EMI SIG
EMERGENCY MANAGEMENT ISSUES
SPECIAL INTEREST GROUP

HPAC as a Biosafety Modeling Tool

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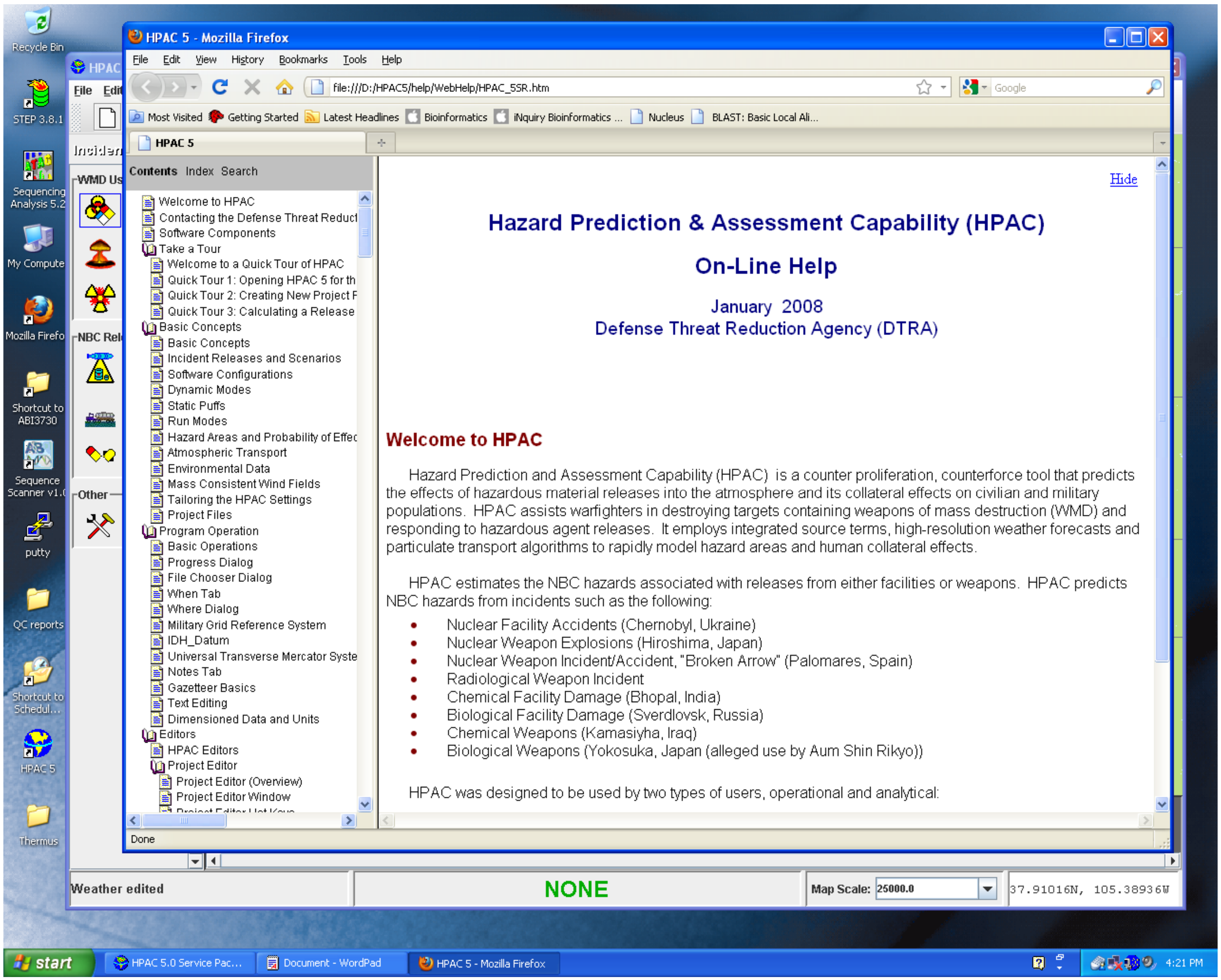
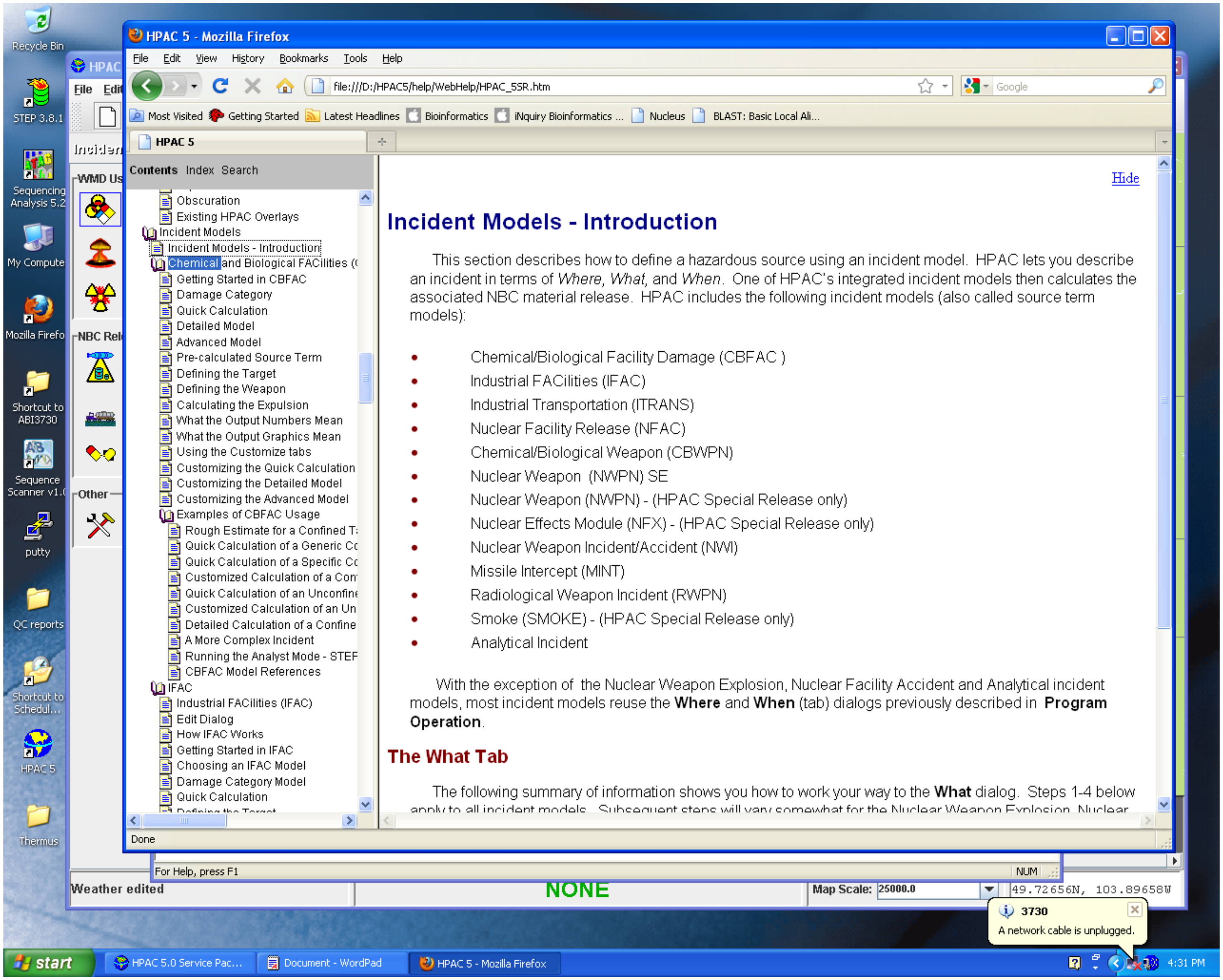
BWG Chair

