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## ***Special Population Planner: A GIS-based Emergency Planning System***

***Jim Kuiper, Ed Tanzman, and William Metz***

**2<sup>nd</sup> Joint Emergency Preparedness and Response & Robotics  
and Remote Systems Topical Meeting**

*Session: GIS and Geospatial Science in Emergency Planning and Response II*

*Monday, March 10, 1:30 pm - 3:00 pm*



U.S. Department  
of Energy

UChicago ►  
Argonne<sub>LLC</sub>



# Overview

- My subject has similarities to the others in this session, including a GIS system supporting emergency planners and modeling of airborne plumes, but the focus will be on something not adequately addressed in some emergency planning efforts: **special-needs populations**
- Why plan for individuals with special needs?
- Who has special needs?
- What are some unique considerations for special needs populations?
- What work has been done at Argonne in this area?
  - Alabama Chemical Stockpile Emergency Preparedness Program
  - Data repository
  - Special Population Planner
- Conclusions

## Why Plan for Special-Needs Populations?

- The Americans with Disabilities Act specifically prohibits exclusion of persons from the benefits of government services or programs solely because they are disabled.
- Recent major emergencies have many examples where it's clear that some could not respond adequately:
  - World Trade Center on 9/11/2001
  - Hurricane Katrina
- Does your emergency plan adequately consider:
  - Whether new residents or visitors would know what to do if there were an emergency?
  - Whether a blind or hearing-impaired person would receive emergency signals?
  - Whether a physically or mentally impaired person can shelter or evacuate if necessary?
- Do you have a means of knowing the unique needs of people in your area beyond generalized statistics?
  - Studies indicate that up to 19% of Americans are disabled
  - How many disabled individuals live in your community, and where?
  - What other situations need unique planning, such as prisons, hospitals, or stadiums?
- Once you have the information, what training, materials or assistance can you provide?

## Who Has Special Needs?

- There is no U.S. national definition
- Persons who:
  - Have low incomes
  - Are infirm or disabled
  - Reside in confined facilities
  - Do not speak English
  - Lack transportation
  - Are senior citizens or elderly
  - Are tourists, visitors, or homeless
  - Have physical, mental, and/or medical problems (either temporary or chronic)
- Children who are sometimes in self-care (latchkey children)



# *What Are Some Unique Considerations for Special-Needs Populations?*

- Each category involves different:
  - Approaches to communication
  - Approaches to assistance
  - Preparation for, and needs in an emergency situation
- Data gathering includes:
  - Communication challenges (many and varied)
  - Sensitive data with obligation to protect privacy
  - Voluntary participation
  - Rapid change in population requires frequent updates

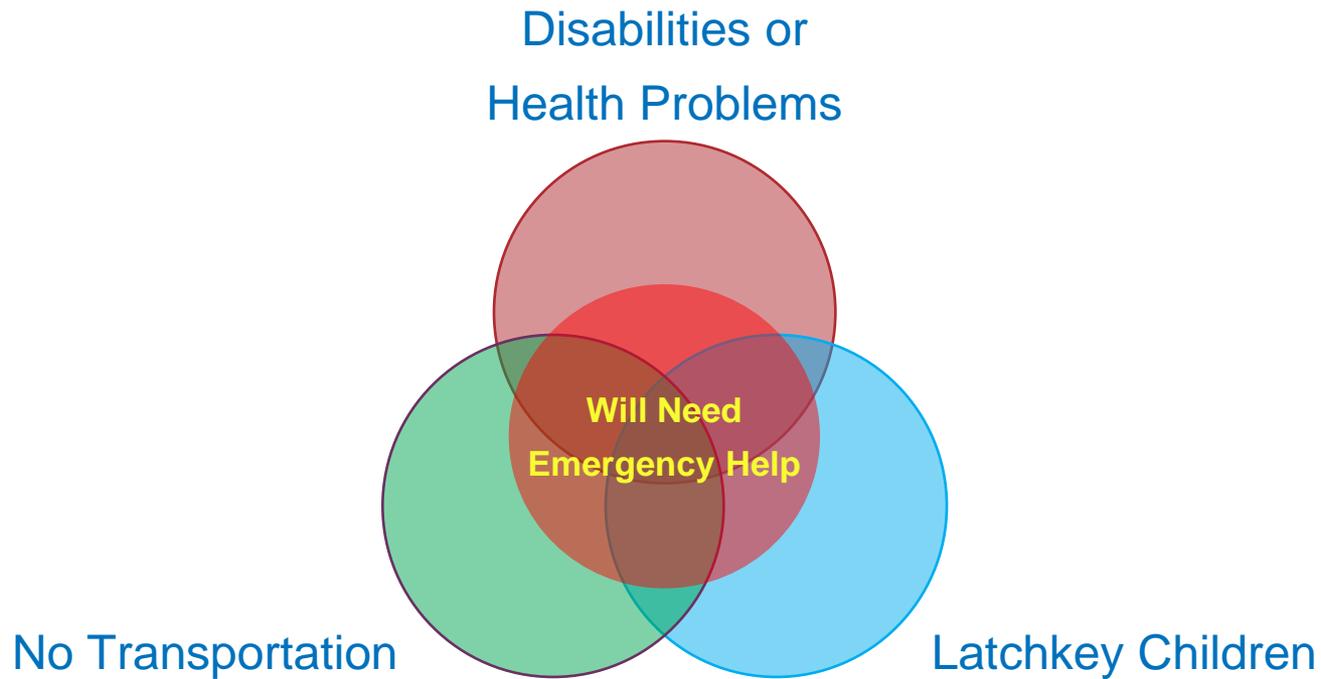
# Chemical Stockpile Emergency Preparedness (CSEP) Program Protects Nearby Communities

