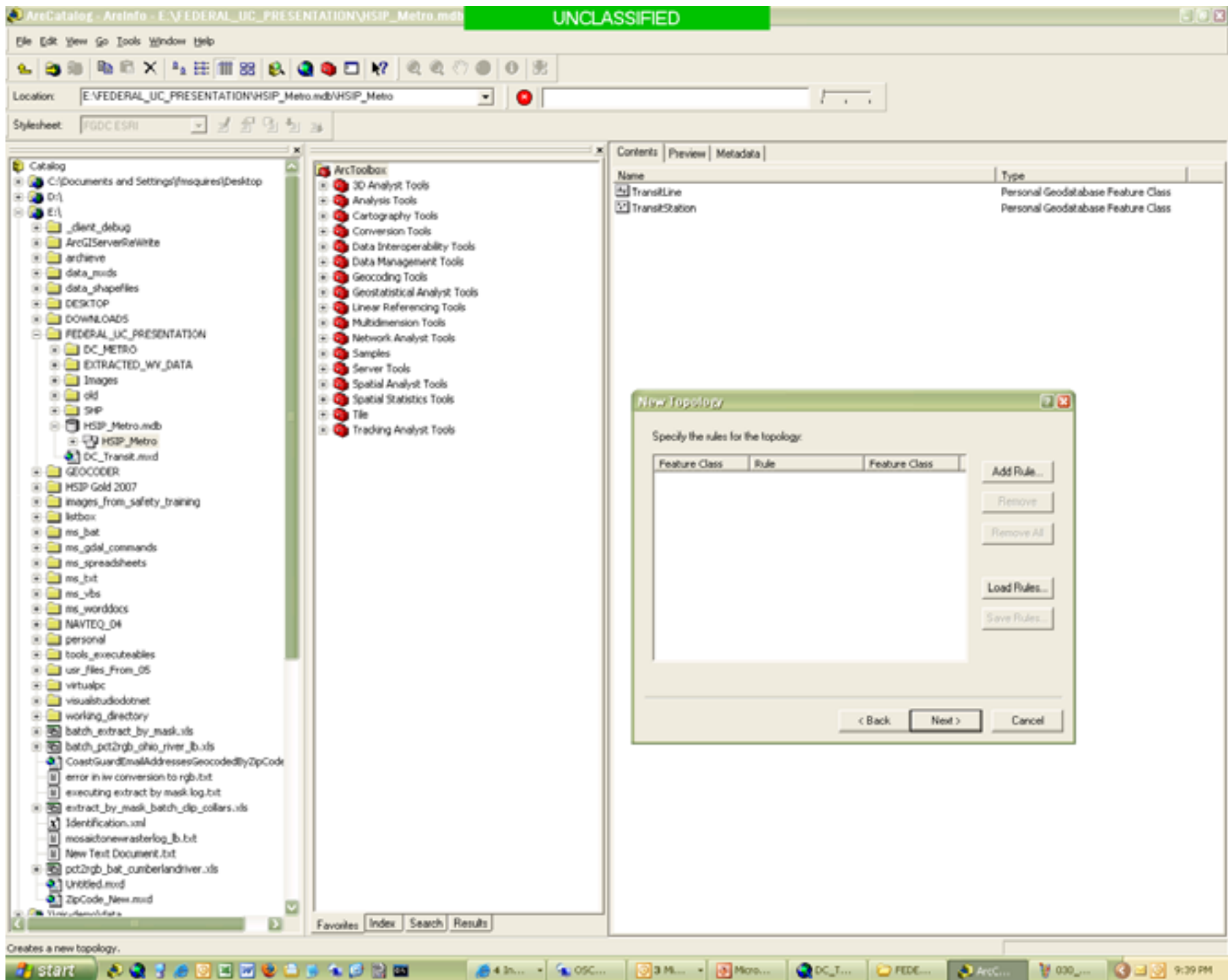


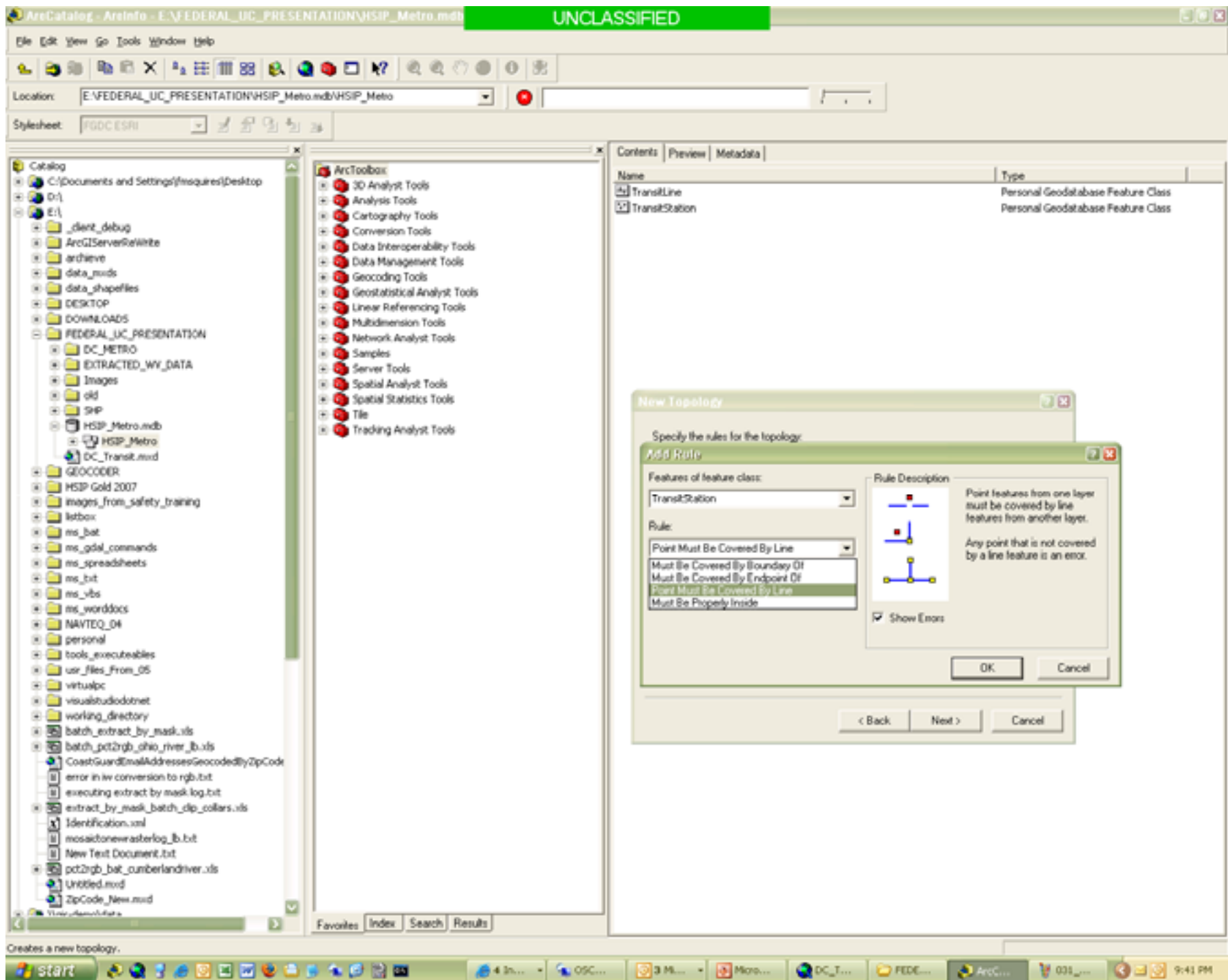


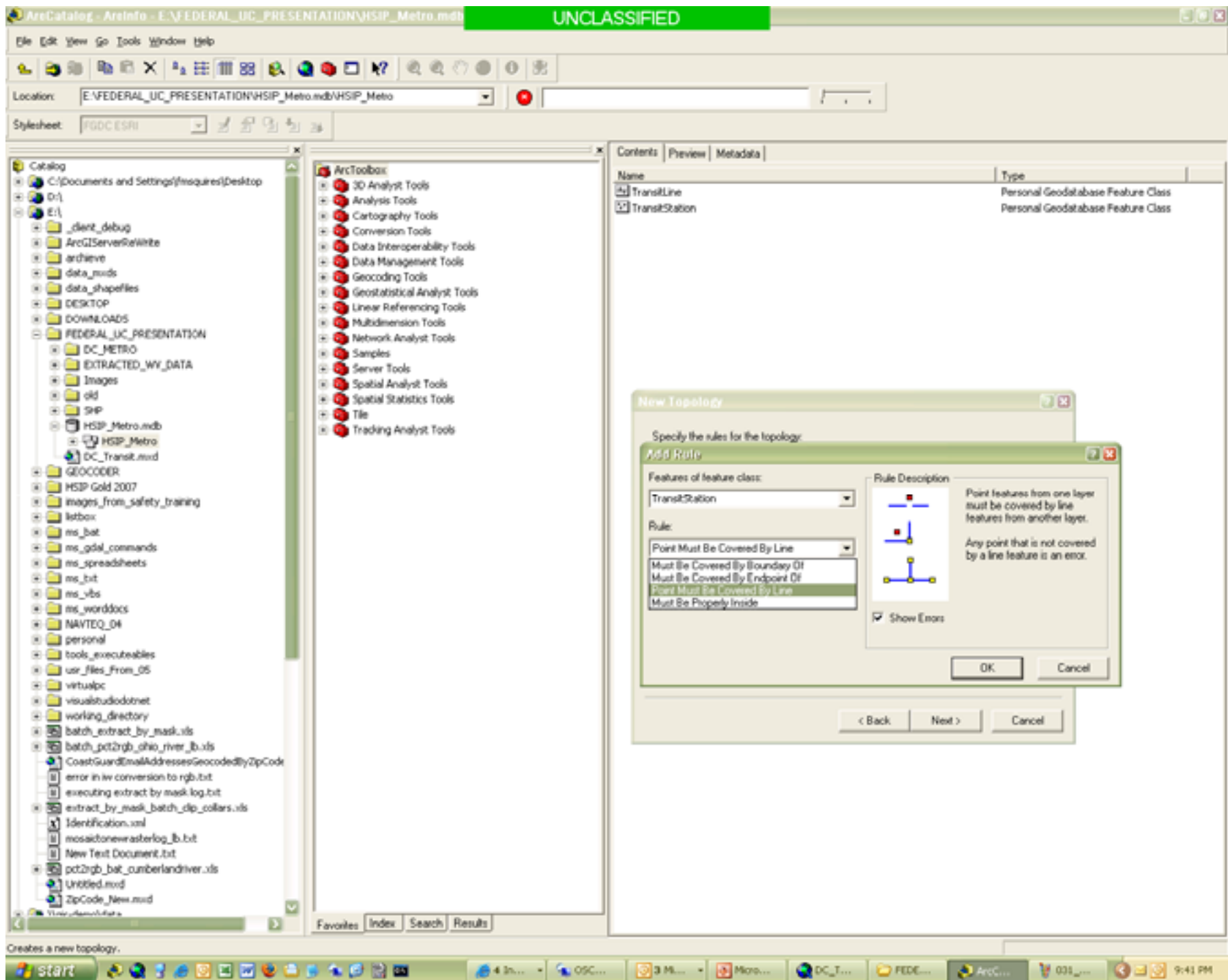


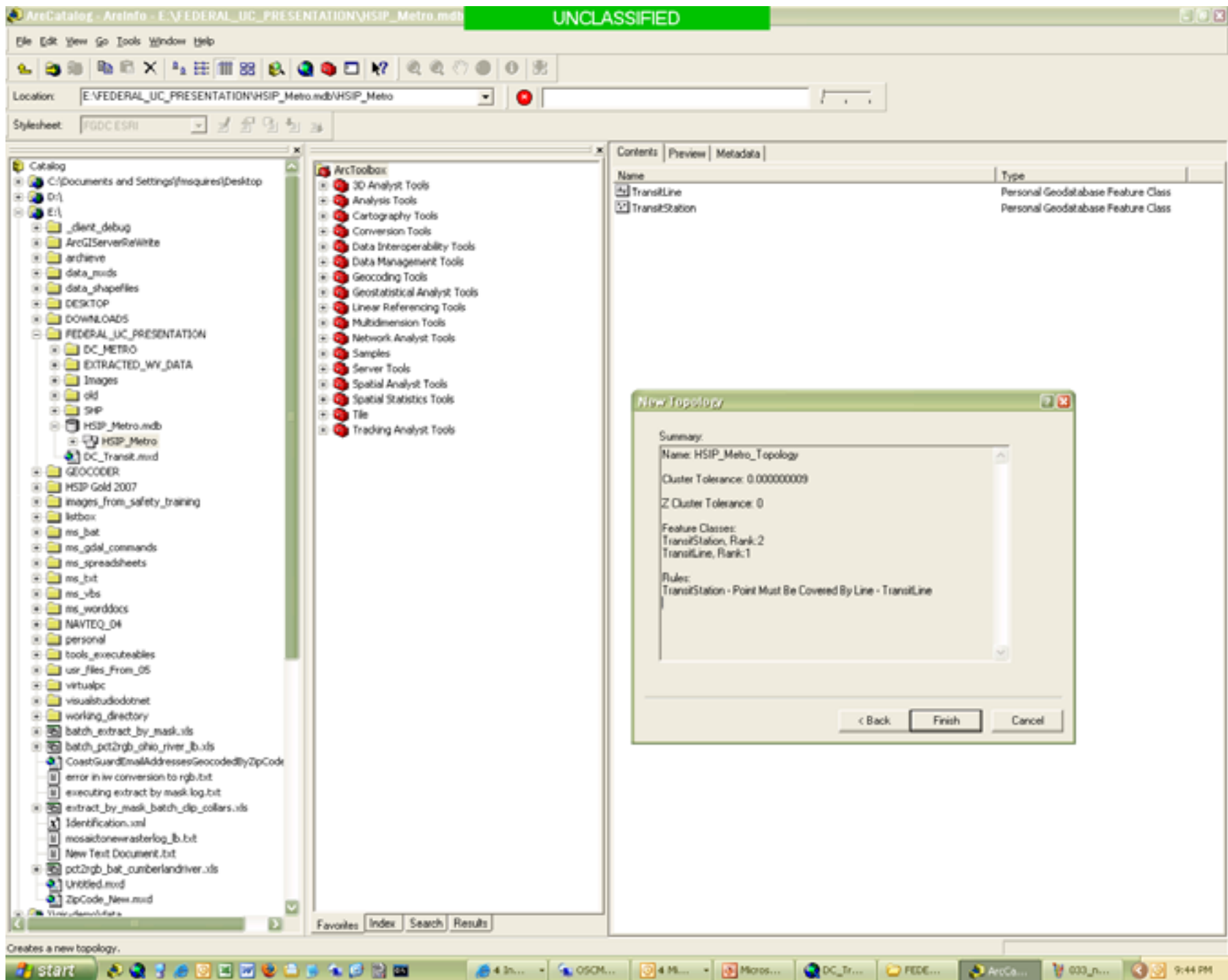


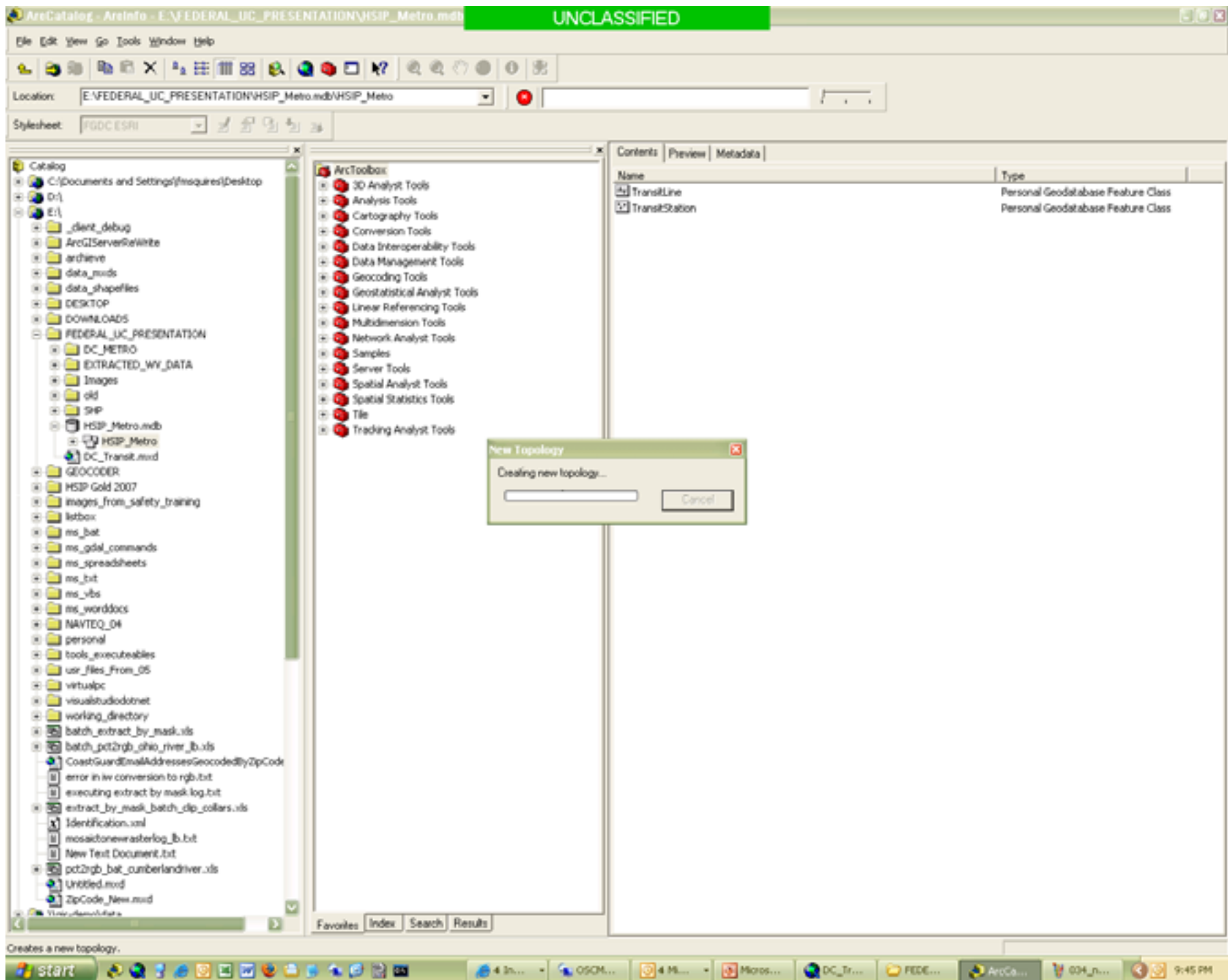


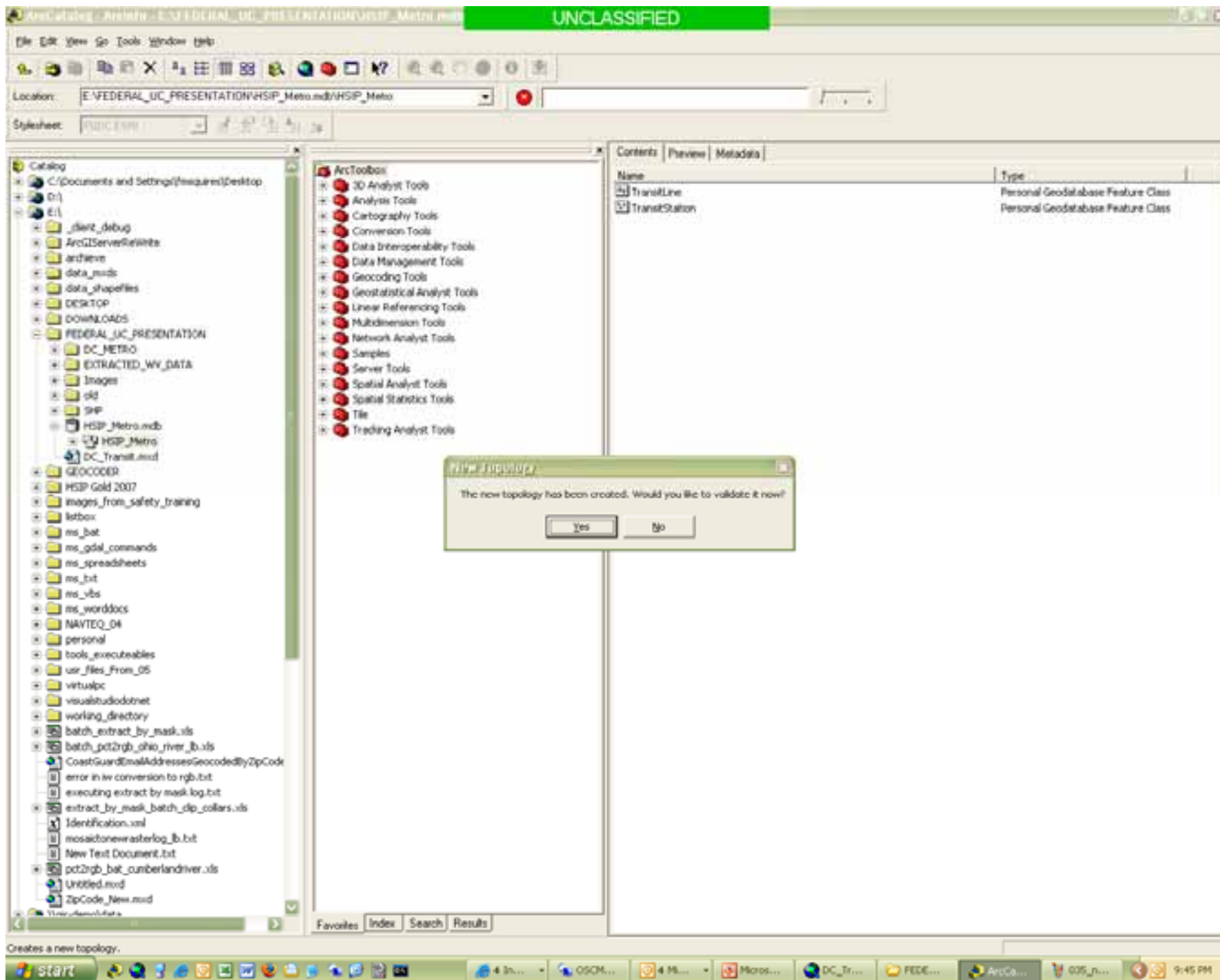


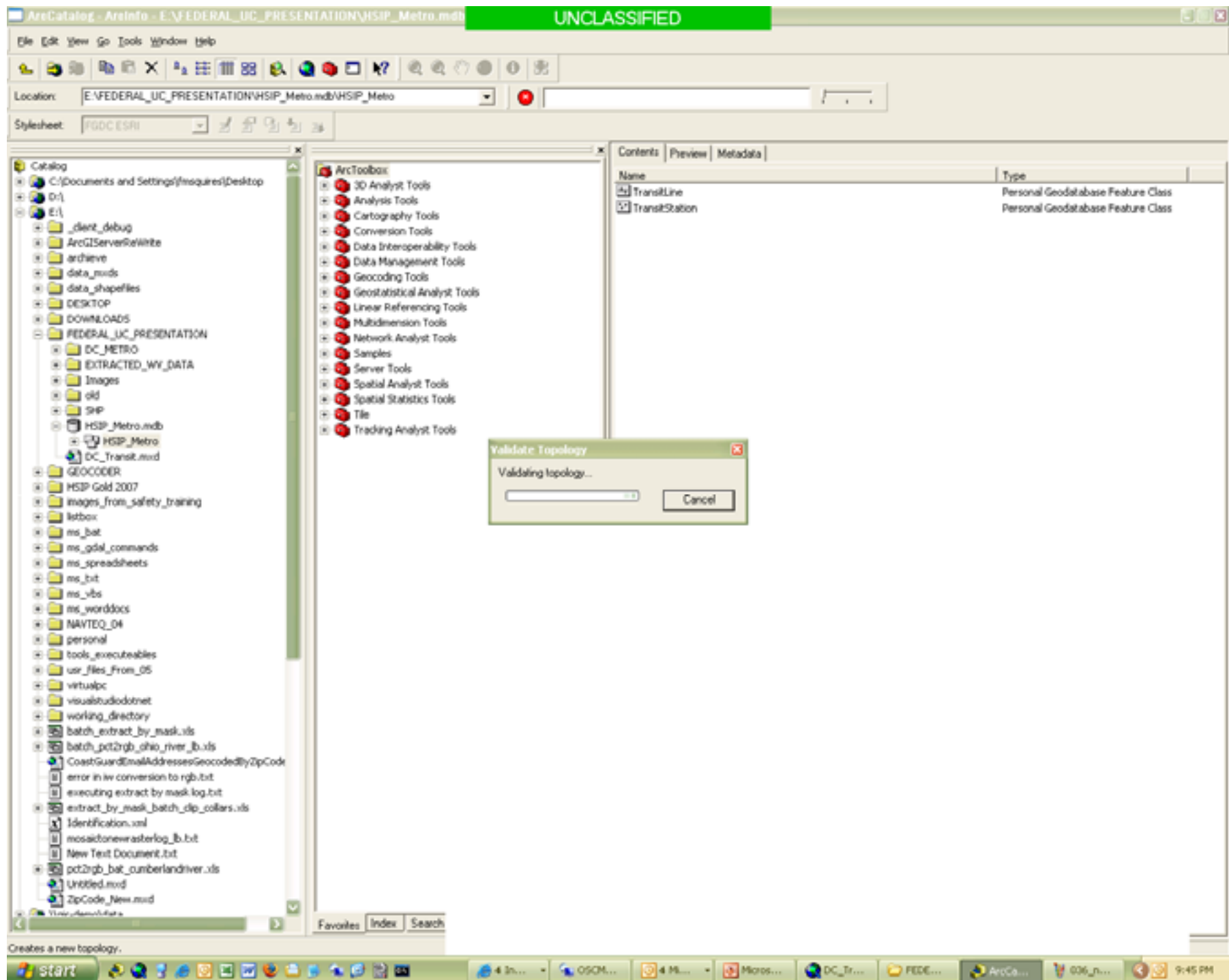


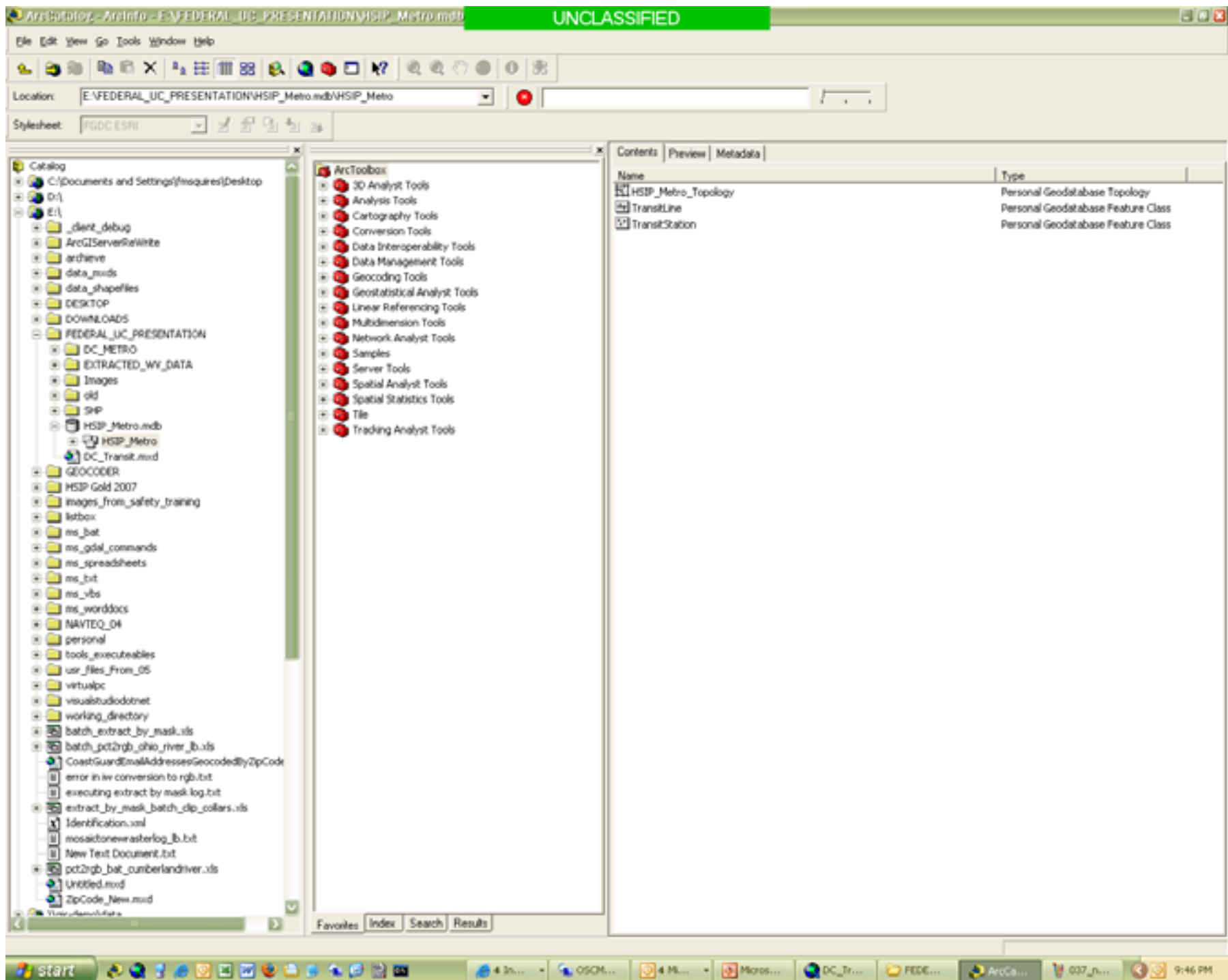


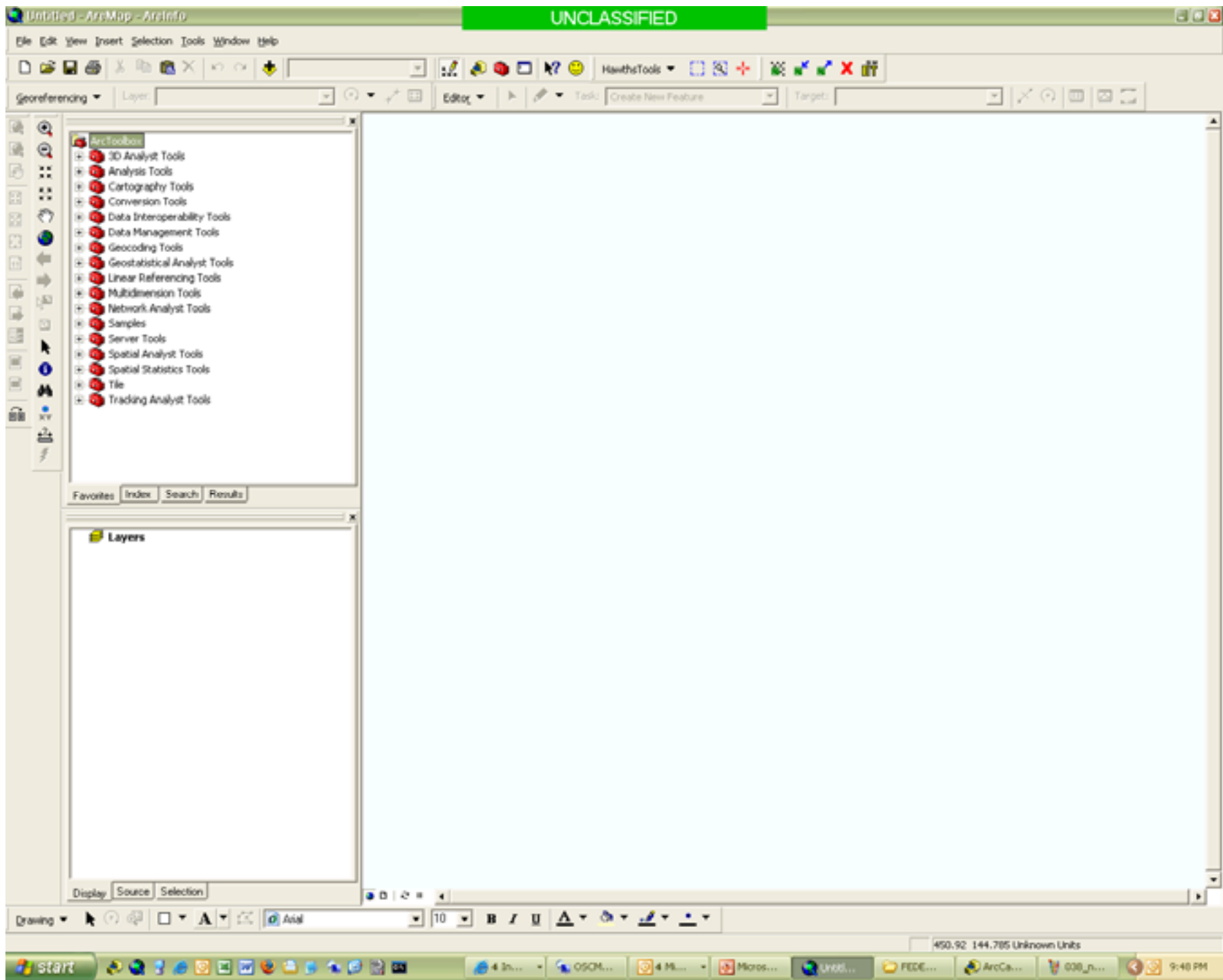


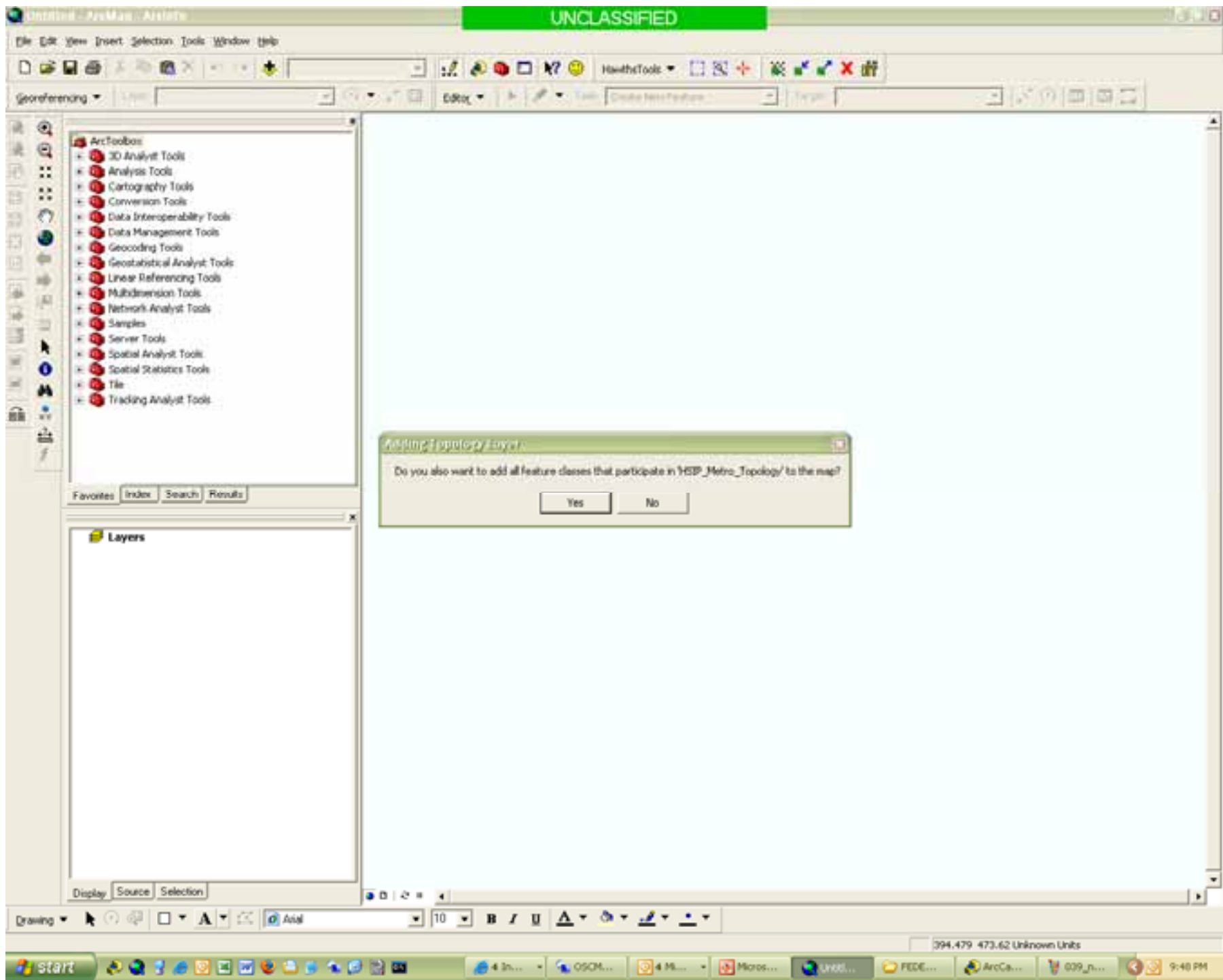


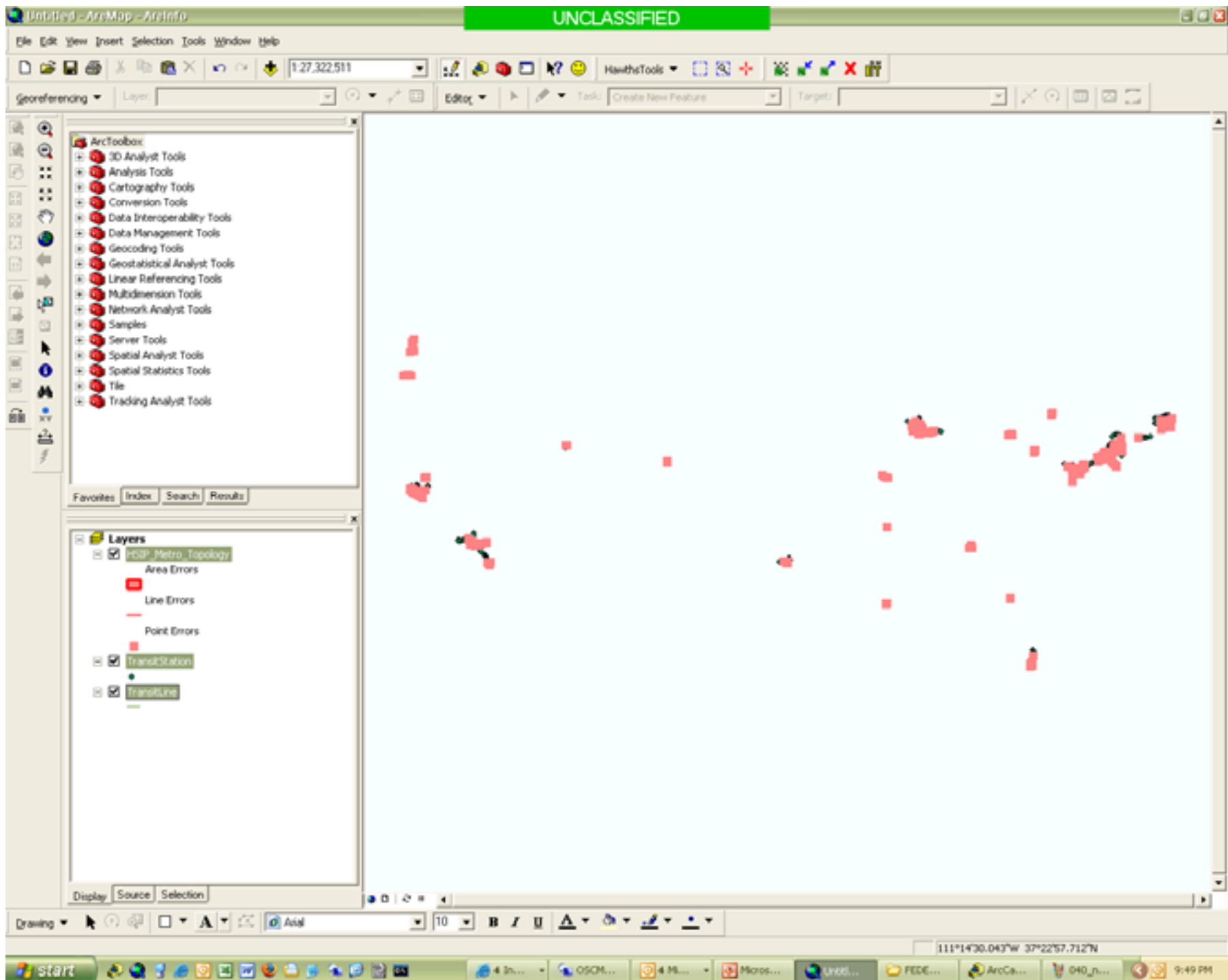