May 3, 2010

HPAC Features




HPAC 5 - Mozilla Firefox
File Edit View History Bookmarks Tools Help
file:///D:/HPAC5/help/WebHelp/HPAC_5SR.htm
Most Visited Getting Started Latest Headlines Bioinformatics iNquiry Bioinformatics ... Nucleus BLAST: Basic Local Ali...
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Quick Calculation of an Unconfine
Customized Calculation of an Un
Detailed Calculation of a Confine
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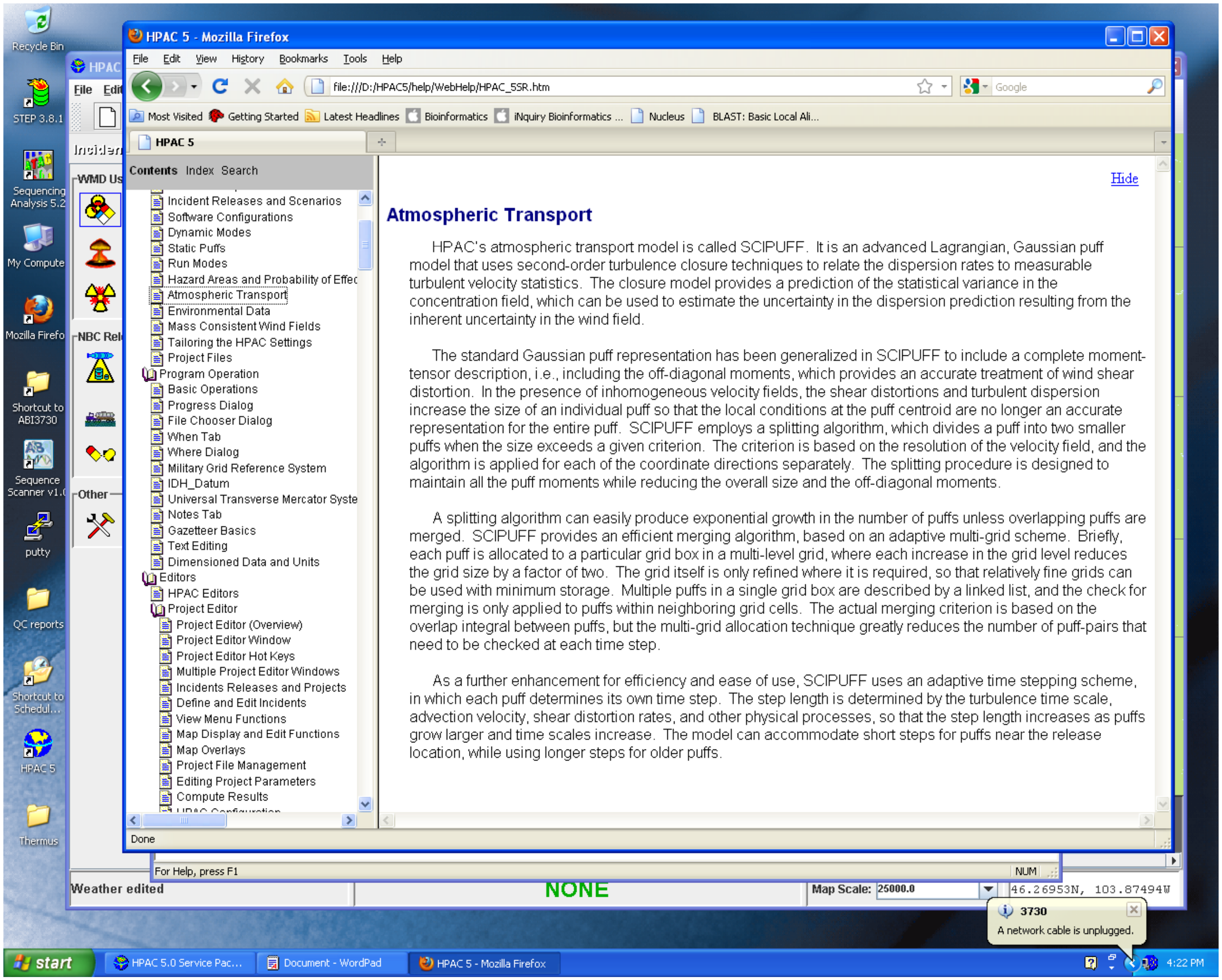
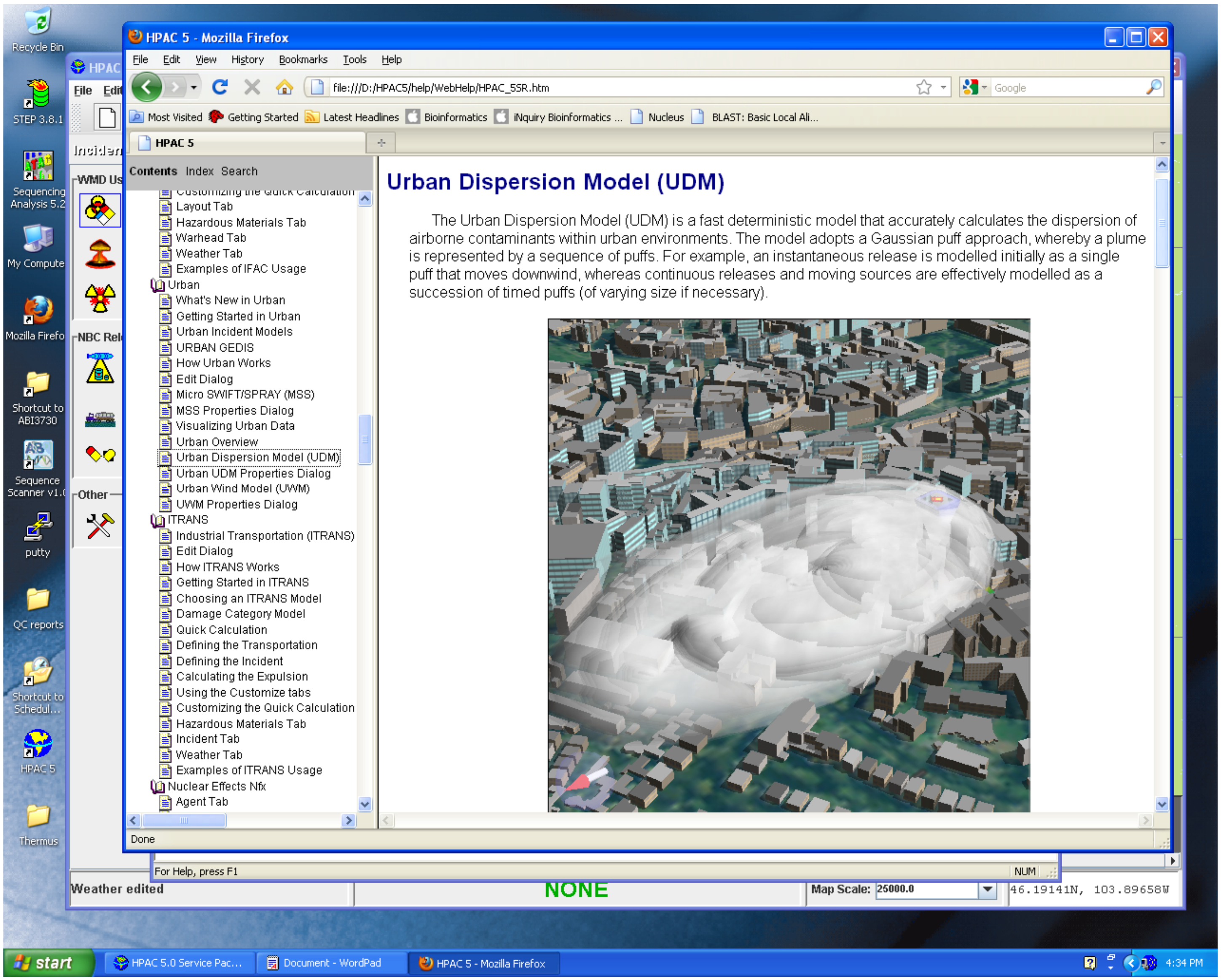
Edit Dialog
How IFAC Works
Getting Started in IFAC
Choosing an IFAC Model
Damage Category Model
Quick Calculation
Hide
Incident Models - Introduction
This section describes how to define a hazardous source using an incident model. HPAC lets you describe an incident in terms of Where, What, and When. One of HPAC's integrated incident models then calculates the associated NBC material release. HPAC includes the following incident models (also called source term models):
Chemical/Biological Facility Damage (CBFAC)
Industrial FACilities (IFAC)
Industrial Transportation (ITRANS)
Nuclear Facility Release (NFAC)
Chemical/Biological Weapon (CBWPN)
Nuclear Weapon (NWPN) SE
Nuclear Weapon (NWPN) - (HPAC Special Release only)
Nuclear Effects Module (NFX) - (HPAC Special Release only)
Nuclear Weapon Incident/Accident (NWI)
Missile Intercept (MINT)
Radiological Weapon Incident (RWPN)
Smoke (SMOKE) - (HPAC Special Release only)
Analytical Incident
With the exception of the Nuclear Weapon Explosion, Nuclear Facility Accident and Analytical incident models, most incident models reuse the Where and When (tab) dialogs previously described in Program Operation.
The What Tab
The following summary of information shows you how to work your way to the What dialog. Steps 1-4 below
Done
For Help, press F1
NUM
Weather edited
NONE
Map Scale: 25000.0
49.72656N, 103.89658W
3730
A network cable is unplugged.
start
HPAC 5.0 Service Pac...
Document - WordPad
HPAC 5 - Mozilla Firefox
4:31 PM