- CSEPP was initiated because the Army stores and is destroying deteriorating chemical weapons at 7 domestic installations
- Continued storage includes small risk of airborne release into surrounding communities.



- Anniston, AL, planning zones include 115,000 households with 275,000 residents.
- Argonne asked in 1996 to enhance preparedness for “persons with special needs.”
- About 9% reported “special needs” in 1998 survey.

# *Which Special-Needs Groups Are Addressed in the Alabama CSEP Program?*

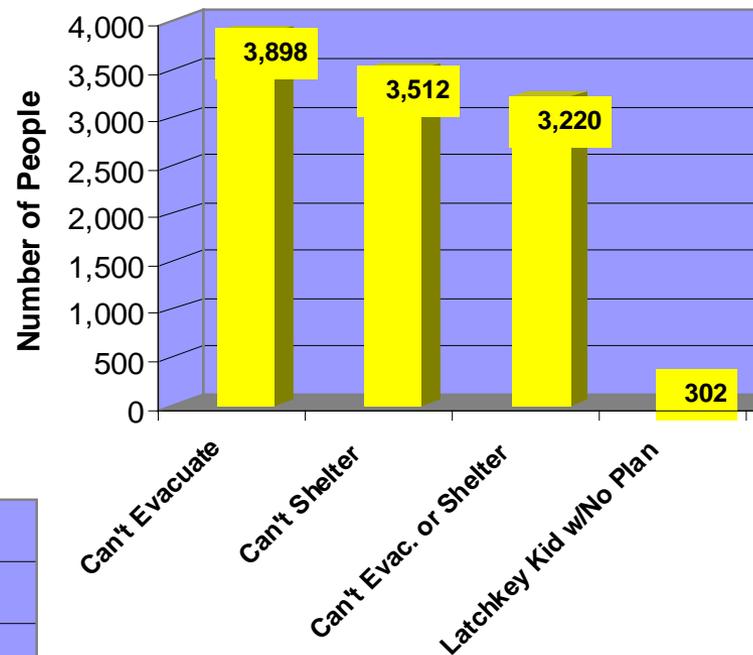
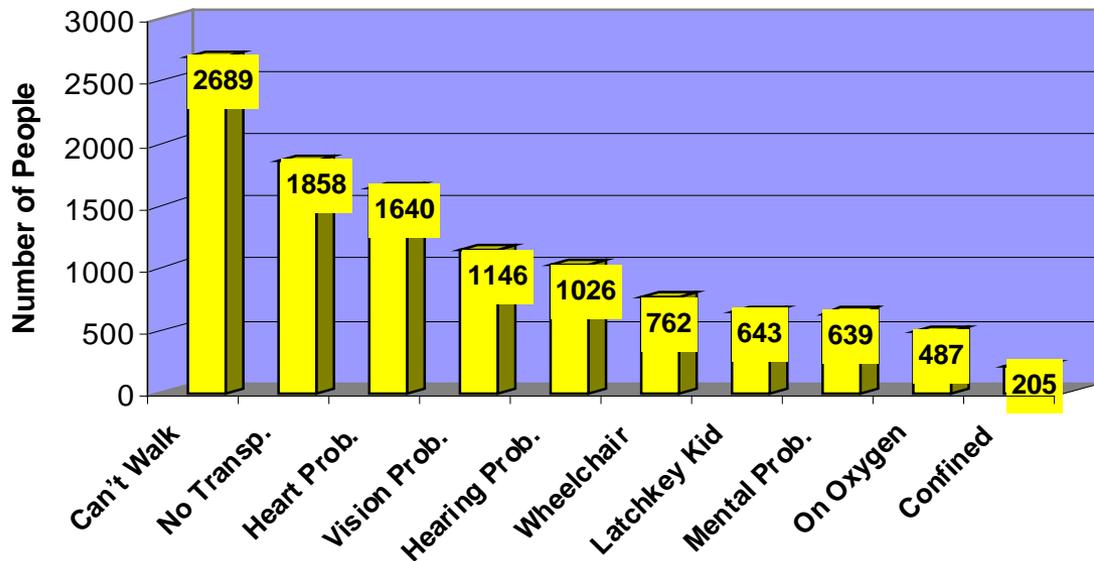