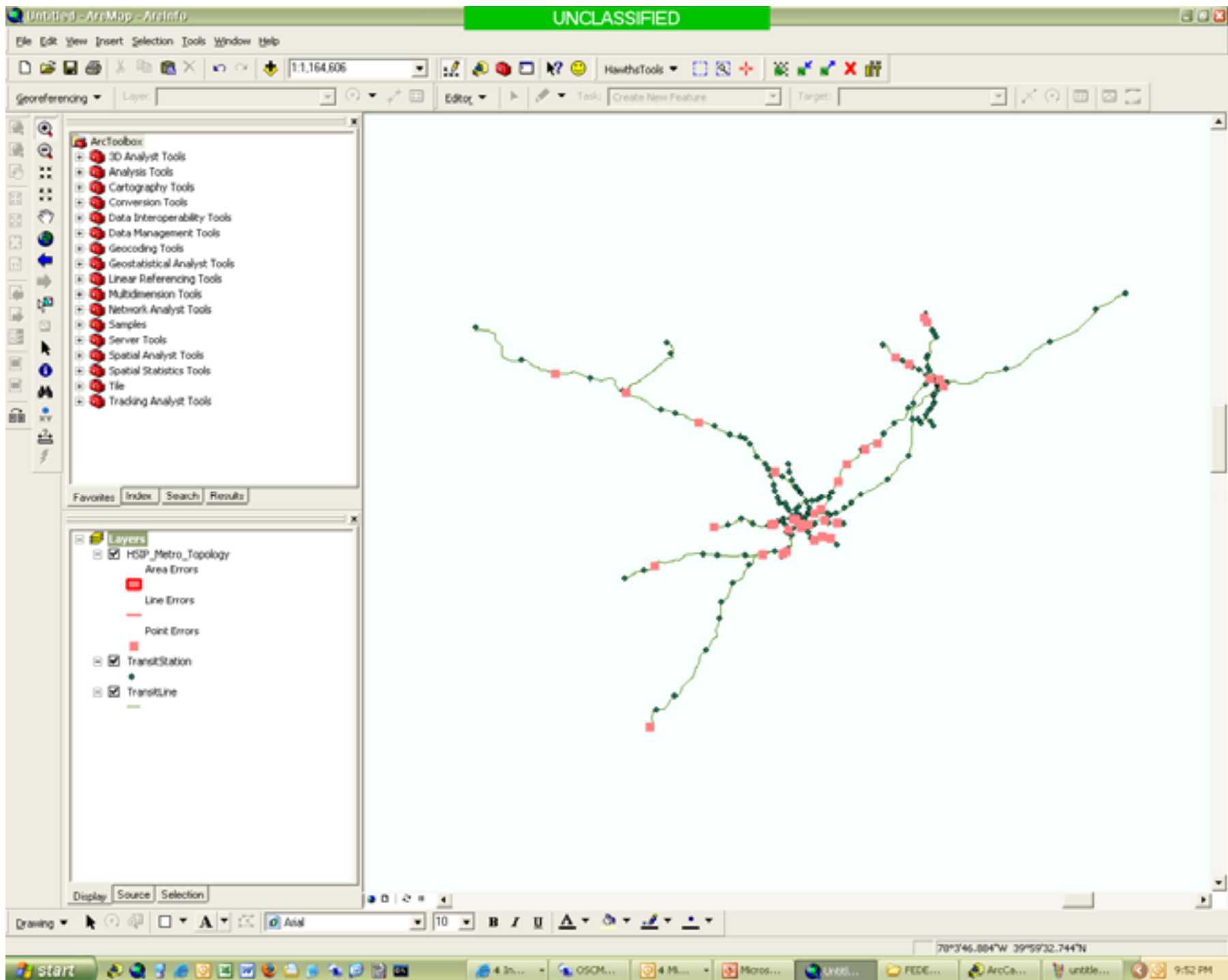


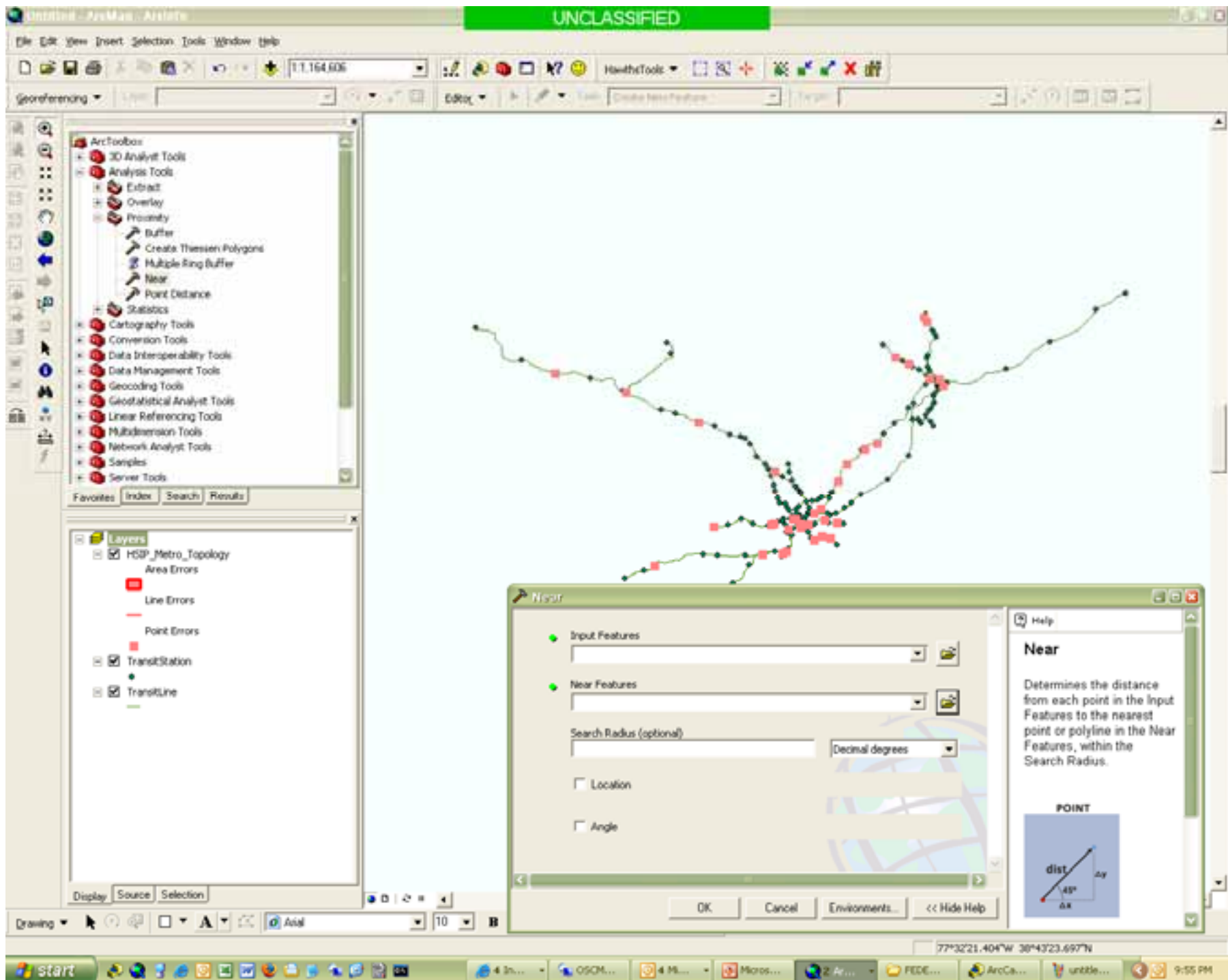


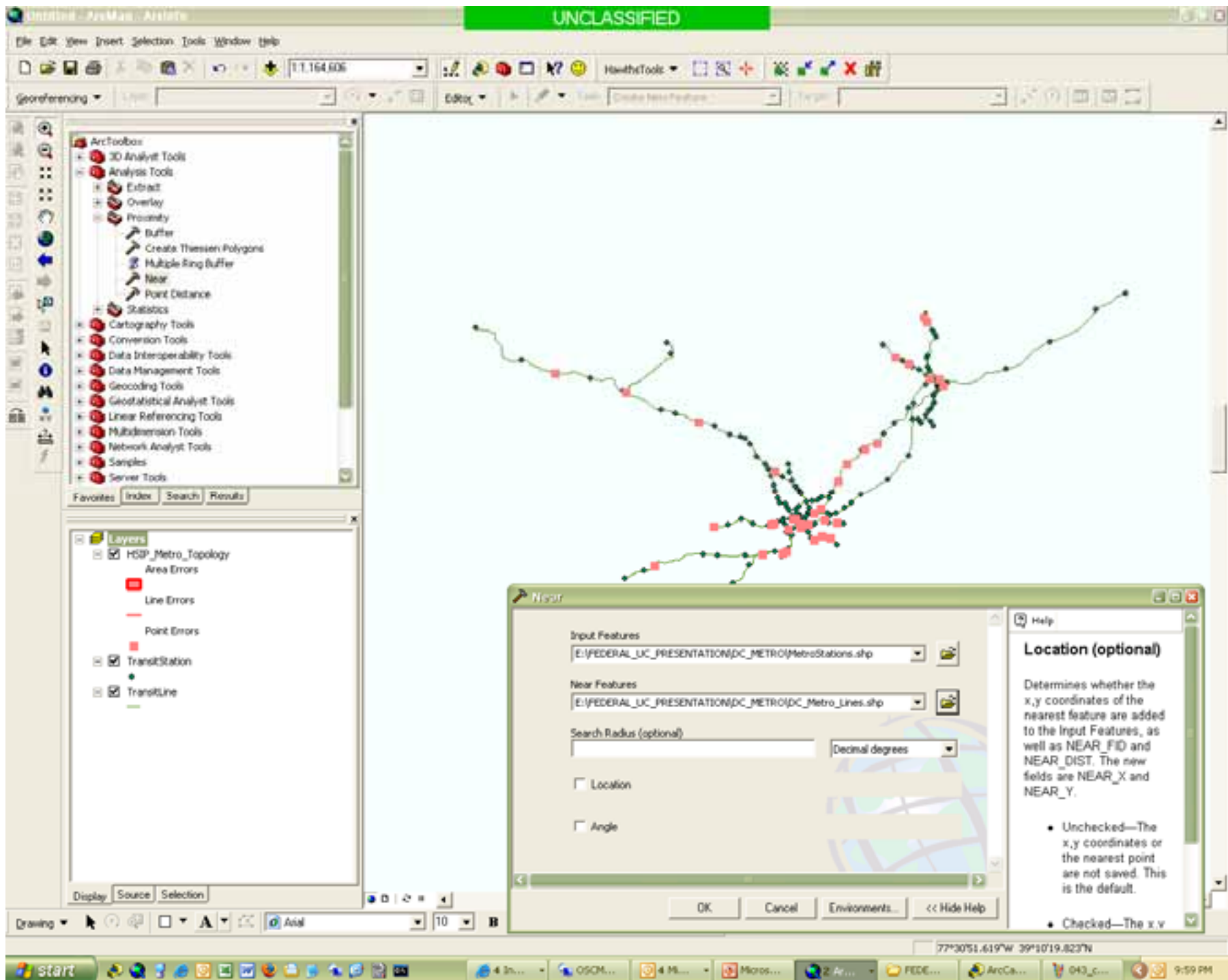


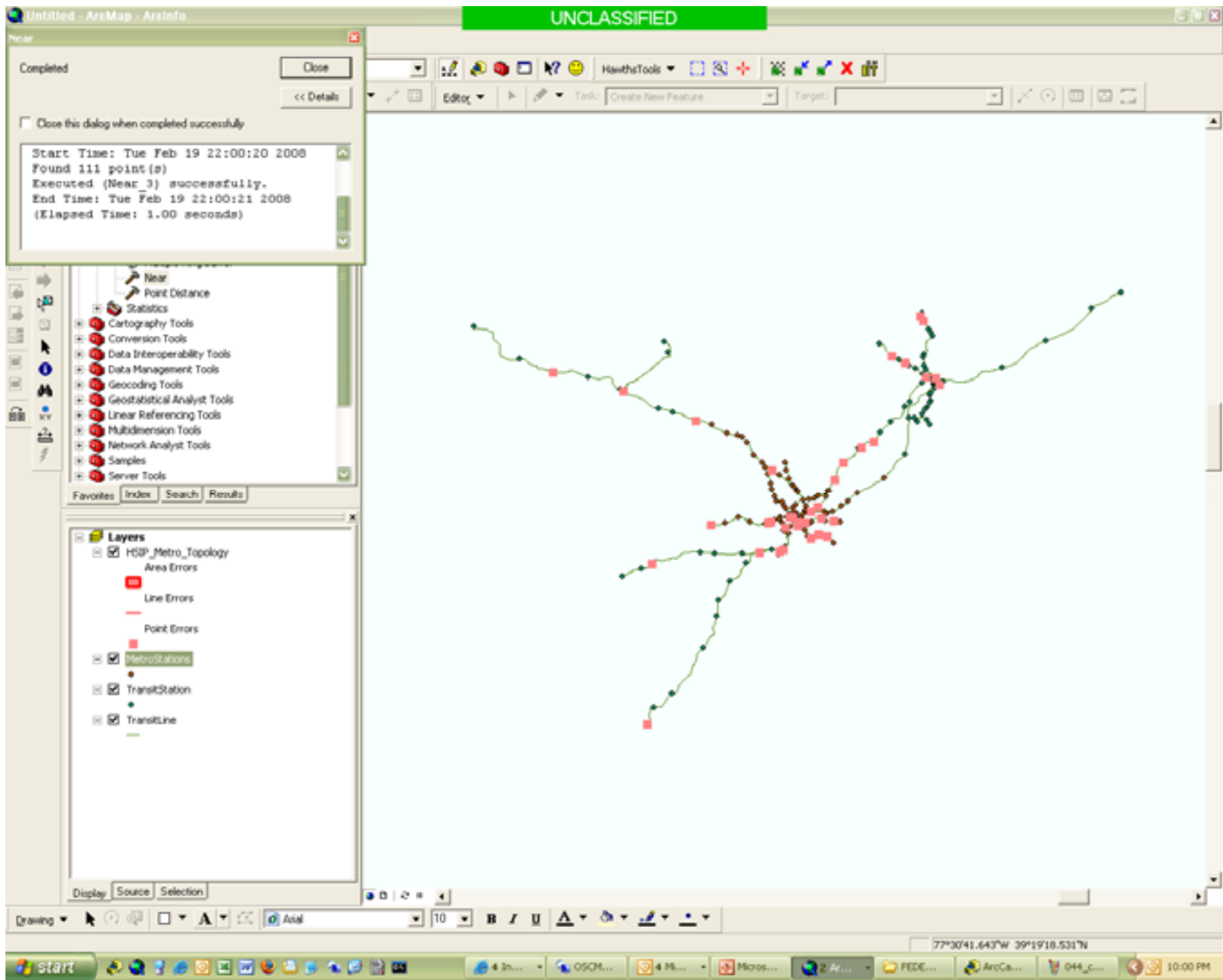


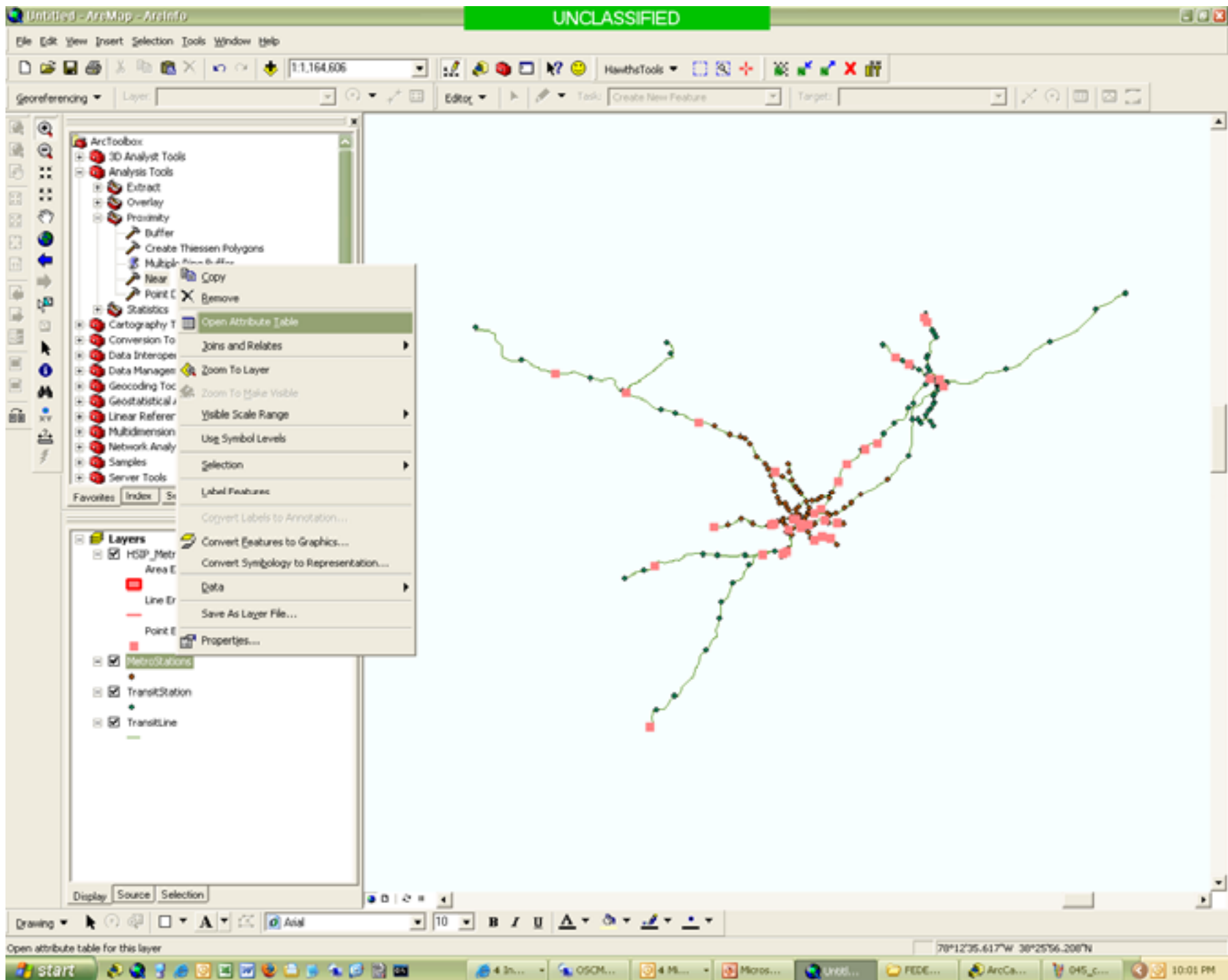


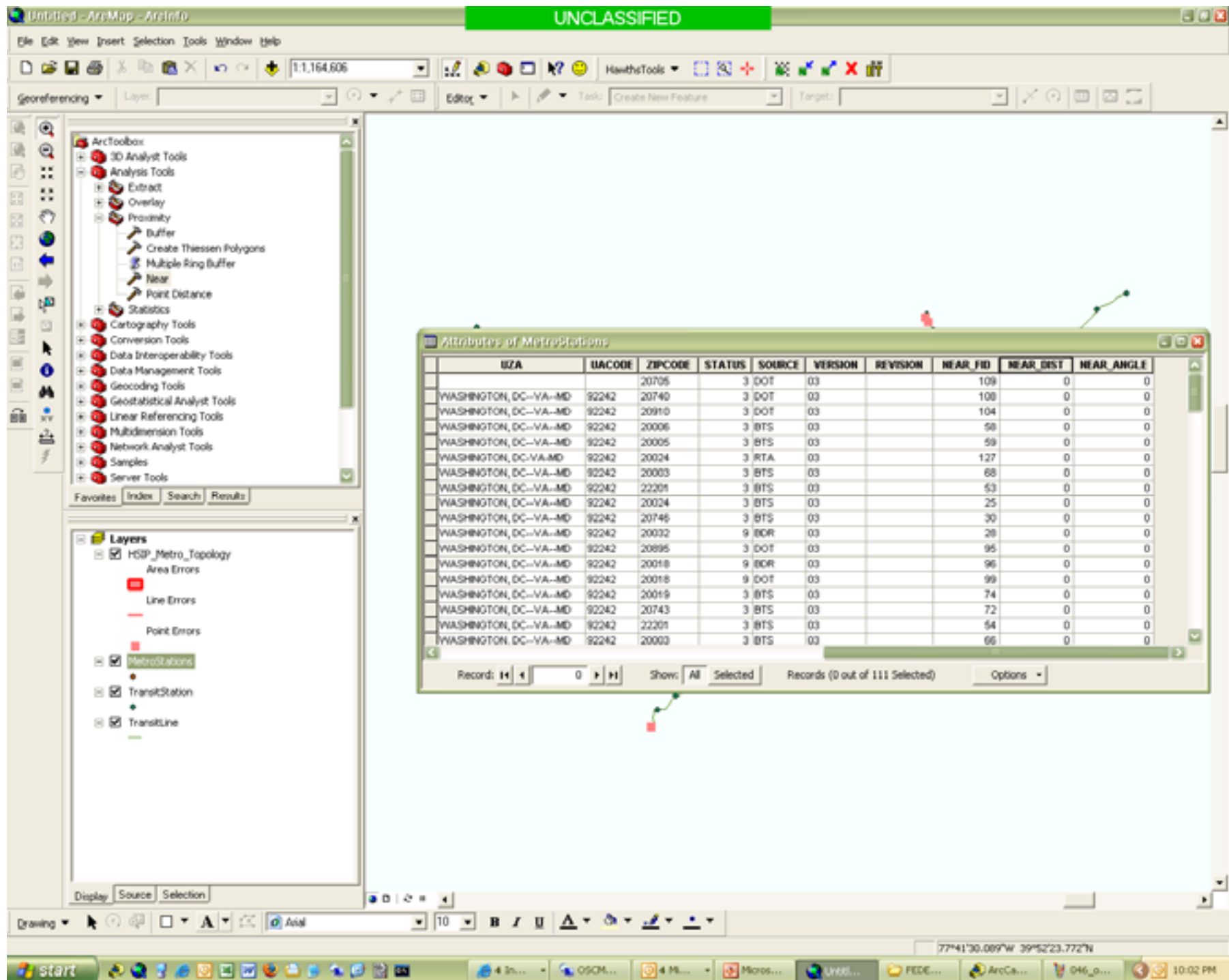


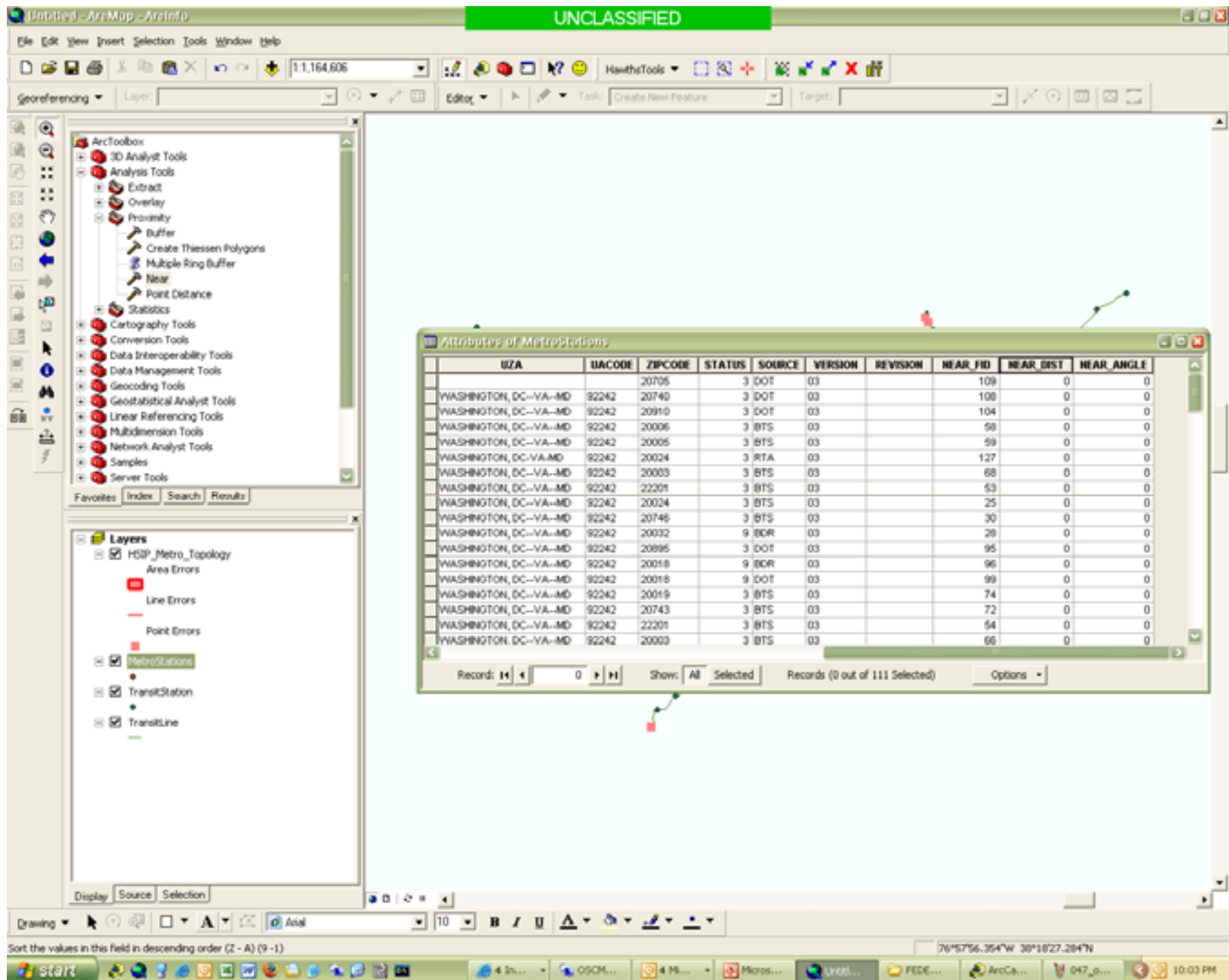


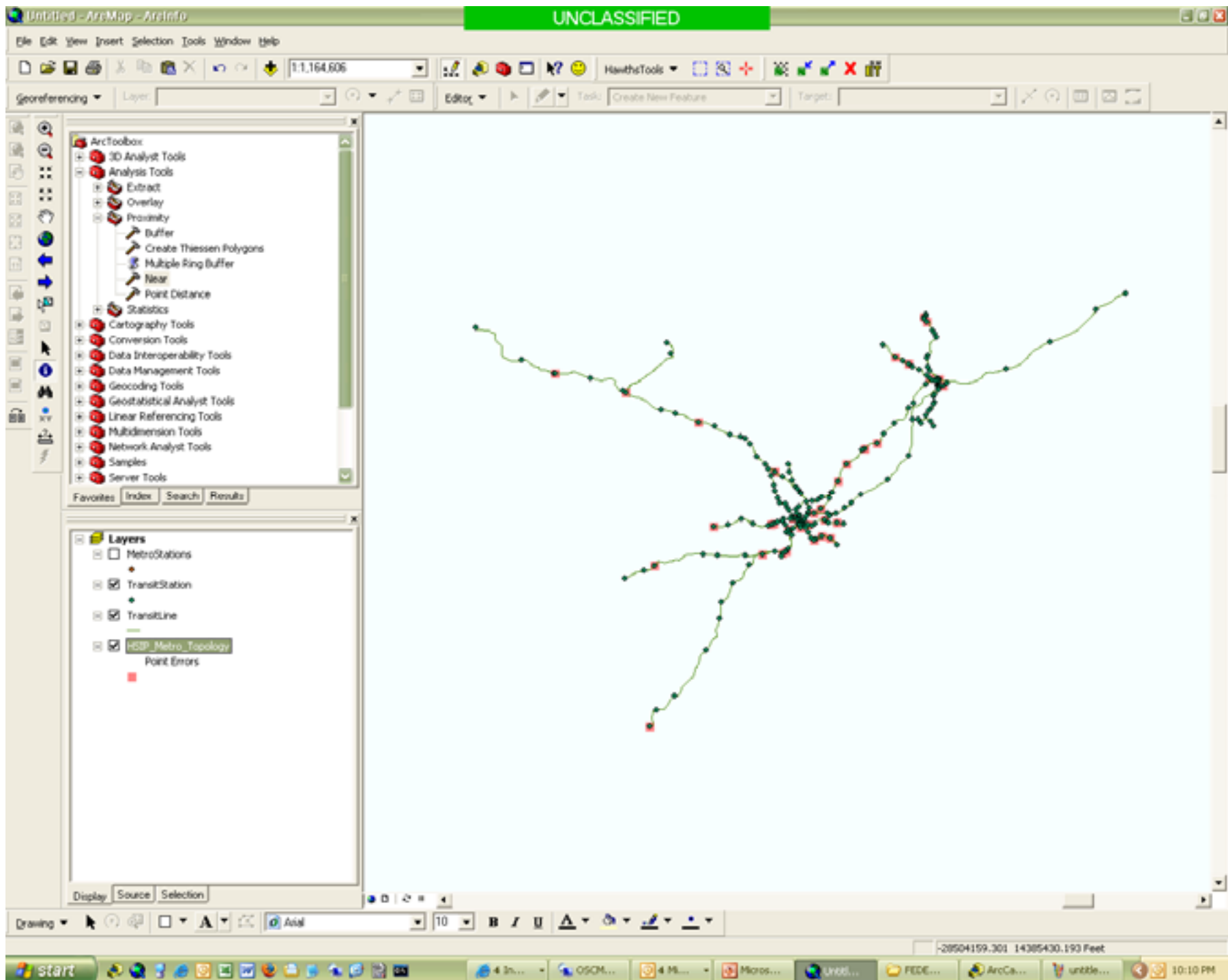


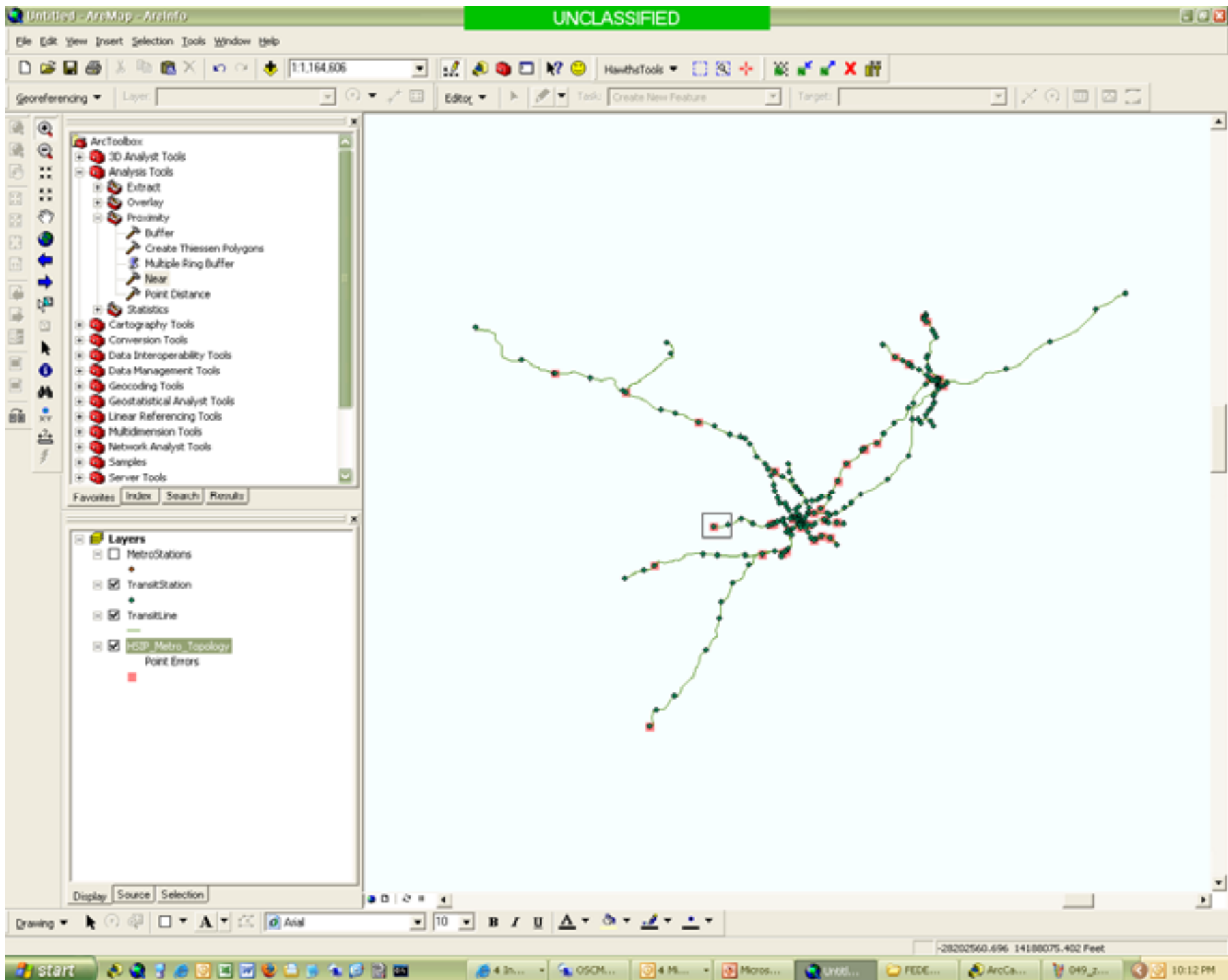


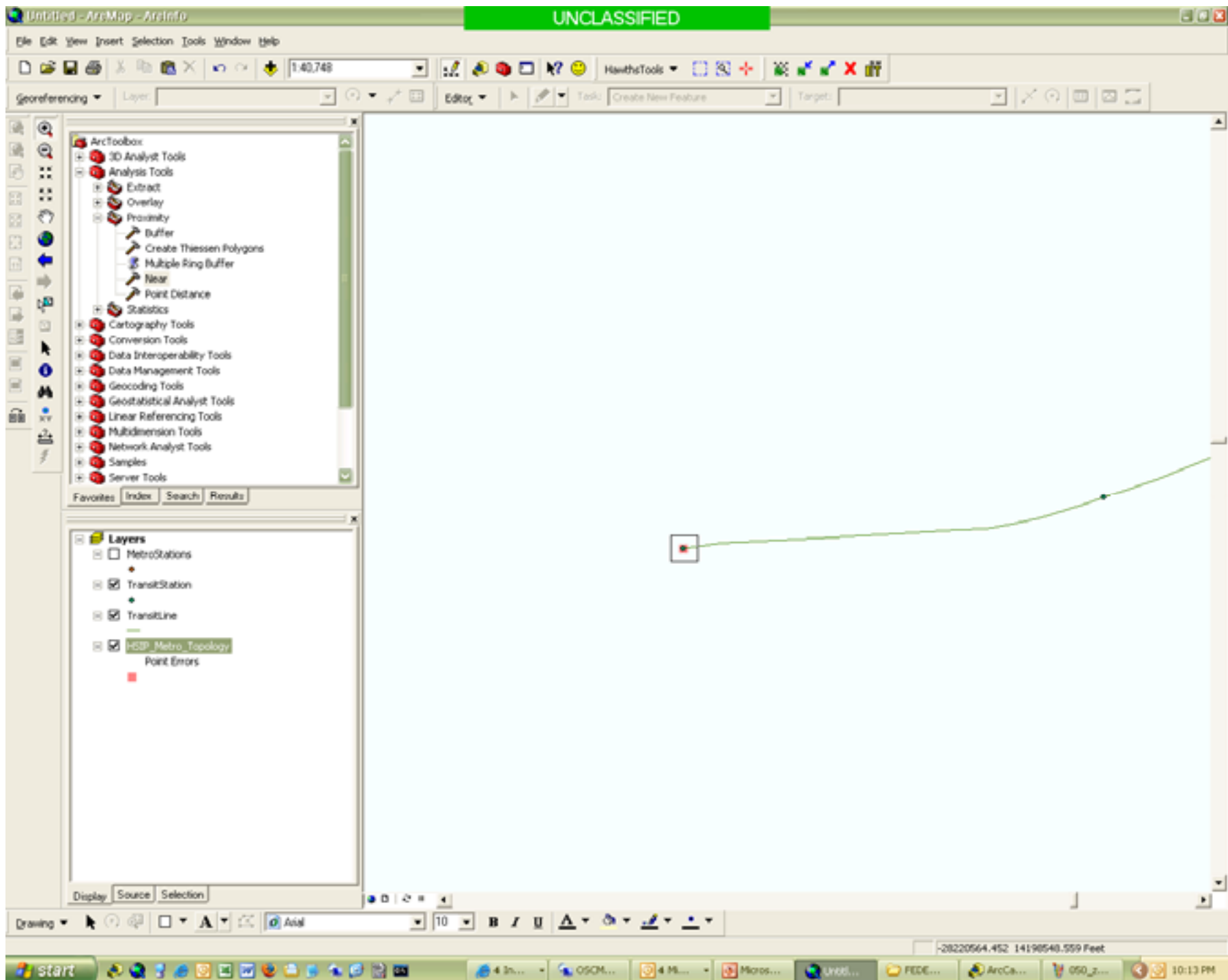