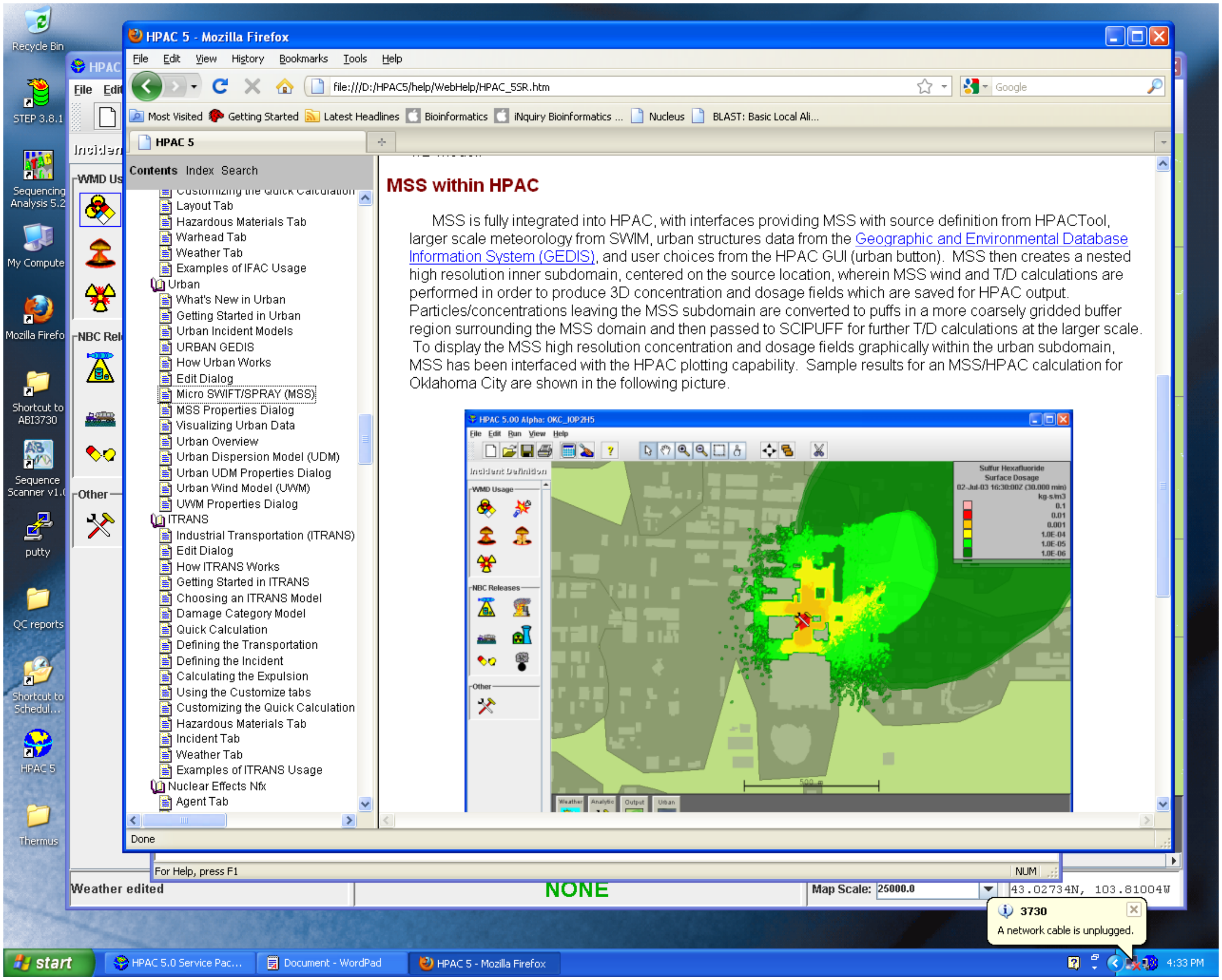
Transport Model - SCIPUFF



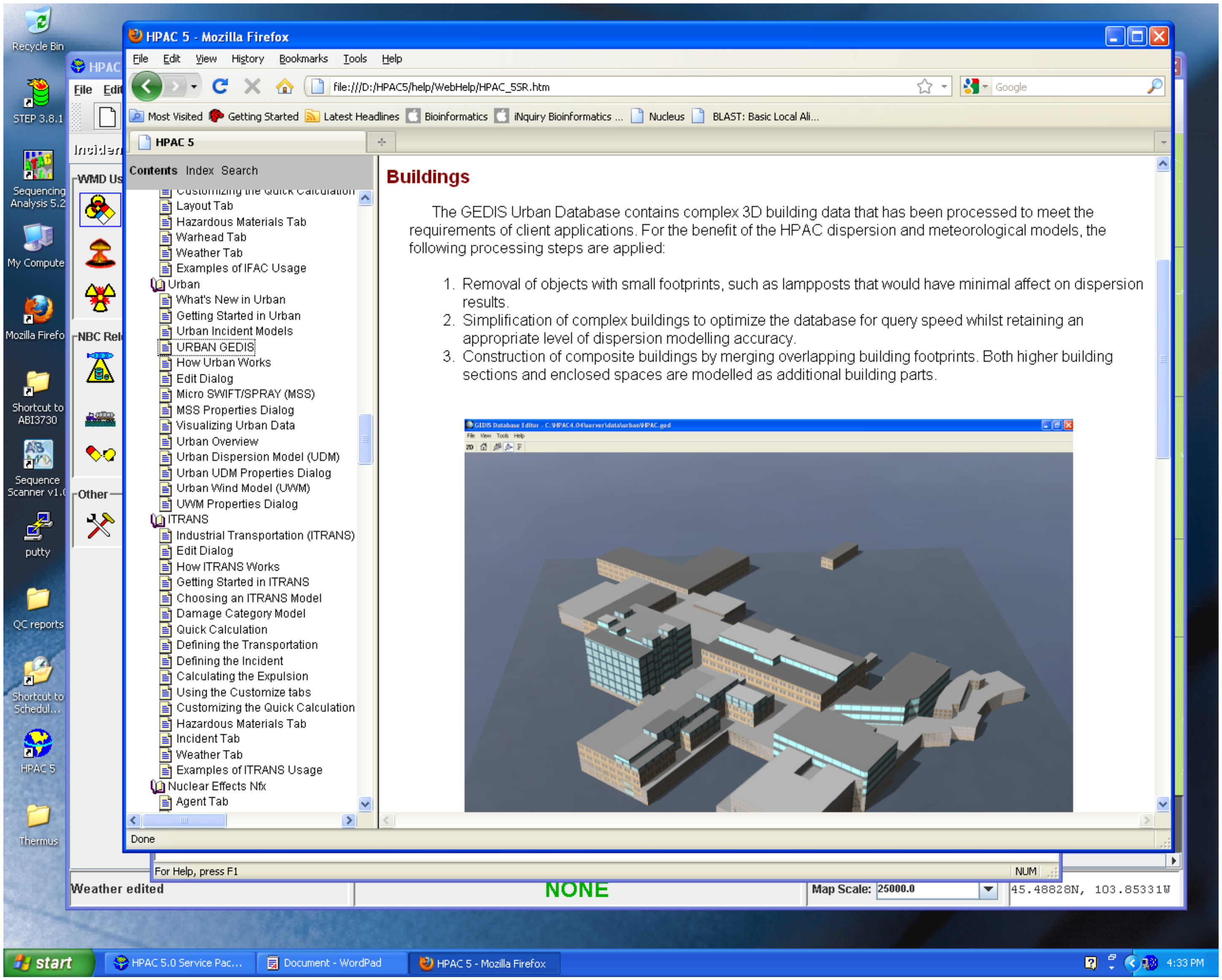
Urban Dispersal - Gaussian Puff (sequential)