# *The Alabama CSEP Program Maintains a Voluntary Registry of Special-Needs Individuals*

- Outreach and data gathering includes:
  - Saturation mailing
  - Special materials and equipment for communicating with vision and hearing-impaired individuals
  - Print, radio, and television advertising
  - Assistance by community senior citizen, religious, and other organizations
  - Interaction with local Emergency Operation, and E-911 centers
  - Consultation of local obituaries
  - Database update mailings with follow-up phone calls
  - Toll free contact number
- Database includes contact information and details about type of special need
- Location and emergency planning zone determined by street address geocoding
- Geocoded version of database included in GIS database

# Daunting Range of Special Needs Reported by 4,603 Persons Who Registered in 2007

- Sheltering and evacuation are key protective actions.
- Many who reportedly cannot implement one also cannot implement the other.



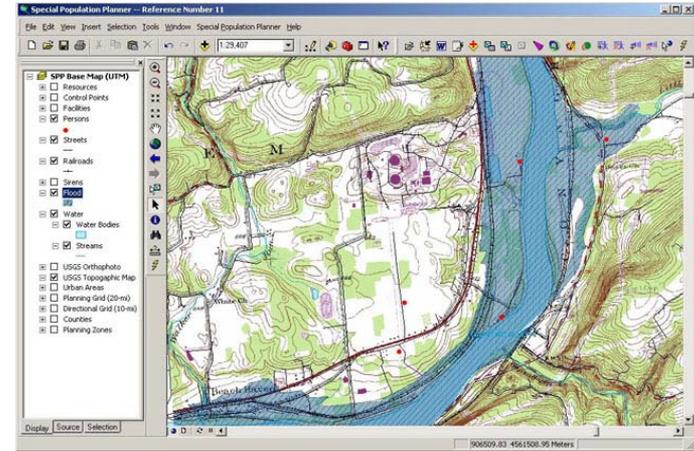
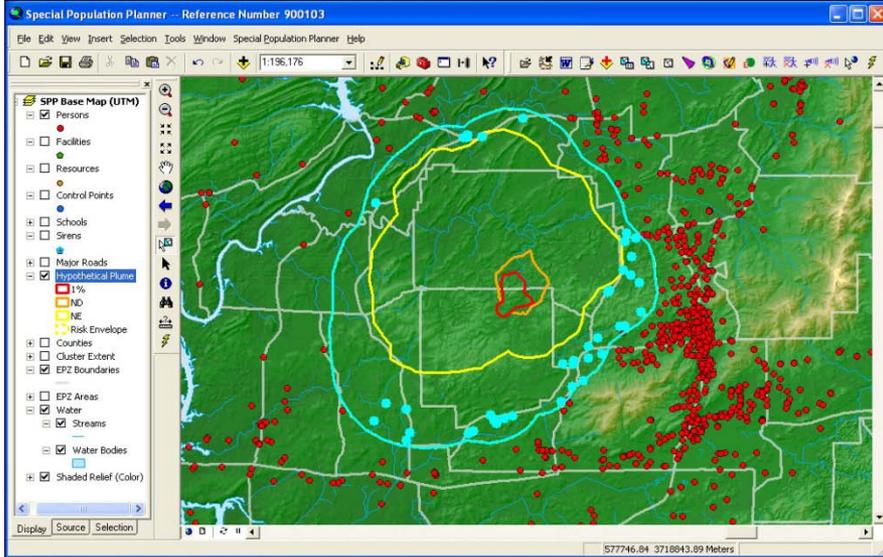
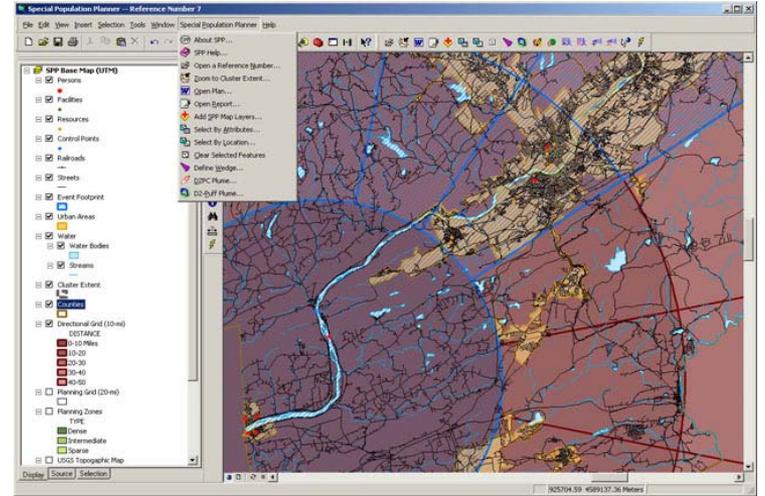
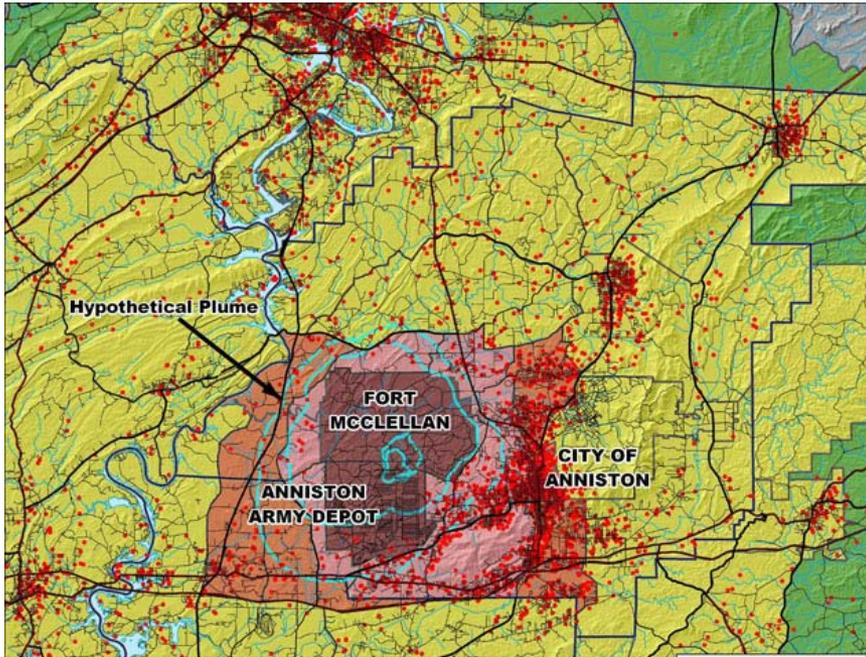
- Totals do not include “institutionalized” persons (in schools, prisons, hospitals, nursing homes, etc.).