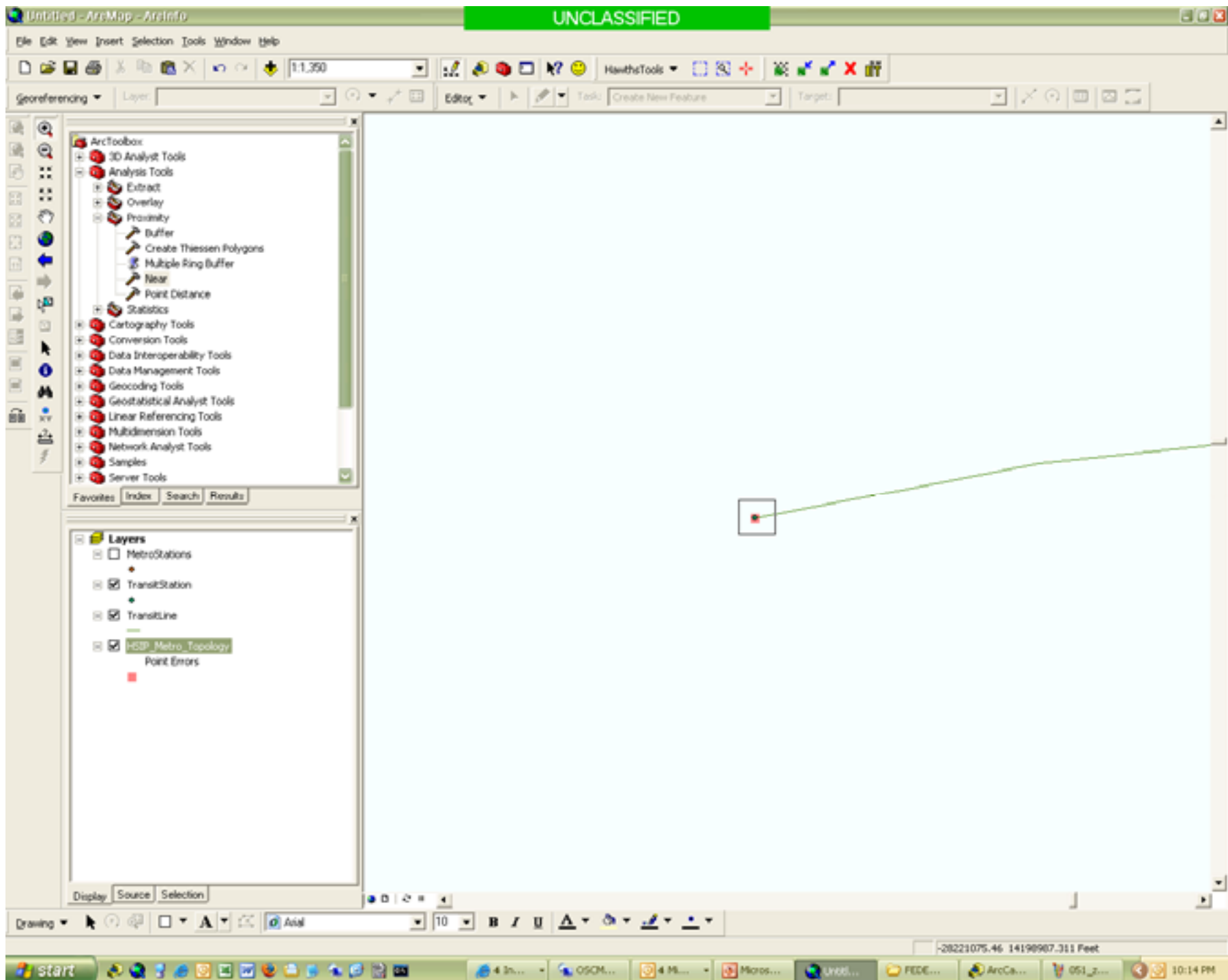


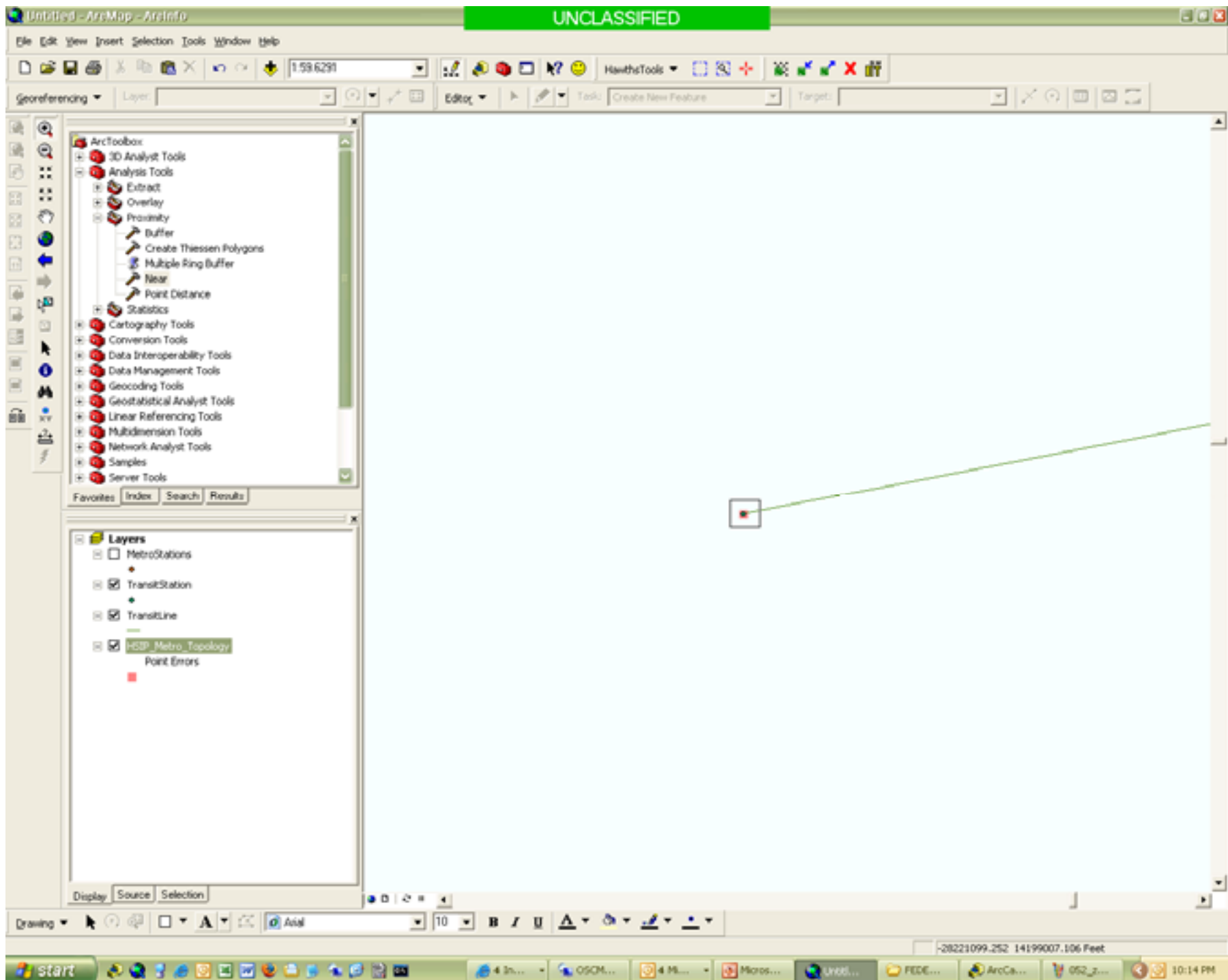


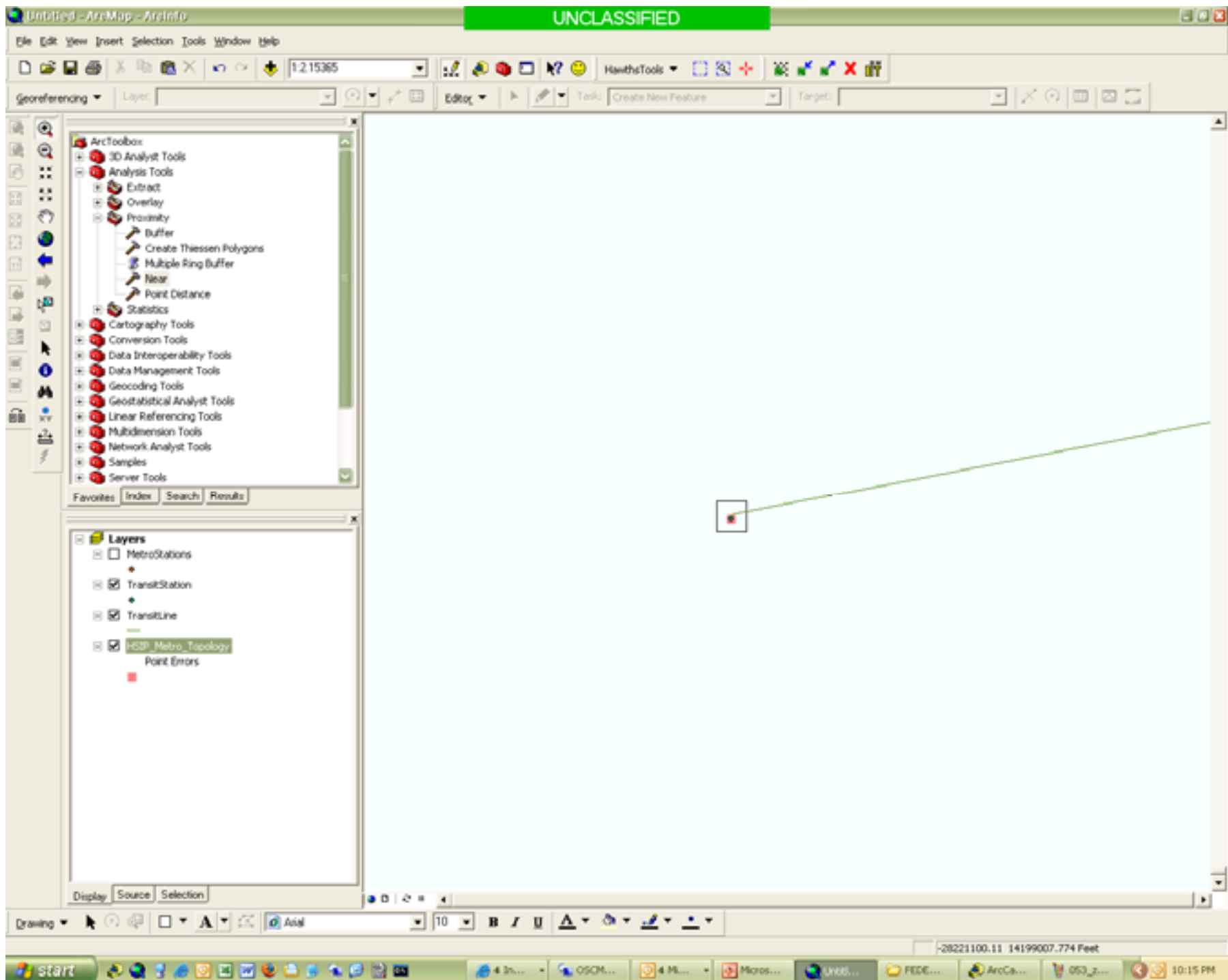


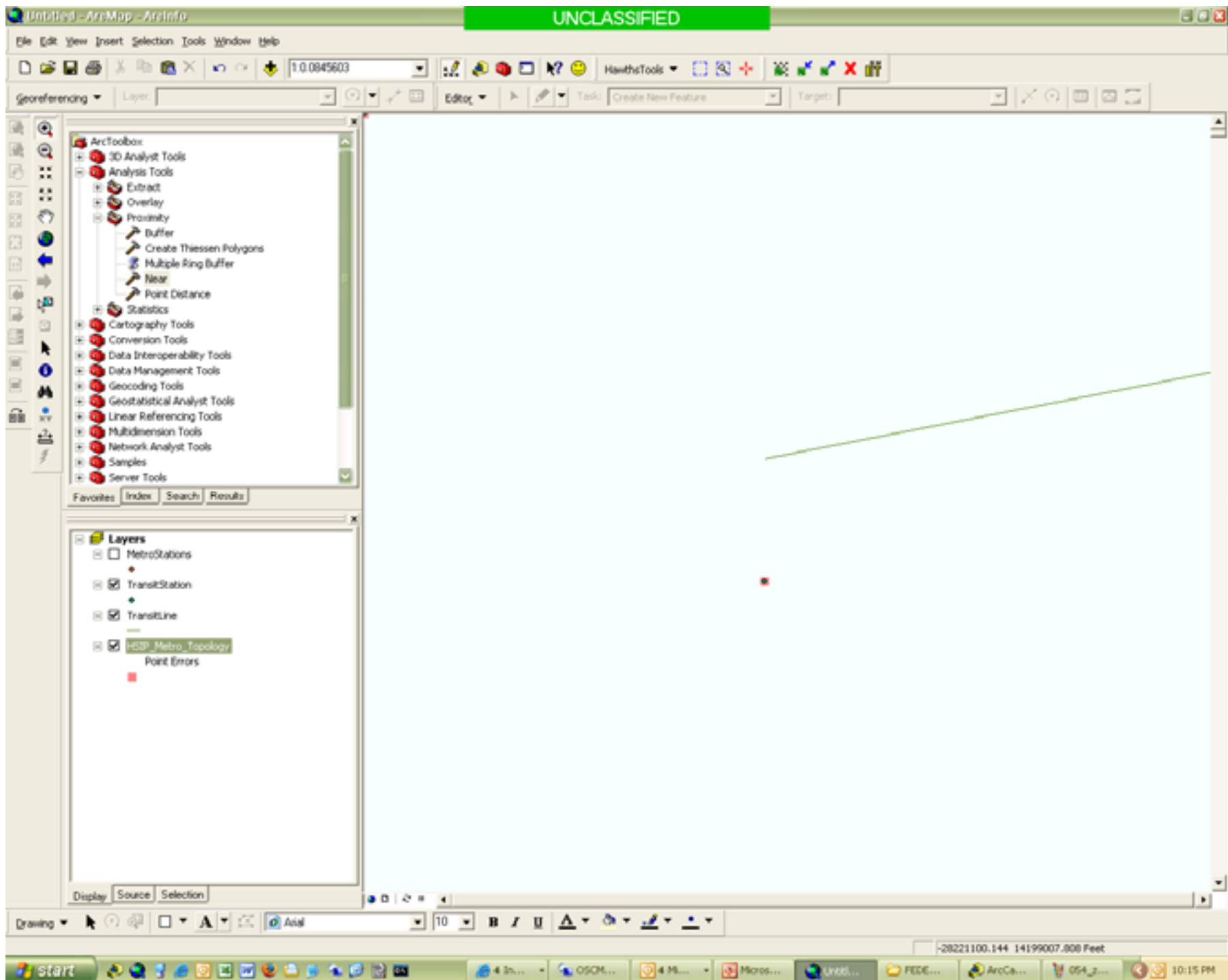


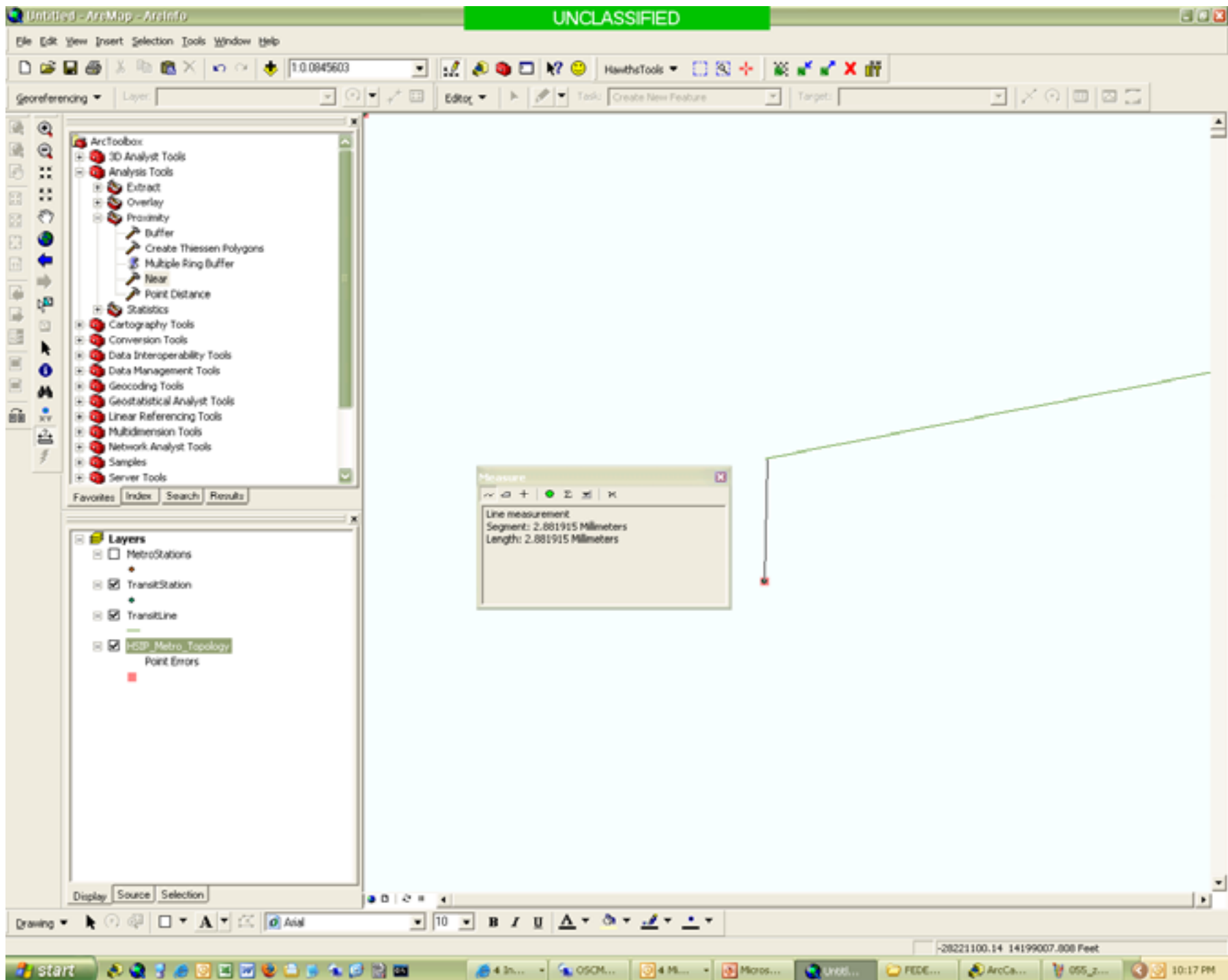






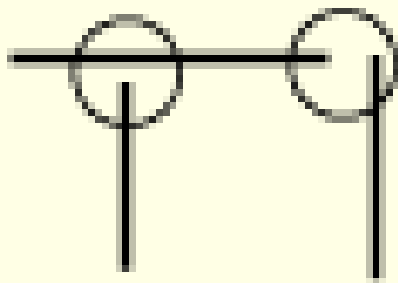




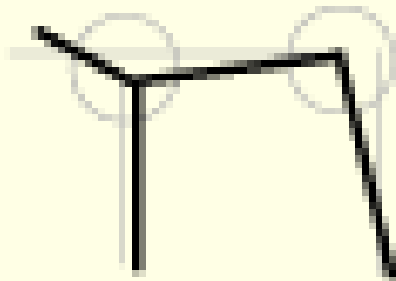


Cluster Tolerance

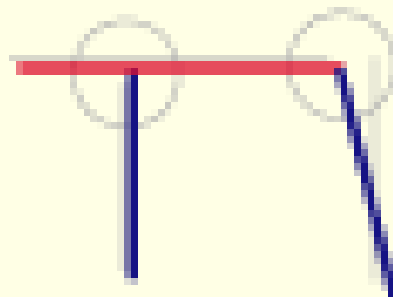
Before Validate



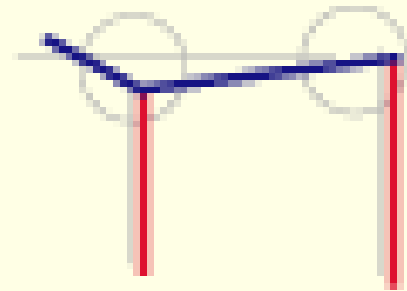
After Validate



Equal Ranks



Unequal Ranks