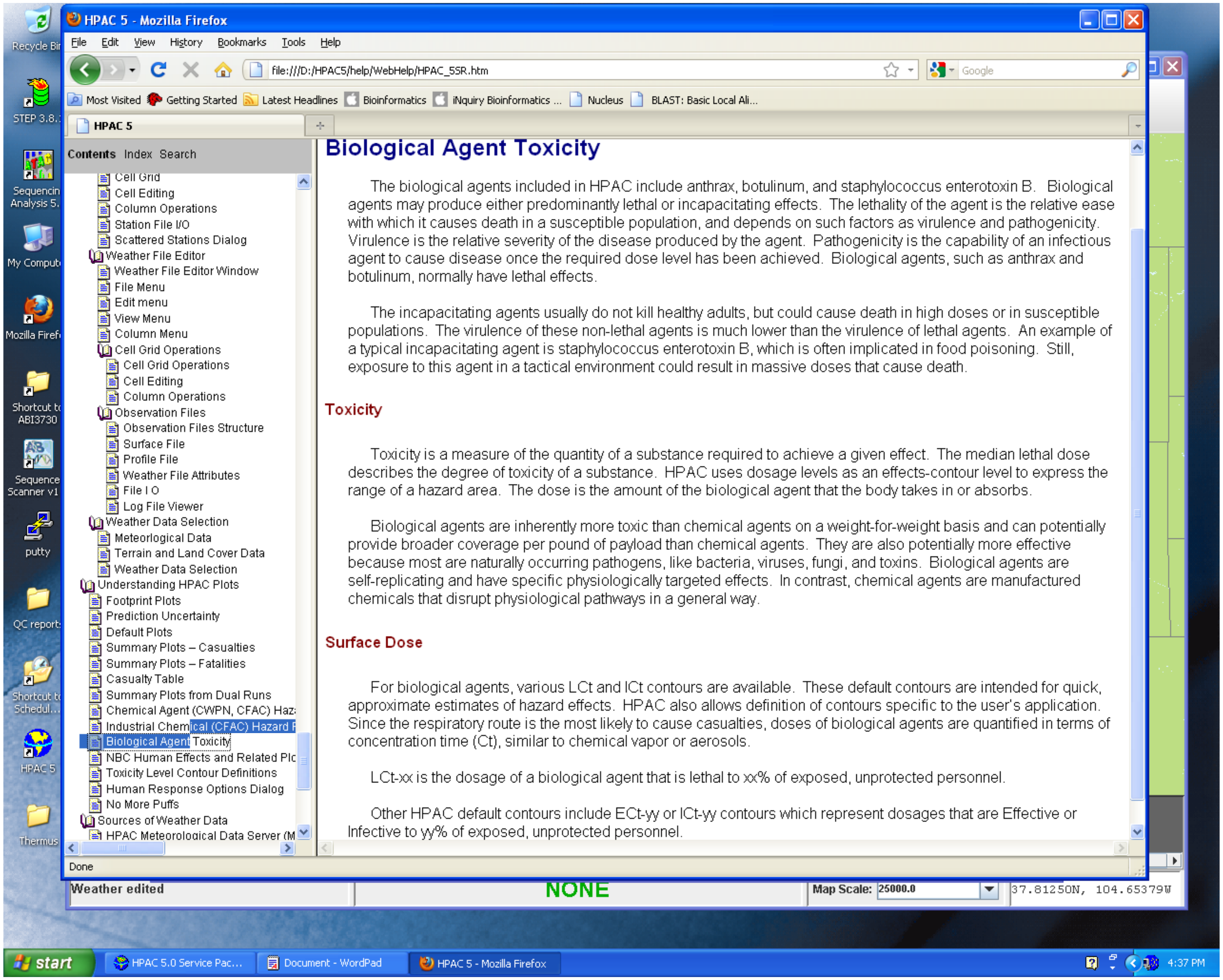
Micro SWIFT/SPRAY Urban Dispersal



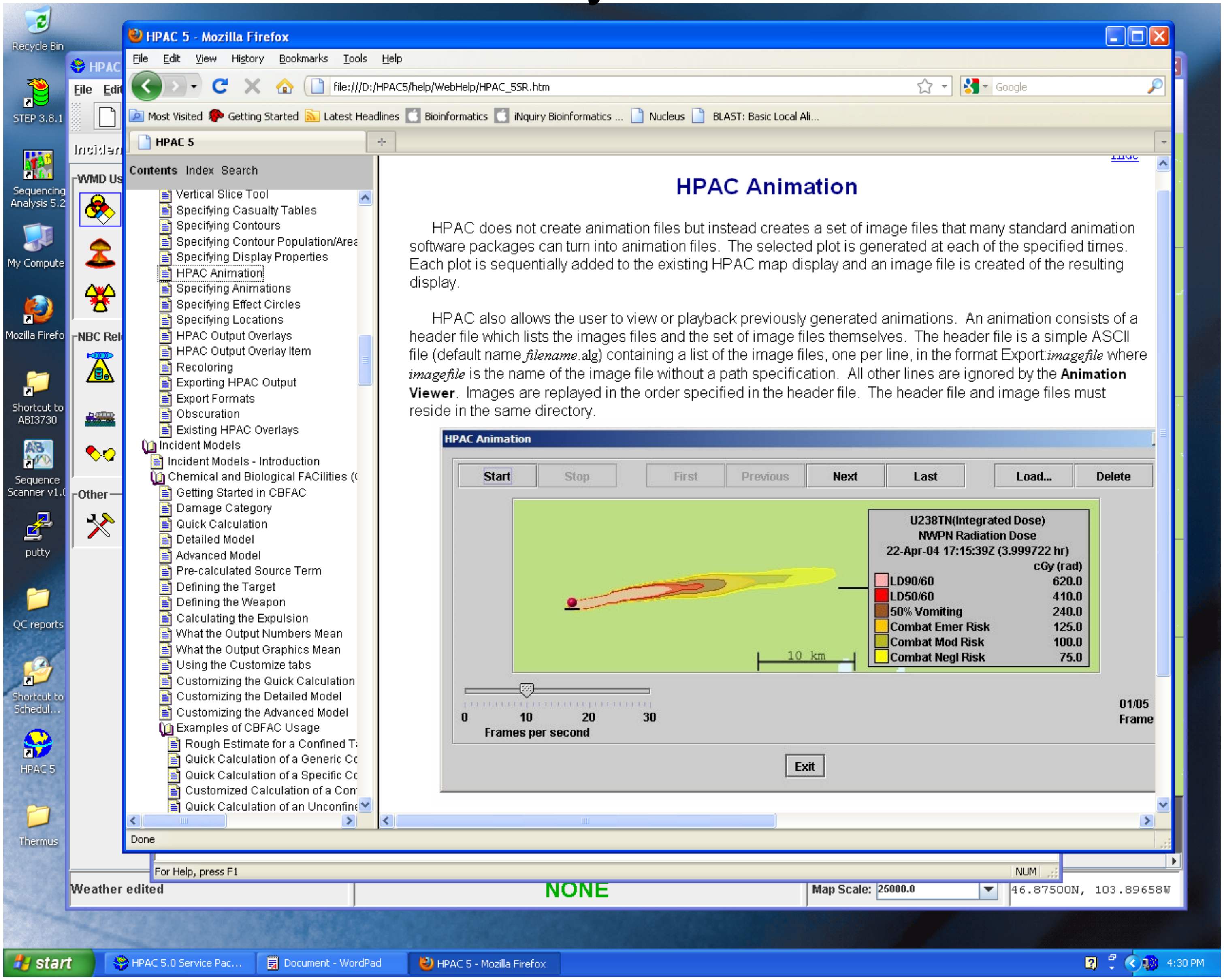
GEDIS Urban Database



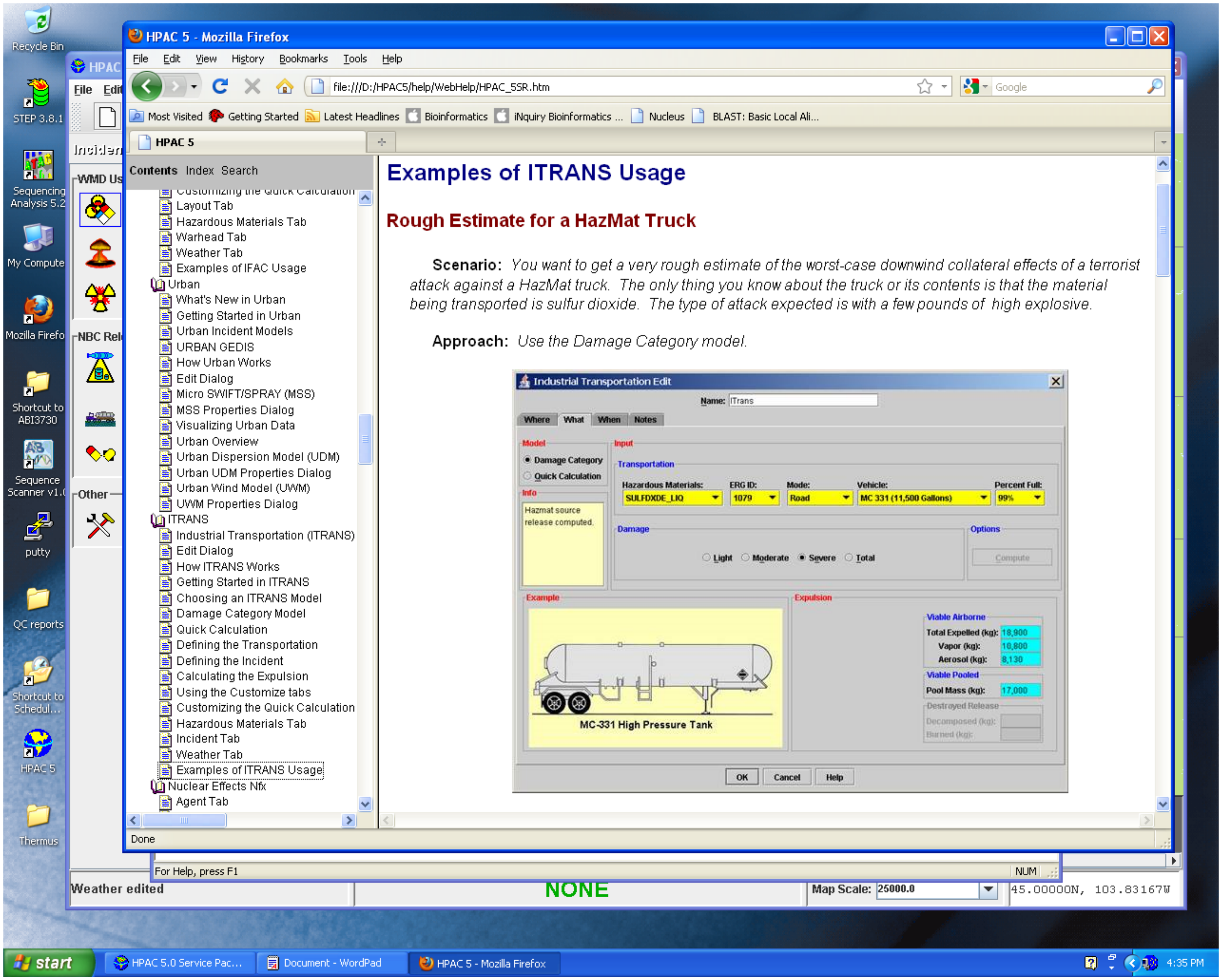
Biological Agent Toxicity and Infectivity