## What Services Were Provided in the Alabama CSEP Program?

<b>For General Population and Persons with Special Needs</b>	<b>Inner Zones &lt;10 km</b>	<b>Middle Zones 10-20 km</b>	<b>Outer Zones 20-50 km</b>
Tone alert radio delivered	X	X	X
Shelter-in-place kit for available for pickup	X	X	X
Portable room air cleaner available for pickup	X		
Respiratory protection device available for pickup	X		
<b>Only for Persons with Special Needs</b>			
Tone alert radio with strobe or vibrating unit	X	X	X
Toll-free telephone assistance	X	X	X
Targeted outreach activities	X	X	X
Special-needs-related training	X	X	
Home delivery of protective equipment	X	X	
Portable room air cleaner with auxiliary features	X	X	
Offer of caulking, sealing, and structural modifications	X		



- Add examples of SPP, and specifically mention D2PC and WebPuff models
- EOCs have live met data and know current disposal activities at the Depot
- SPP can show current potential accident scenario with current weather conditions
- Also stores and retrieves emergency plans based on emergency zones
- Reports and maps
- All-hazards uses
- Include image from Susquehanna nuclear plant



**SPP Report**

BusinessObjects

1 / 2 75%



## Persons: Detailed

Special Population Planner

EPZ Type / Zone:	User Zone 1:	User Zone 2:	CANTE
<b>Inter / Luzer</b>	<b>F-12</b>	<b>IRZ</b>	
<b>Doe, John</b> Age: 72      Phone: 123-456-7890			
120 Pond Hill Rd		18655	County: Luzerne