From ESRI

Determining Cluster Tolerance

if	100	feet	~equals	0.0003	decimal degrees
	and				
	100*12*25.4	mm	equals	100	feet
	then				
	30480	mm	equals	0.0003	decimal degrees
	and				
	1	mm	equals	0.0000000098425	decimal degrees
	3	mm	equals	0.0000000295276	decimal degrees
	10	mm	equals	0.0000000984252	decimal degrees
default cluster tolerance for WGS 84				0.0000000089832	decimal degrees

Topology Properties



General

Feature Classes

Rules

Errors

Name:

HSIP_Metro_v2_Topology

Cluster Tolerance:

0.00000000984

degrees

Status

Validated - No Errors

All parts of the topology have been validated and there are no topology errors.

OK

Cancel

Apply

Topology Properties



General Feature Classes Rules Errors

Generate Summary

Export To File...

Rule	Errors	Exceptions
Must Be Larger Than Cluster Tolerance	0	0
Point Must Be Covered By Line		
TransitStation, TransitLine	574	0
Total	574	0

OK

Cancel

Apply

Topology Properties



General

Feature Classes

Rules

Errors

Generate Summary

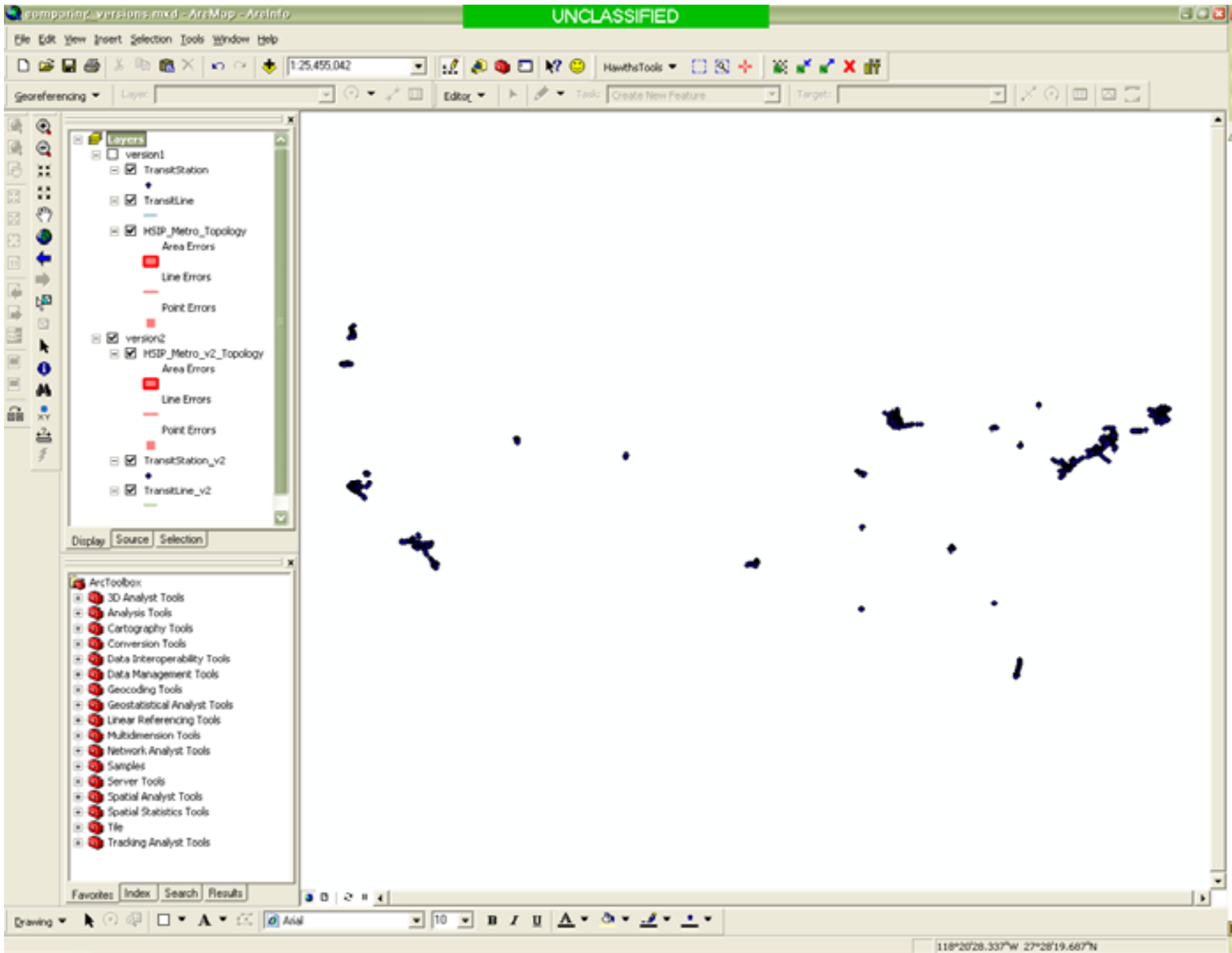
Export To File...

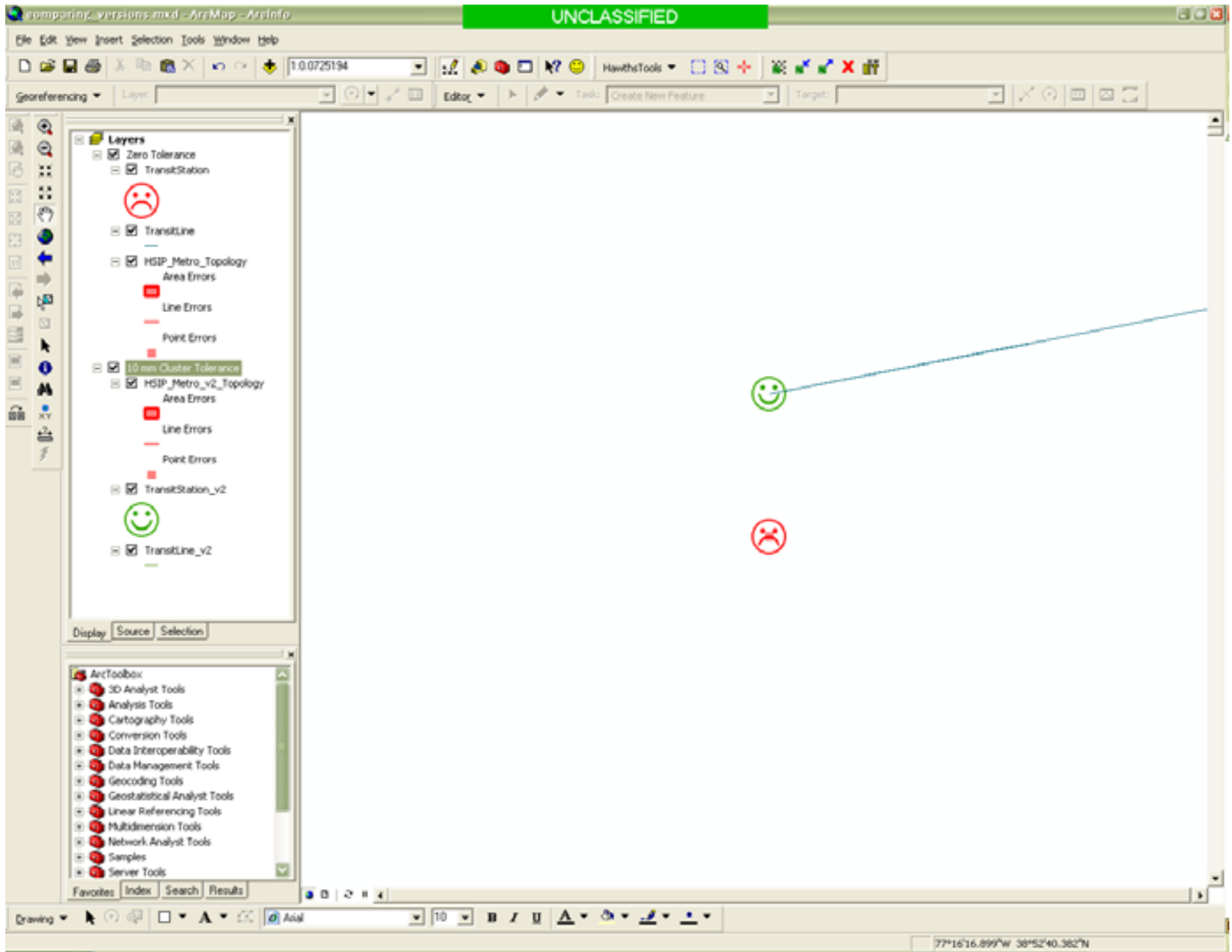
Rule	Errors	Exceptions
Must Be Larger Than Cluster Tolerance	0	0
Point Must Be Covered By Line		
TransitStation_y2, TransitLine_y2	0	0
Total	0	0

OK

Cancel

Apply





Topics

- Explain topology and its related components
- Show how to build a topological relationship in ArcGIS
- Discuss the benefits and drawbacks of topological relationships

MISSION ACCOMPLISHED !

Topology Validated

- Is the data better?
- Cluster tolerance and coordinate shifts

Topology isn't

- A good way to “correct” data *creation* discrepancies
- Necessary for simple display/identification of data

Topology and shapefiles

- A final word of caution:

Understanding Topological “Errors”

- Errors are just violations of User Set Rules
- Setting Rules is arbitrary

Valid Reasons For Topological “Errors”

- Most important: Resolution of the data
- Definition of features and how they relate to each other
 - Not everyone looks at a river the same way.

Summary

- Talked about topology, cluster tolerances, and data source considerations
- Looked at an example of topology creation in ArcGIS
- Considered the ups and downs of topological relationships between datasets.

Thanks for sticking around!

- Questions
- Comments