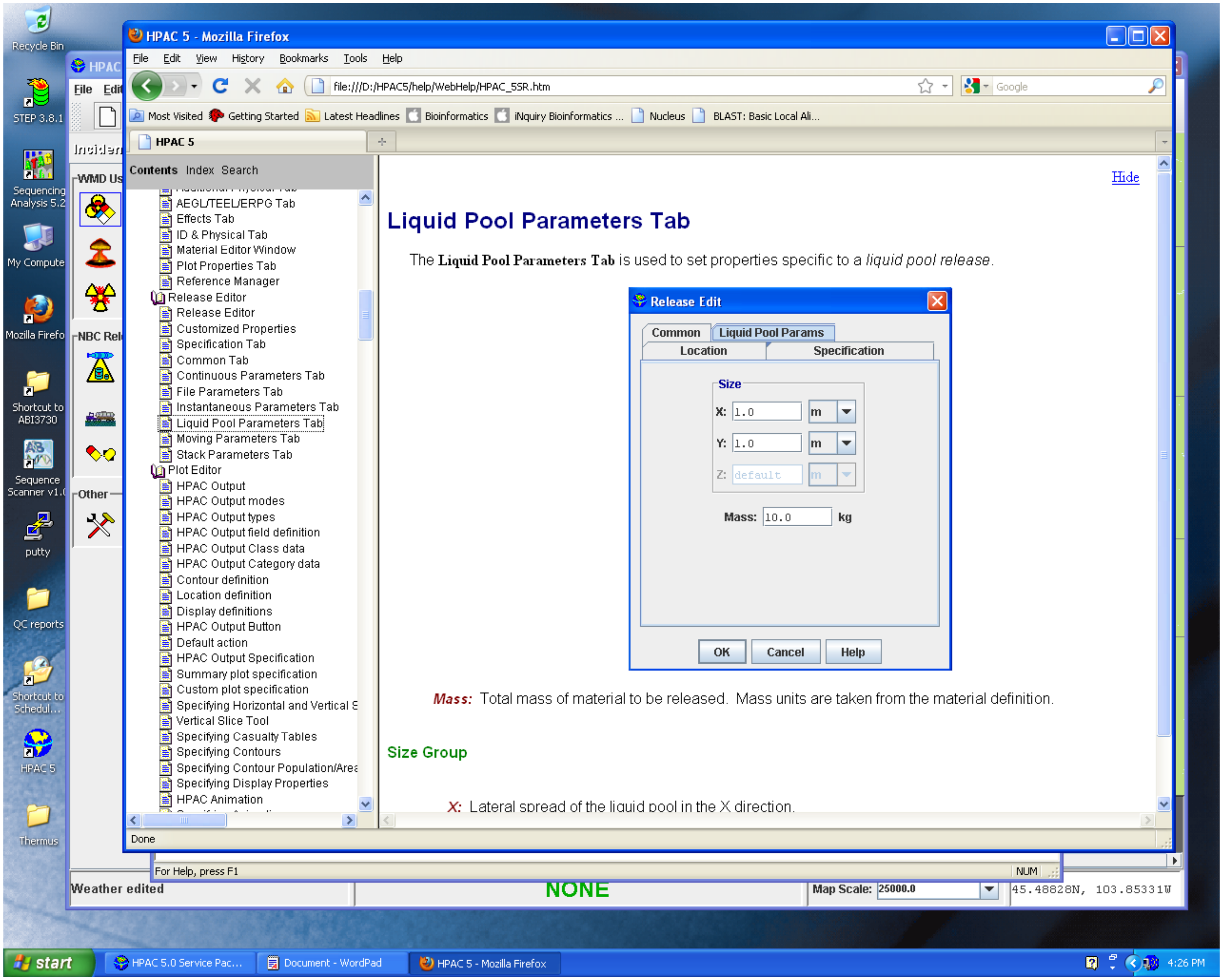
Plume Dynamics



Other Features

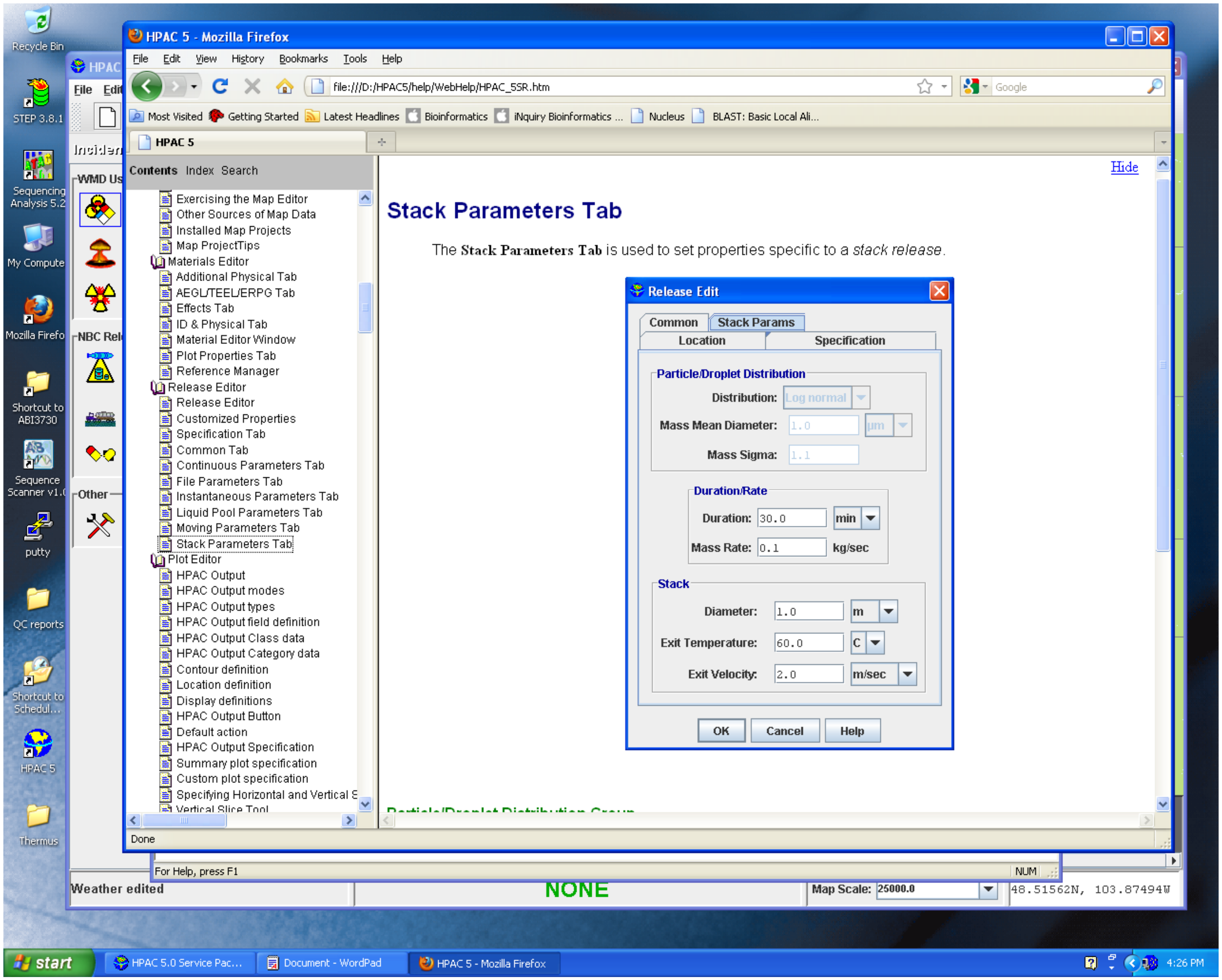


Spills

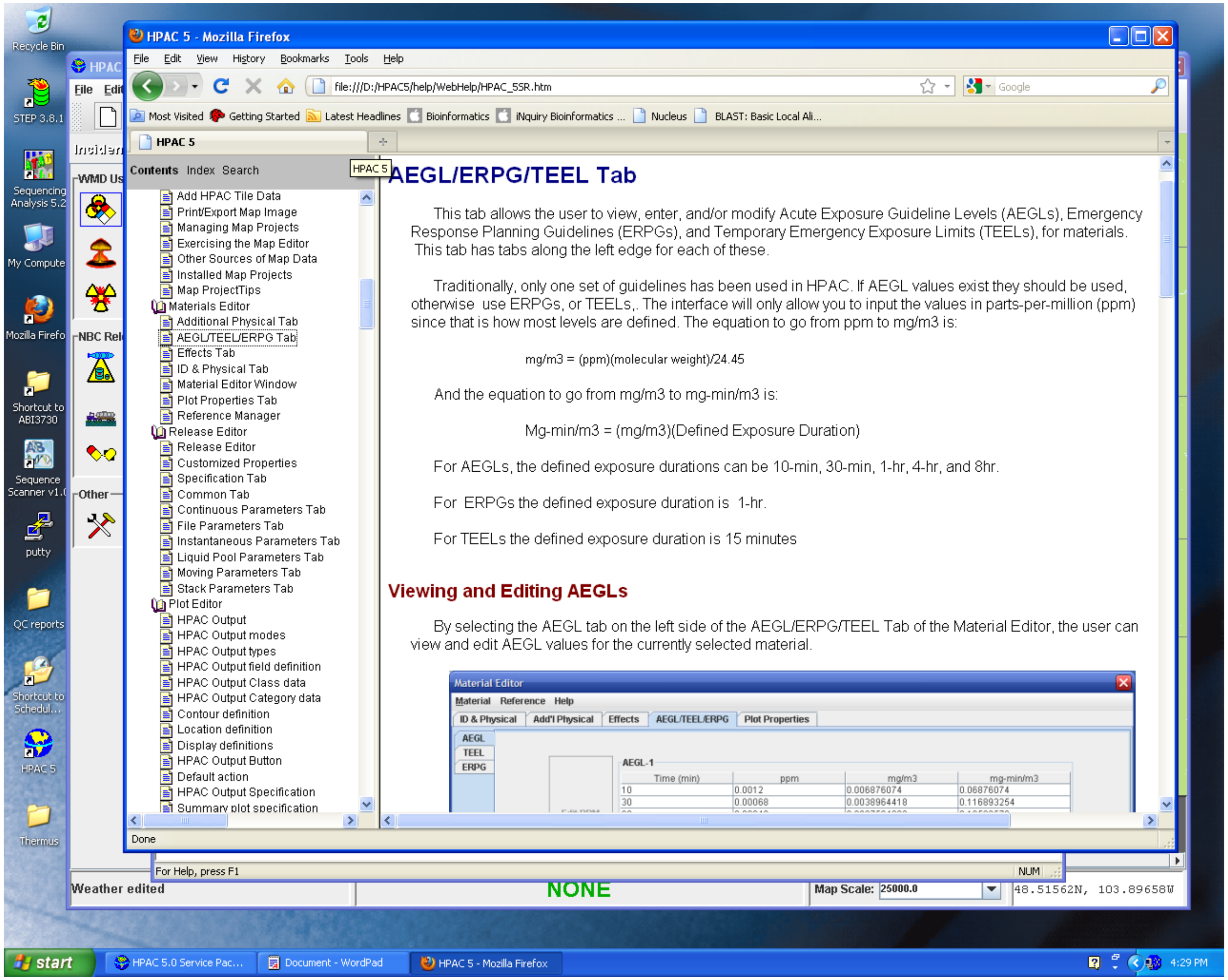


HPAC 5 - Mozilla Firefox
file:///D:/HPAC5/help/WebHelp/HPAC_5SR.htm
Contents Index Search
Liquid Pool Parameters Tab
The Liquid Pool Parameters Tab is used to set properties specific to a liquid pool release.
Release Edit
Common
Liquid Pool Params
Location
Specification
Size
X: 1.0 m
Y: 1.0 m
Z: default m
Mass: 10.0 kg
OK
Cancel
Help
Mass: Total mass of material to be released. Mass units are taken from the material definition.
Size Group
X: Lateral spread of the liquid pool in the X direction.
Weather edited
NONE
Map Scale: 25000.0
45.48828N, 103.85331W