Vision Difficulties: Yes	Heart Problem: No	Can Not Shelter: No	
Hearing Difficulties: Yes	Physically Unable: No	Child(s) Alone: No	
Can Not Walk: No	Wheelchair: No	On Oxygen: No	
Confined to Bed: No	Sometimes Confused: No	Unable to Evacuate: Yes	
Can Not Drive: Yes	Mentally Challenged: No		
Other Issues:		Updated: 01 / 15 / 2007 Update Source: Hypothetical person	
<b>Inter / Luzer</b>	<b>F-12</b>	<b>IRZ</b>	
<b>Doe, Jane</b> Age: 32      Phone: 123-456-7890			
650 Fowler Ave		18603	County: Luzerne
Vision Difficulties: No	Heart Problem: No	Can Not Shelter: No	
Hearing Difficulties: No	Physically Unable: Yes	Child(s) Alone: No	
Can Not Walk: Yes	Wheelchair: Yes	On Oxygen: No	
Confined to Bed: No	Sometimes Confused: No	Unable to Evacuate: Yes	
Can Not Drive: Yes	Mentally Challenged: No		
Other Issues:		Updated: 01 / 15 / 2007 Update Source: Hypothetical person	

**Location Editor: Add 'Persons' Record 905809** [X]

Location | Attributes

Click on the map, enter a coordinate, or use an address to locate the point

Map Click | Change Projection

X Coord:  Units: Meter

Y Coord:

Projection: NAD 1983 UTM Zone 16N

Geocoding by Address

Reference Layer:

Address:  Zip:

Geocoding Options | Locate

Setup | Add | Cancel

**Location Editor: Add 'Persons' Record 905809** [X]

Location | Attributes

Id:

Firstname:

Middlename:

Lastname:

Suffix:

Ageyr:

Visionprob:

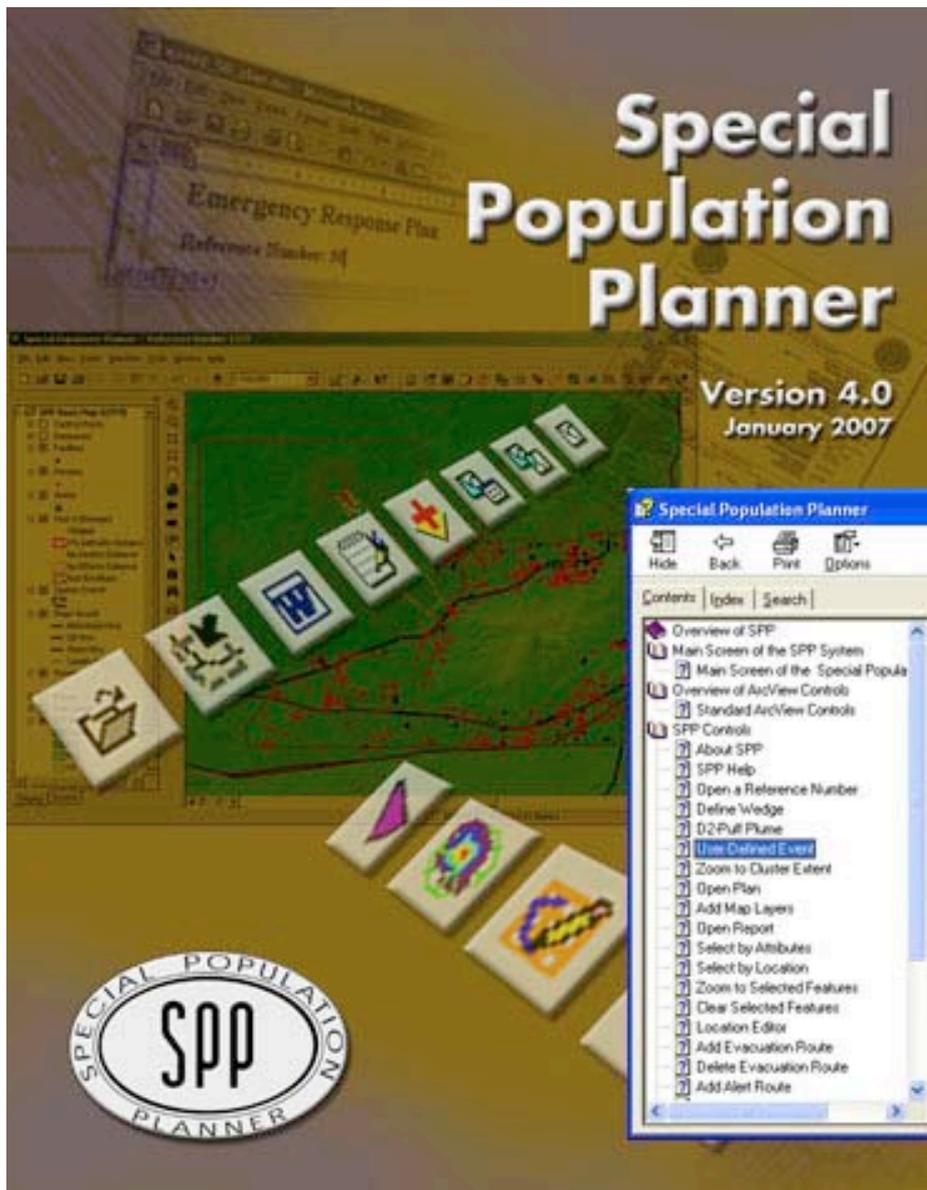
Hearngprob:

Isconfused:

Mentdisab:

Cantwalk:

Setup | Add | Cancel



**Special Population Planner**

Hide Back Print Options

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- Overview of SPP
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  - Add Evacuation Route
  - Delete Evacuation Route
  - Add Alert Route

Previous Next

SPP Help Open a Refers Define Wedge D2-Pull Plume **User-Def. Events** Zoom to Cluster

## User-Defined Event

The *User Defined Event* dialog provides a flexible tool to use any existing GIS layer or an area drawn on the map to open a planning map for all hazards analysis. Click on the *User Defined Event* tool to on the SPP toolbar to open the dialog

**User Defined Event**

Choose a layer for the background planning zones.

Planning Zone Layer: Planning Zones (County)

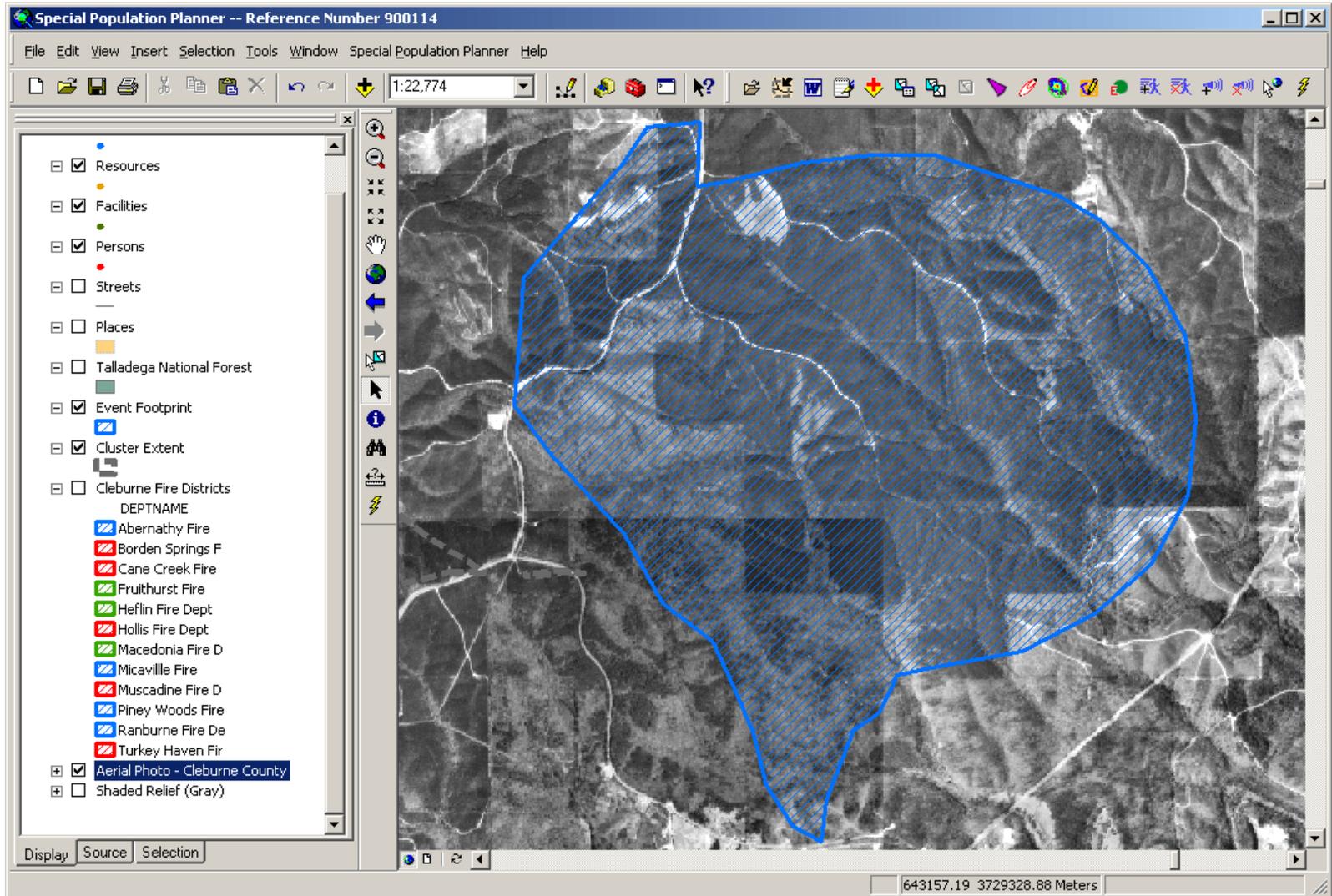
Choose a layer indicating the event footprint, or draw a polygon.