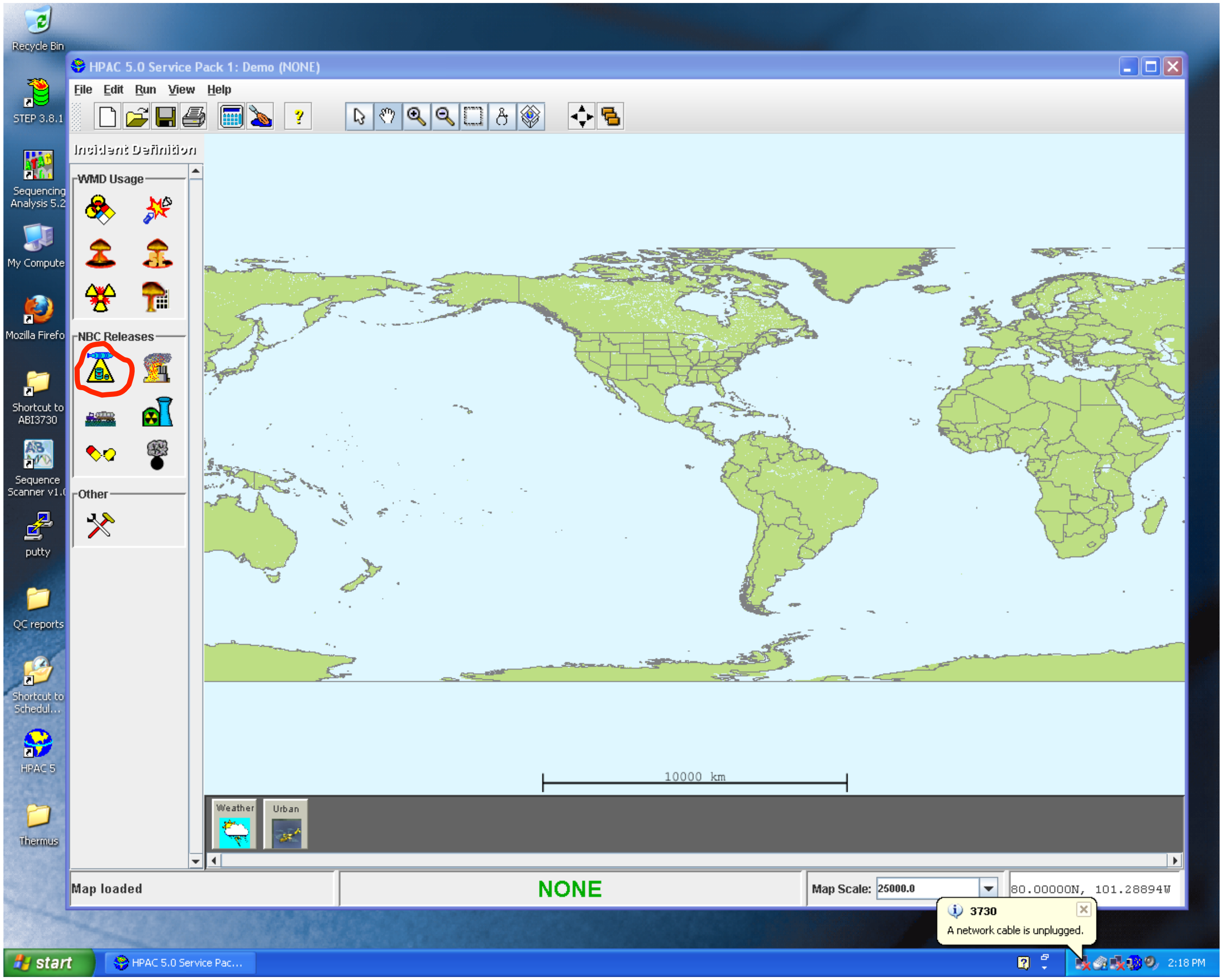
Stack Release

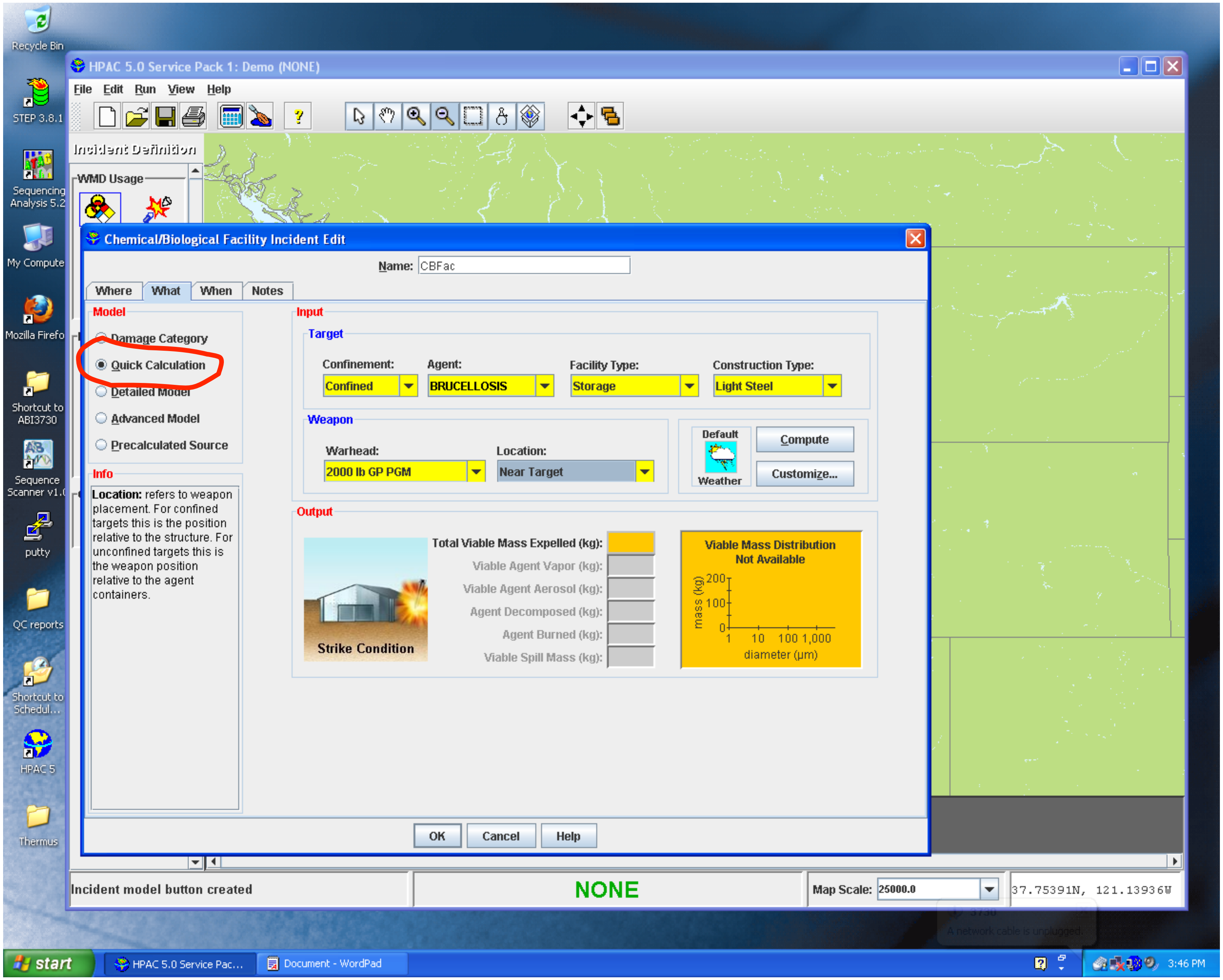


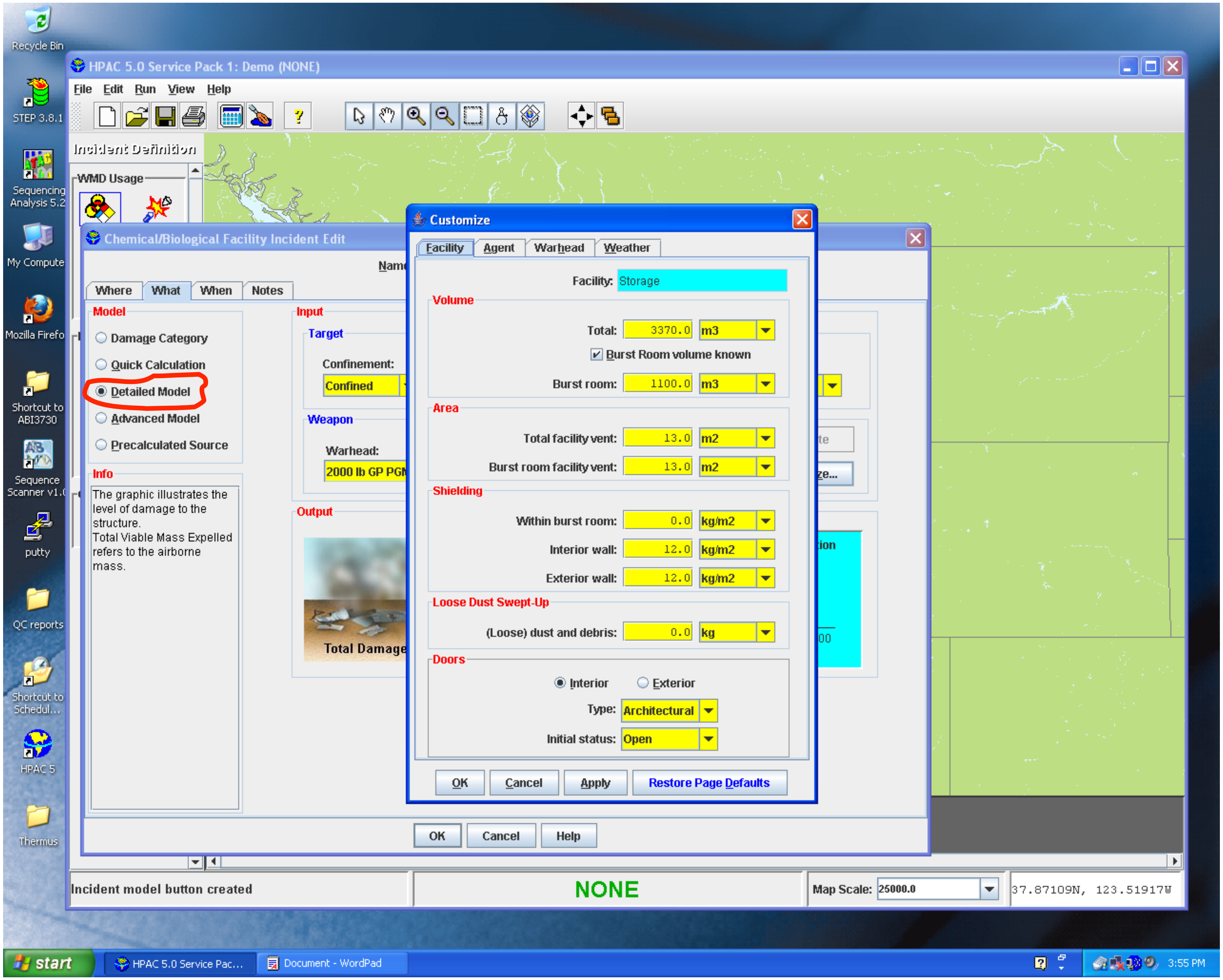
AEGLs, ERPGs, and TEELs



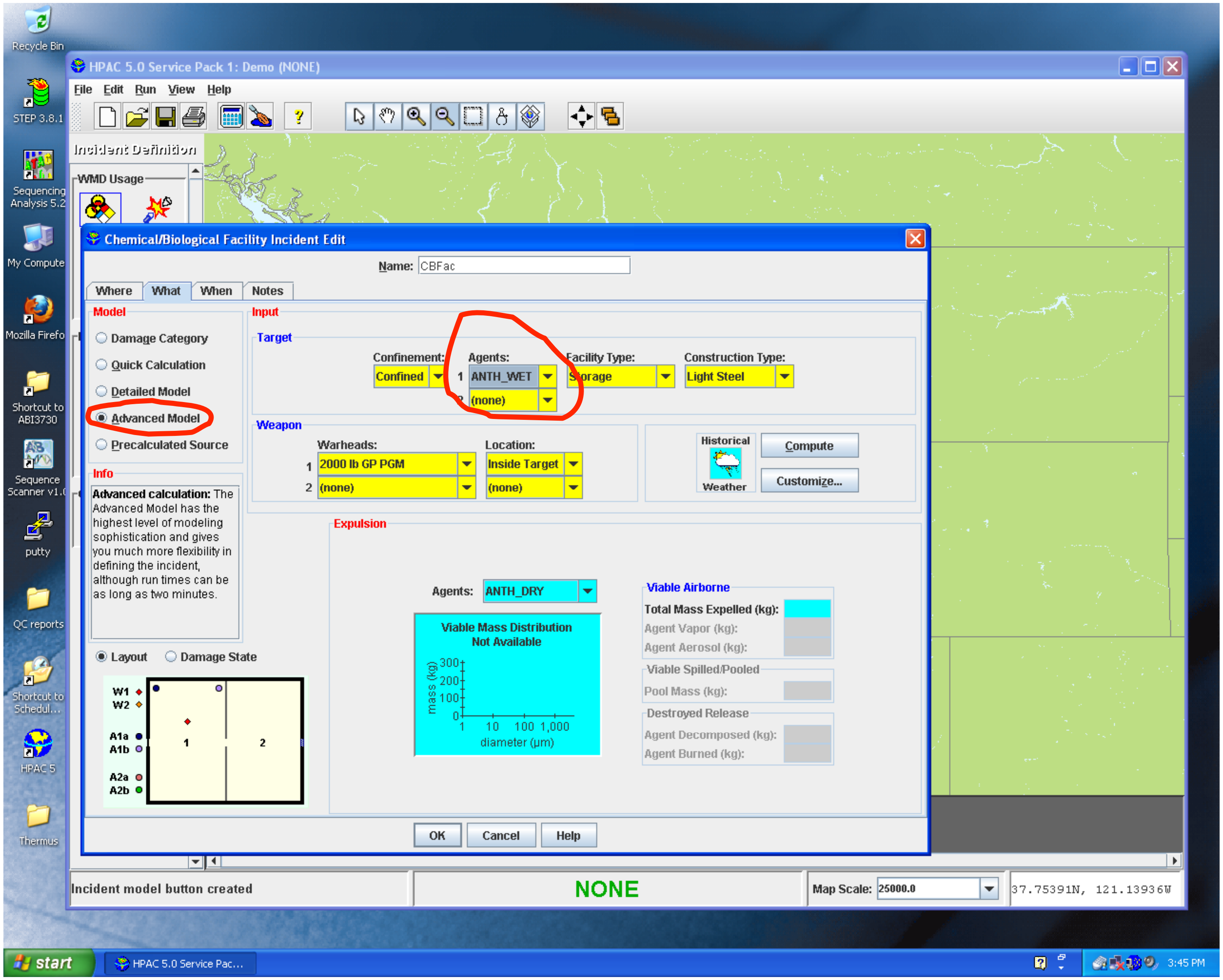
Using the Package

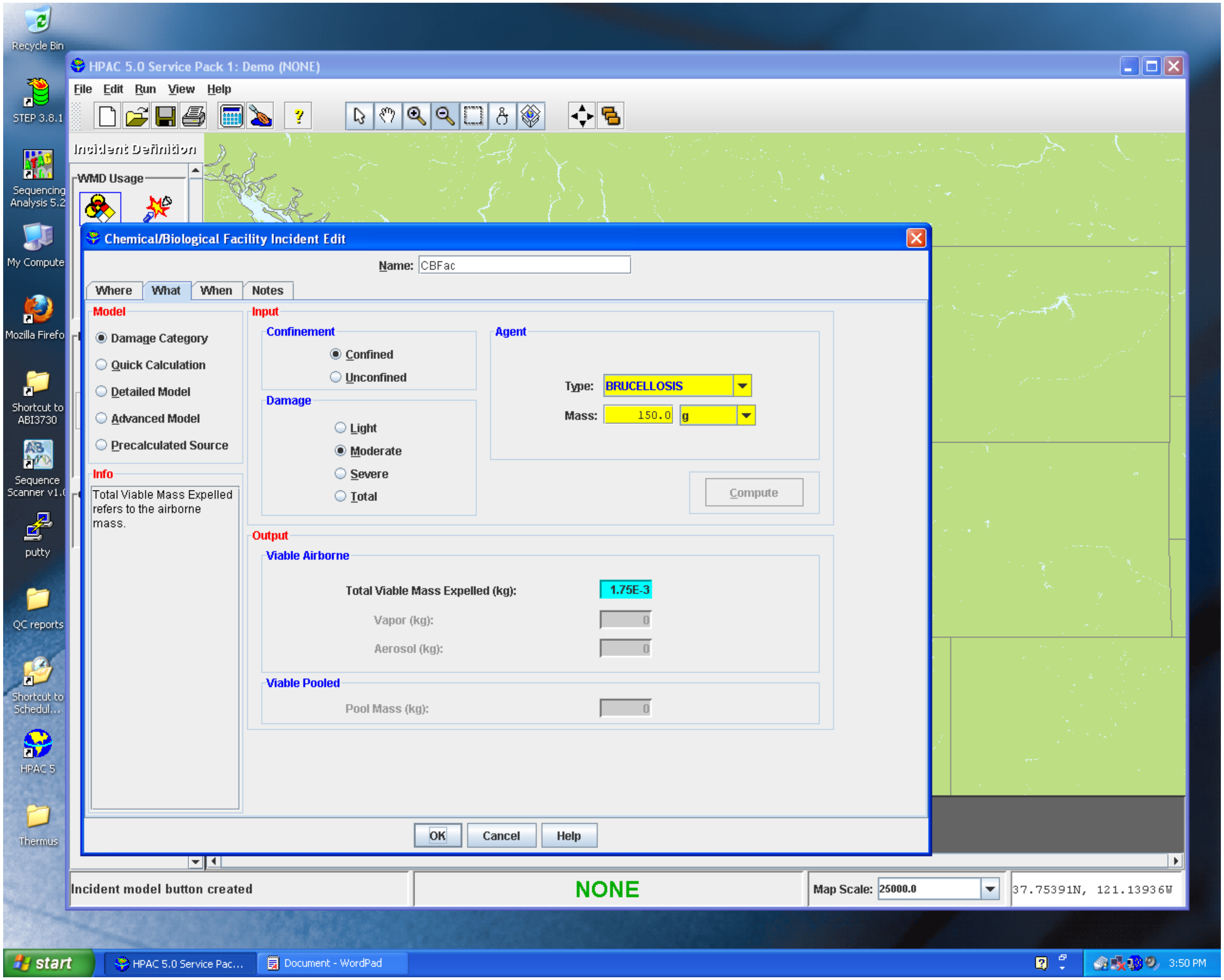



HPAC 5.0 Service Pack 1: Demo (NONE)
File Edit Run View Help
Incident Definition
WMD Usage
Chemical/Biological Facility Incident Edit
Name: CBFac
Where What When Notes
Model
Damage Category
Quick Calculation
Detailed Model
Advanced Model
Precalculated Source
Info
Location: refers to weapon placement. For confined targets this is the position relative to the structure. For unconfined targets this is the weapon position relative to the agent containers.
Input
Target
Confinement: Confined
Agent: BRUCELLOSIS
Facility Type: Storage
Construction Type: Light Steel
Weapon
Warhead: 2000 lb GP PGM
Location: Near Target
Default Weather
Compute
Customize...
Output
Strike Condition
Total Viable Mass Expelled (kg):
Viable Agent Vapor (kg):
Viable Agent Aerosol (kg):
Agent Decomposed (kg):
Agent Burned (kg):
Viable Spill Mass (kg):
Viable Mass Distribution Not Available
mass (kg)
diameter (µm)
OK Cancel Help
Incident model button created
NONE
Map Scale: 25000.0
37.75391N, 121.13936W
start
HPAC 5.0 Service Pac...
Document - WordPad
3:46 PM