Emergency Event Footprint Layer: FloodedArea 

or  Use Selection

Draw Polygon

Name: 100-Year Flood Extent

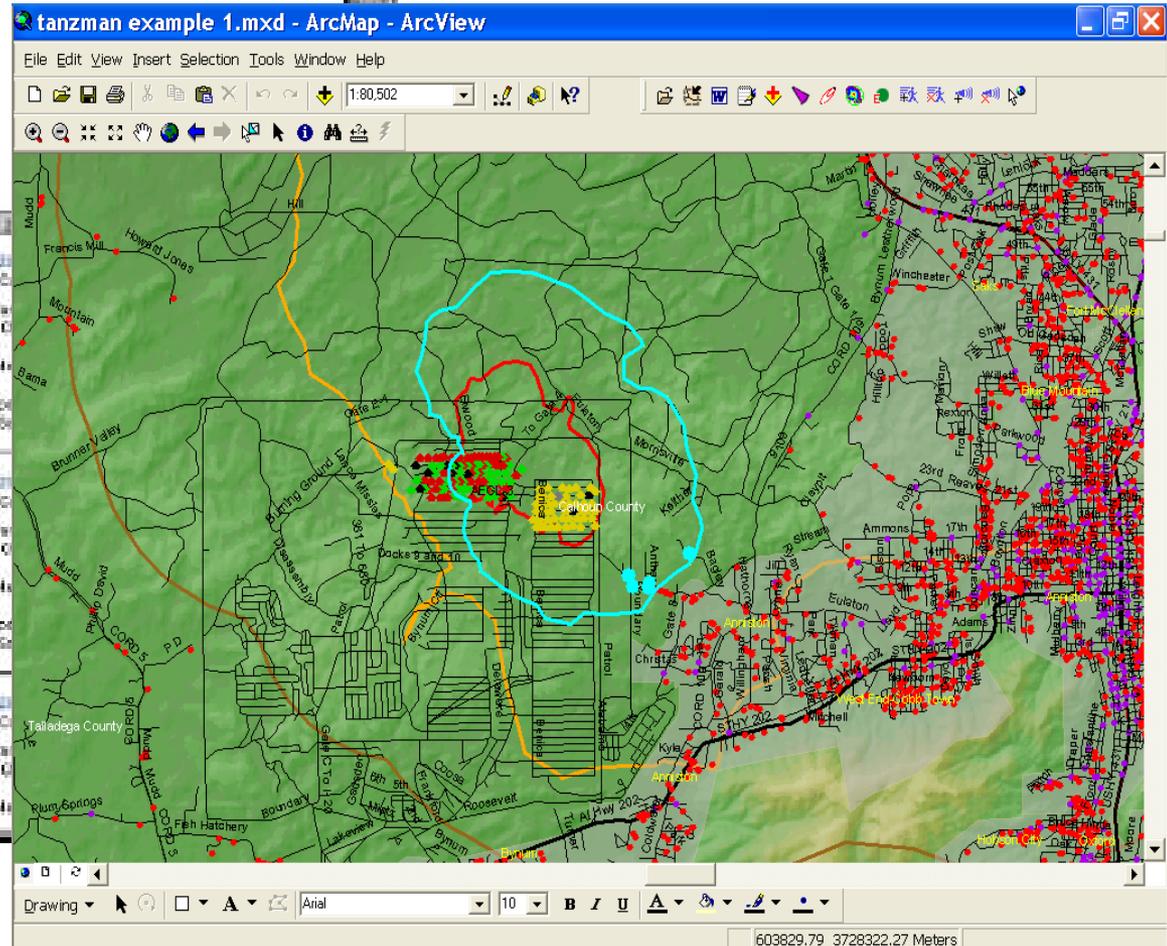


# Special Population Planner Enables Planning Based on Risk and/or Need

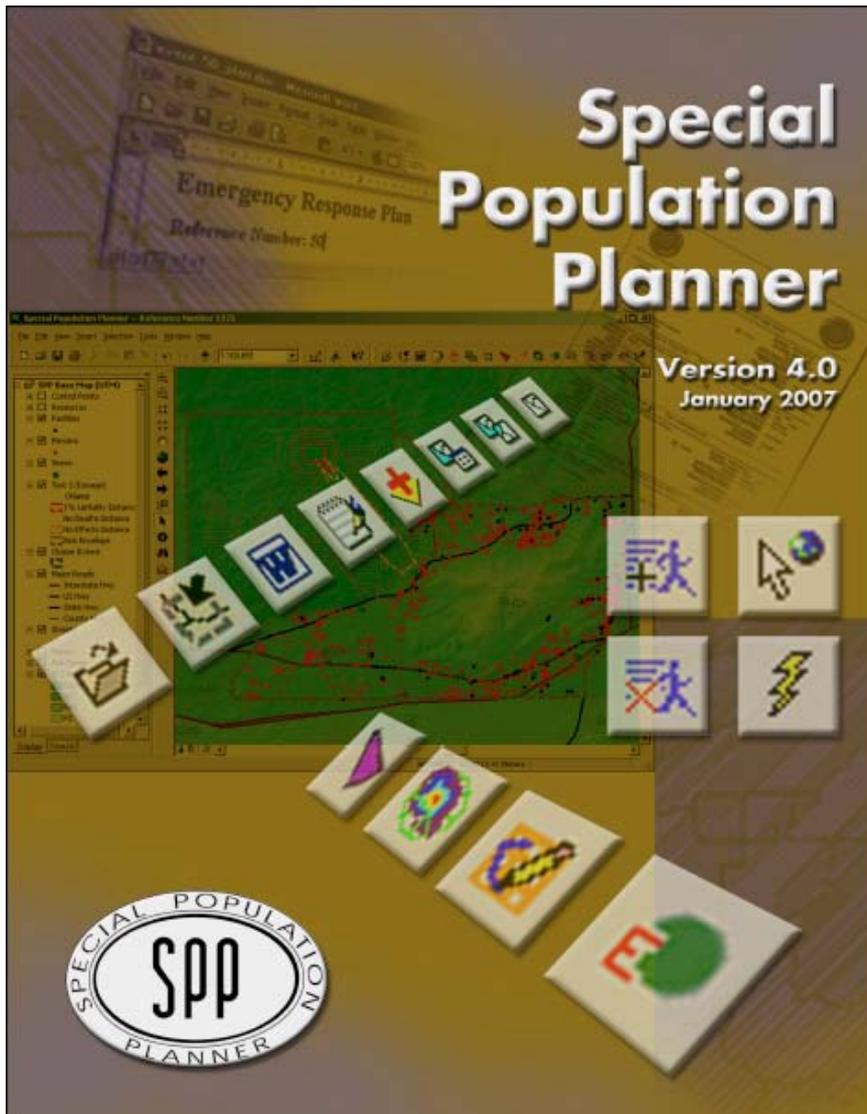
SPP Report



UIC Type / Desc.	User Desc. 1	User Desc. 2
<b>PHYSICALLY DISABLED</b>	<b>52</b>	<b>No Data</b>
Doc. John 181 Main Street	Anniston	Age: 47 Phone: 123 18201
Vision Difficulties: Y10 Hearing Difficulties: Can Not Walk: Y10 Confined to Bed: Can Not Drive:	Heart Problems: Physically Unable: Y10 Wheelchair: Y10 Sometimes Confused: Mentally Challenged:	Unstable: Update S
Other Issues:		
<b>PHYSICALLY DISABLED</b>	<b>52</b>	<b>No Data</b>
Doc. John 181 Main Street	Anniston	Age: 74 Phone: 123 18201
Vision Difficulties: Y10 Hearing Difficulties: Can Not Walk: Y10 Confined to Bed: Can Not Drive: Y10	Heart Problems: Y10 Physically Unable: Y10 Wheelchair: Sometimes Confused: Mentally Challenged:	Unstable: Update S
Other Issues:		
<b>PHYSICALLY DISABLED</b>	<b>52</b>	<b>No Data</b>
Doc. John 181 Main Street	Anniston	Age: 57 Phone: 123 18201
Vision Difficulties: Y10 Hearing Difficulties: Can Not Walk: Y10 Confined to Bed: Can Not Drive:	Heart Problems: Y10 Physically Unable: Y10 Wheelchair: Sometimes Confused: Mentally Challenged:	Unstable: Update S
Other Issues:		



## *SPP is Released as a Free Open Source Application*



- <http://sourceforge.net/projects/spc-pop-planner/>
- Requirements:
  - ArcView or ArcGIS 9.1 or higher
  - Crystal Reports XI (bundled with ESRI software)
  - Microsoft Access 2002 (or later)
  - Microsoft Word
- Includes:
  - Complete manual and integrated help file.
  - Database structure with example information.
- Technical support available separately.

## Conclusions



- Managing special needs issues is a complex yet important part of emergency planning and response

What software was developed to facilitate emergency planning?

- What emergency preparedness enhancements resulted?