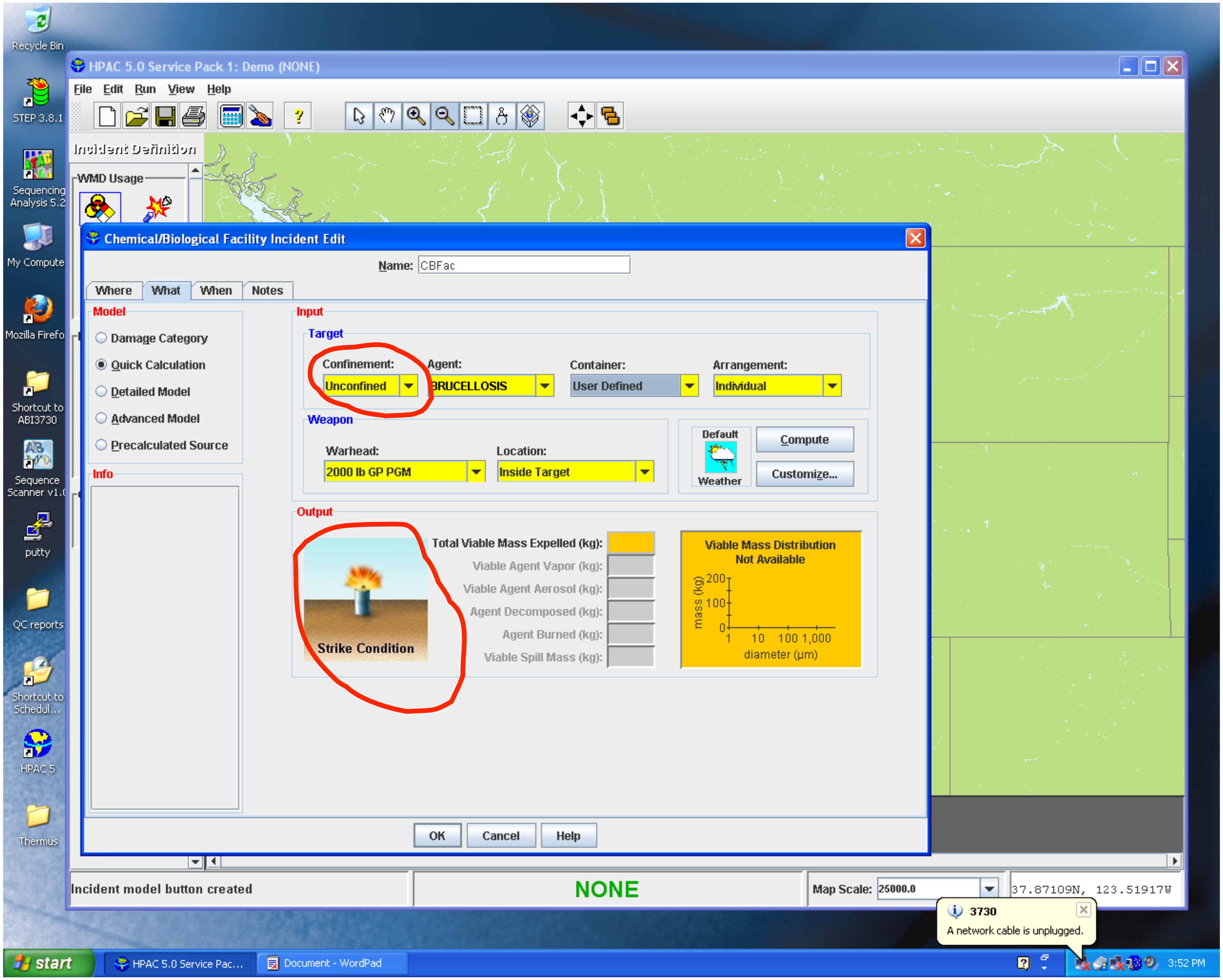

HPAC 5.0 Service Pack 1: Demo (NONE)
File Edit Run View Help
Incident Definition
WMD Usage
Chemical/Biological Facility Incident Edit
Where What When Notes
Model
Damage Category
Quick Calculation
Detailed Model
Advanced Model
Precalculated Source
Info
The graphic illustrates the level of damage to the structure.
Total Viable Mass Expelled refers to the airborne mass.
Input
Target
Confinement:
Confined
Weapon
Warhead:
2000 lb GP PGM
Output
Total Damage
Customize
Facility Agent Warhead Weather
Facility: Storage
Volume
Total: 3370.0 m3
Burst Room volume known
Burst room: 1100.0 m3
Area
Total facility vent: 13.0 m2
Burst room facility vent: 13.0 m2
Shielding
Within burst room: 0.0 kg/m2
Interior wall: 12.0 kg/m2
Exterior wall: 12.0 kg/m2
Loose Dust Swept-Up
(Loose) dust and debris: 0.0 kg
Doors
Interior Exterior
Type: Architectural
Initial status: Open
OK Cancel Apply Restore Page Defaults
OK Cancel Help
Incident model button created
NONE
Map Scale: 25000.0
37.87109N, 123.51917W
start
HPAC 5.0 Service Pac...
Document - WordPad
3:55 PM

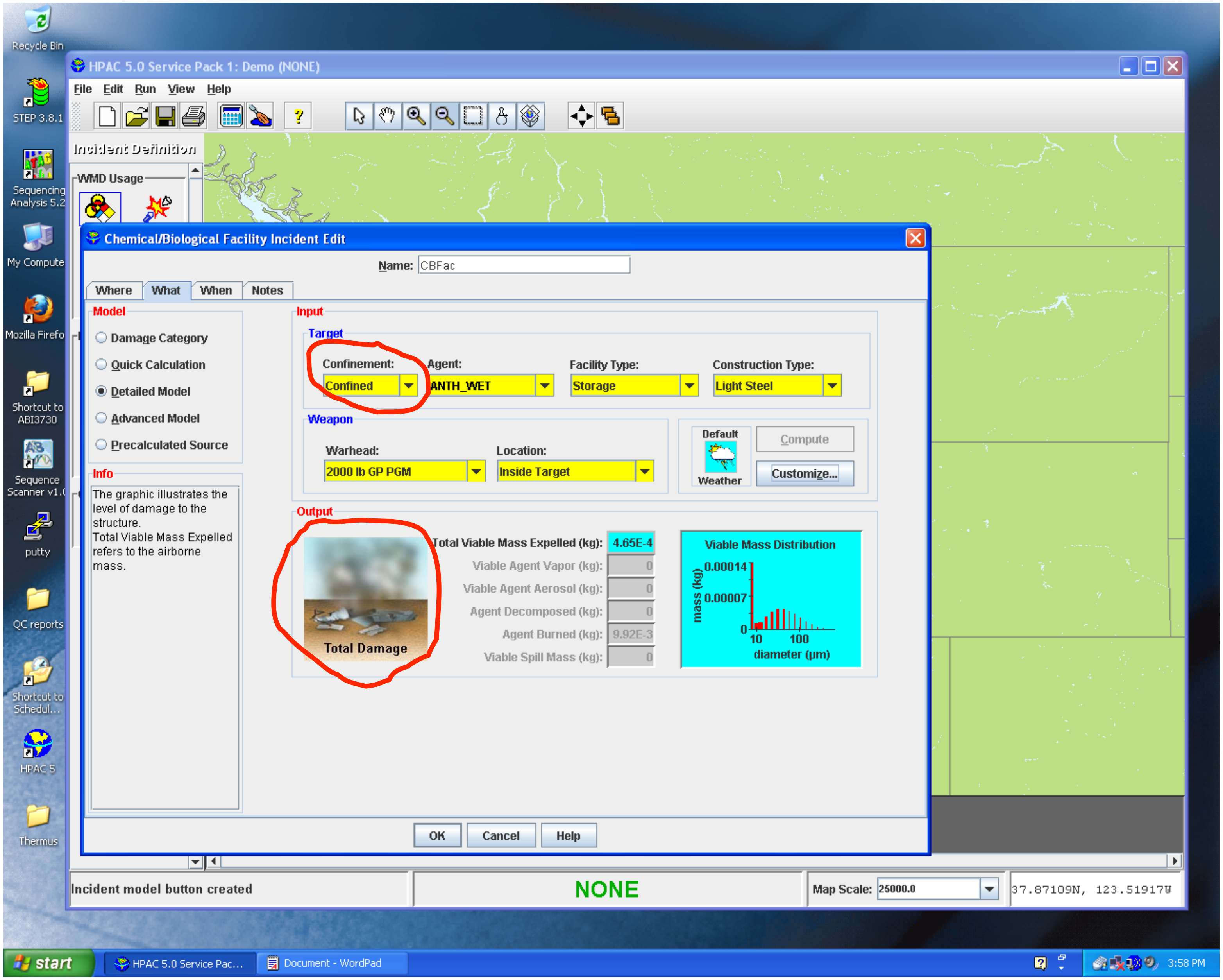
Some Features Appear to Disable Full Menu



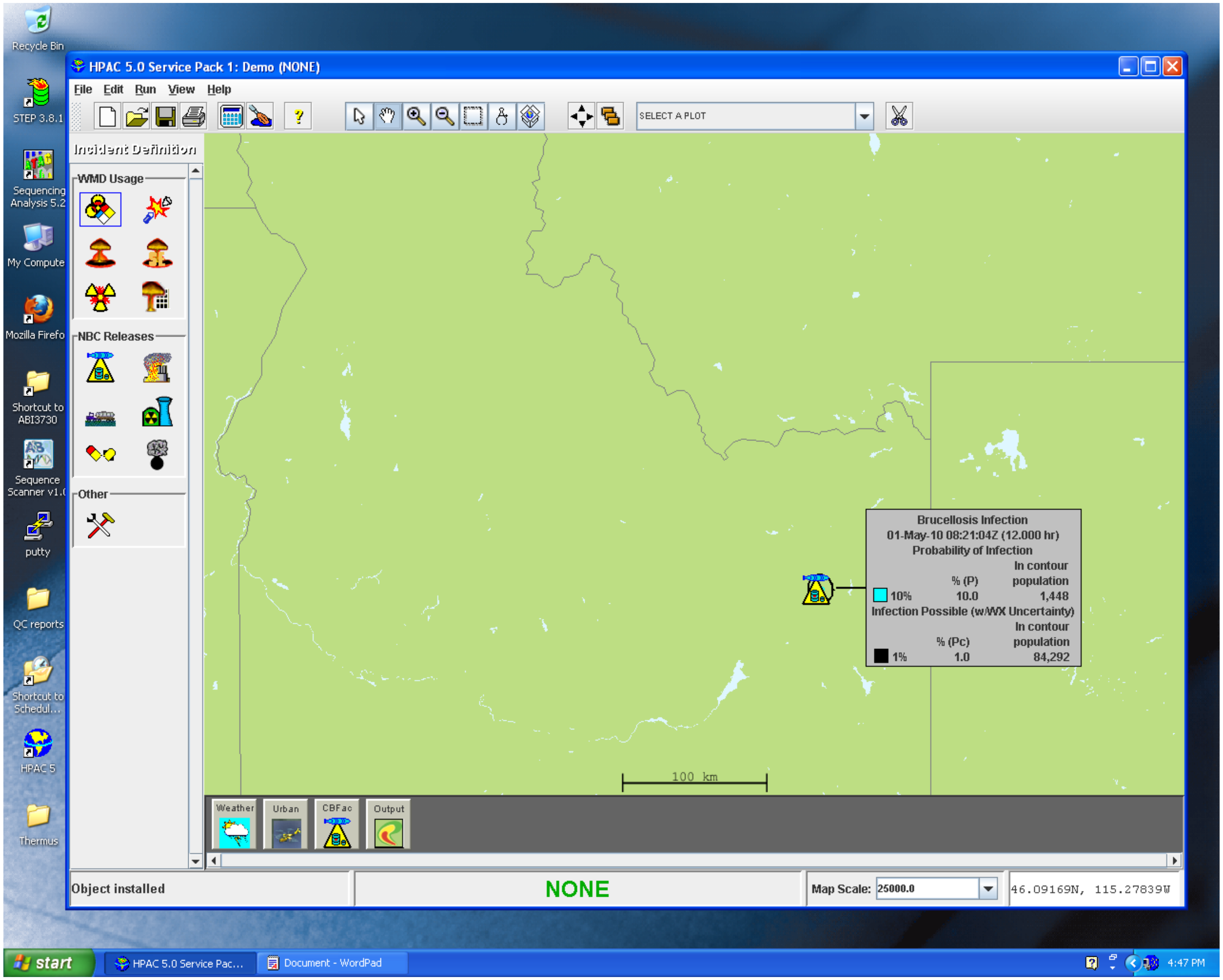


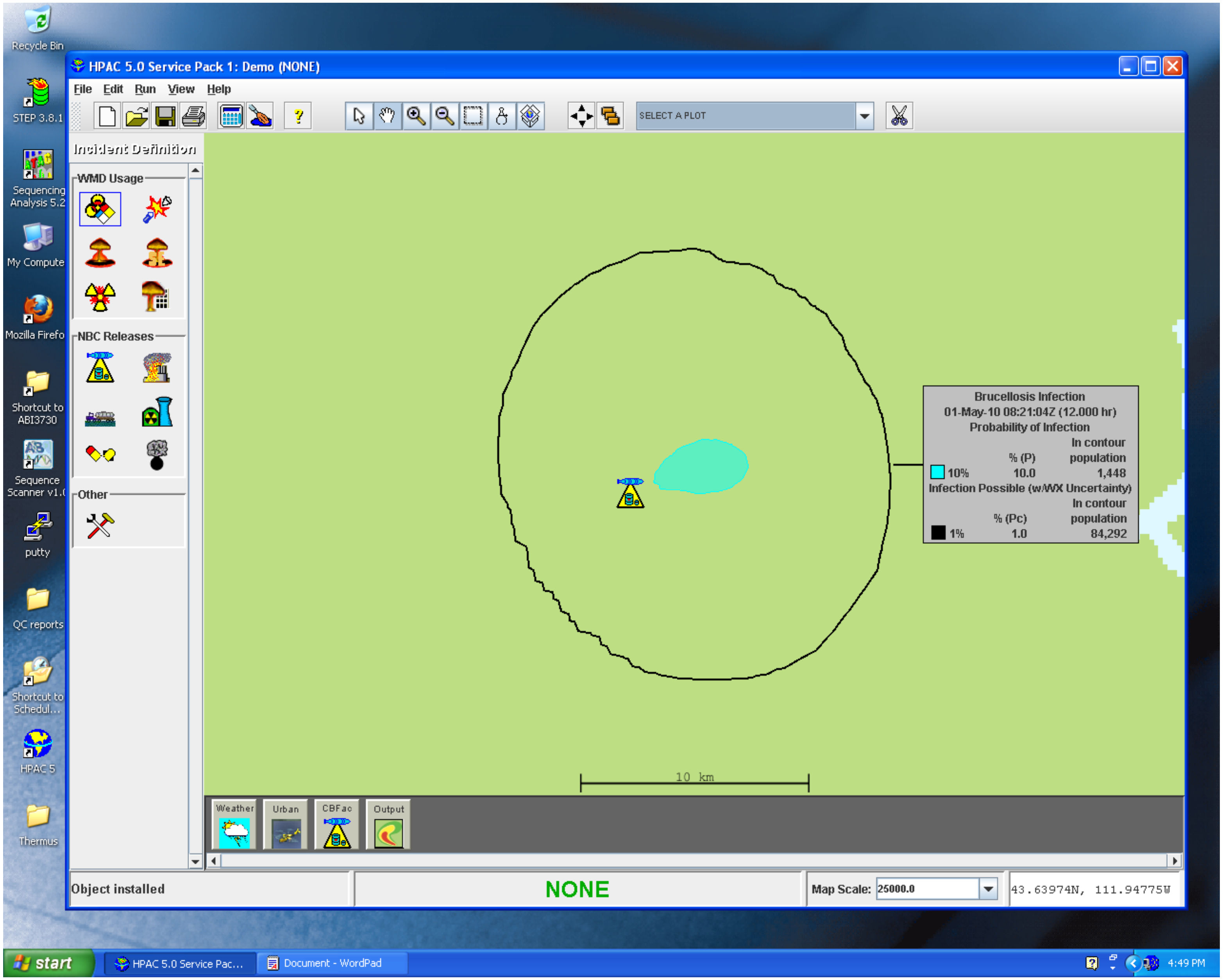
HPAC 5.0 Service Pack 1: Demo (NONE)
File Edit Run View Help
Incident Definition
WMD Usage
Chemical/Biological Facility Incident Edit
Name: CBFac
Where What When Notes
Model
Damage Category
Quick Calculation
Detailed Model
Advanced Model
Precalculated Source
Info
Total Viable Mass Expelled refers to the airborne mass.
Input
Confinement
Confined
Unconfined
Damage
Light
Moderate
Severe
Total
Agent
Type: BRUCELLOSIS
Mass: 150.0 g
Compute
Output
Viable Airborne
Total Viable Mass Expelled (kg): 1.75E-3
Vapor (kg): 0
Aerosol (kg): 0
Viable Pooled
Pool Mass (kg): 0
OK Cancel Help
Incident model button created
NONE
Map Scale: 25000.0
37.75391N, 121.13936W
Recycle Bin
STEP 3.8.1
Sequencing Analysis 5.2
My Compute
Mozilla Firefo
Shortcut to ABI3730
Sequence Scanner v1.(
putty
QC reports
Shortcut to Schedul...
HPAC 5
Thermus
start
HPAC 5.0 Service Pac...
Document - WordPad
3:50 PM


HPAC 5.0 Service Pack 1: Demo (NONE)
File Edit Run View Help
Incident Definition
WMD Usage
Chemical/Biological Facility Incident Edit
Name: CBFac
Where What When Notes
Model
Damage Category
Quick Calculation
Detailed Model
Advanced Model
Precalculated Source
Info
Input
Target
Confinement: Unconfined
Agent: BRUCELLOSIS
Container: User Defined
Arrangement: Individual
Weapon
Warhead: 2000 lb GP PGM
Location: Inside Target
Default Weather
Compute
Customize...
Output
Strike Condition
Total Viable Mass Expelled (kg):
Viable Agent Vapor (kg):
Viable Agent Aerosol (kg):
Agent Decomposed (kg):
Agent Burned (kg):
Viable Spill Mass (kg):
Viable Mass Distribution Not Available
mass (kg)
diameter (µm)
OK Cancel Help
Incident model button created
NONE
Map Scale: 25000.0
37.87109N, 123.51917W
3730
A network cable is unplugged.
start
HPAC 5.0 Service Pac...
Document - WordPad
3:52 PM


HPAC 5.0 Service Pack 1: Demo (NONE)
File Edit Run View Help
Incident Definition
WMD Usage
Chemical/Biological Facility Incident Edit
Name: CBFac
Where What When Notes
Model
Damage Category
Quick Calculation
Detailed Model
Advanced Model
Precalculated Source
Info
The graphic illustrates the level of damage to the structure.
Total Viable Mass Expelled refers to the airborne mass.
Input
Target
Confinement: Confined
Agent: ANTH_WET
Facility Type: Storage
Construction Type: Light Steel
Weapon
Warhead: 2000 lb GP PGM
Location: Inside Target
Default Weather
Compute
Customize...
Output
Total Damage
Total Viable Mass Expelled (kg): 4.65E-4
Viable Agent Vapor (kg): 0
Viable Agent Aerosol (kg): 0
Agent Decomposed (kg): 0
Agent Burned (kg): 9.92E-3
Viable Spill Mass (kg): 0
Viable Mass Distribution
mass (kg)
0.00014
0.00007
0
10
100
diameter (μm)
OK Cancel Help
Incident model button created
NONE
Map Scale: 25000.0
37.87109N, 123.51917W
Recycle Bin
STEP 3.8.1
Sequencing Analysis 5.2
My Compute
Mozilla Firefo
Shortcut to ABI3730
Sequence Scanner v1.0
putty
QC reports
Shortcut to Schedul...
HPAC 5
Thermus
start
HPAC 5.0 Service Pac...
Document - WordPad
3:58 PM

Predictions




HPAC 5.0 Service Pack 1: Demo (NONE)
File Edit Run View Help
SELECT A PLOT
Incident Definition
WMD Usage
NBC Releases
Other
Brucellosis Infection
01-May-10 08:21:04Z (12.000 hr)
Probability of Infection
% (P) In contour population
10% 10.0 1,448
Infection Possible (w/WX Uncertainty)
% (Pc) In contour population
1% 1.0 84,292
10 km
Weather
Urban
CBFac
Output
Object installed
NONE
Map Scale: 25000.0
43.63974N, 111.94775W
Recycle Bin
STEP 3.8.1
Sequencing Analysis 5.2
My Compute
Mozilla Firefo
Shortcut to ABI3730
Sequence Scanner v1.(
putty
QC reports
Shortcut to Schedul...
HPAC 5
Thermus
start
HPAC 5.0 Service Pac...
Document - WordPad
4:49 PM

Conclusions

- HPAC is a comprehensive, simple-to-use modeling package (from limited experience by non-expert)
- HPAC is integrated with real-time weather data (DTRA Meteorological Data Server)
- Speed of computation and ability to use the stand-alone package allow testing of many different scenarios
- Facility scenarios will be most useful to BWG users
- Urban dispersal model was not tested but may be extremely useful