A hand holding a pen over a molecular model with a laptop keyboard in the background.

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# Supporting the Air Force Occupational & Environmental Health Program

# Overview

- Background and rationale
- Prototype Occupational & Environmental Health (OEH) GIS applications
  - Radon exposure assessment
  - Emergency Response
  - Drinking Water Program
- Conclusions and next steps

# BACKGROUND & RATIONALE

# USAF Bioenvironmental Engineering

- Performs OEH risk assessments
- Communicates health risks to supervisors
- Performs sampling to quantify and assess exposure risks
- Provides real-time surveillance and decision support during Chemical, Biological, Radiological, or Nuclear (CBRN) incidents
- Ensures safe potable and non-potable water through extensive sampling, analysis, and assessment program
- Ongoing and continuous identification, communication, and reduction of health risks in all operational settings

# GeoBase

- Based on ArcGIS
- Designed to provide common access to current geospatial information for all USAF installations
- Site-specific geospatial information for buildings, facilities, infrastructure, environmental hazards, etc.
- Potential for expanded role in health risk communication, safety, emergency management, disease vector management, and other health-related data sets
- Primarily used by Civil Engineering

# Project Objectives

- Develop OEH layers and data sets for GeoBase that address gaps in Air Force Bioenvironmental Engineering (BE) mission activities, including:
  - Radon Exposure Assessment
  - Emergency Response
  - Environmental Restoration Program Site – Vapor Intrusion
  - Backflow Prevention Device Program
  - Drinking Water Sampling Program

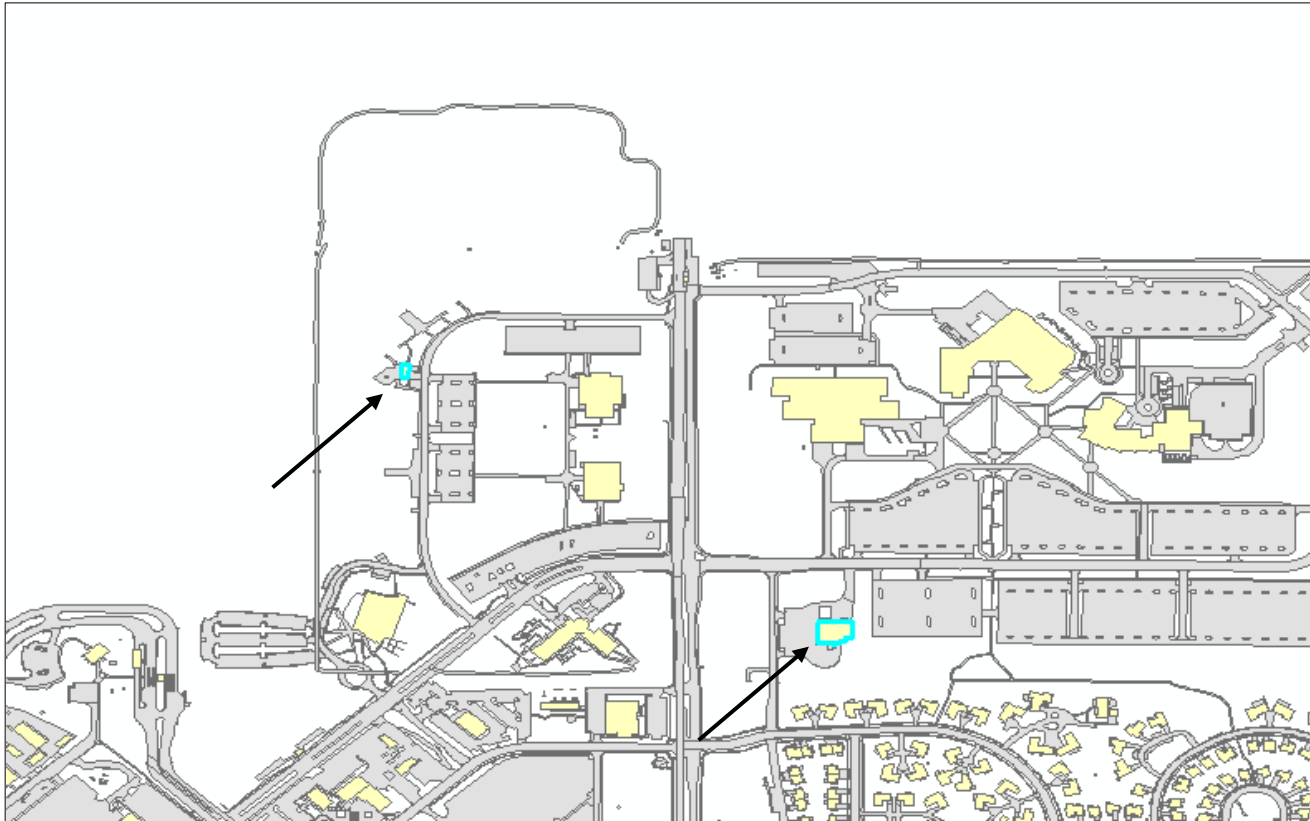
# RADON EXPOSURE ASSESSMENT

# Key Features

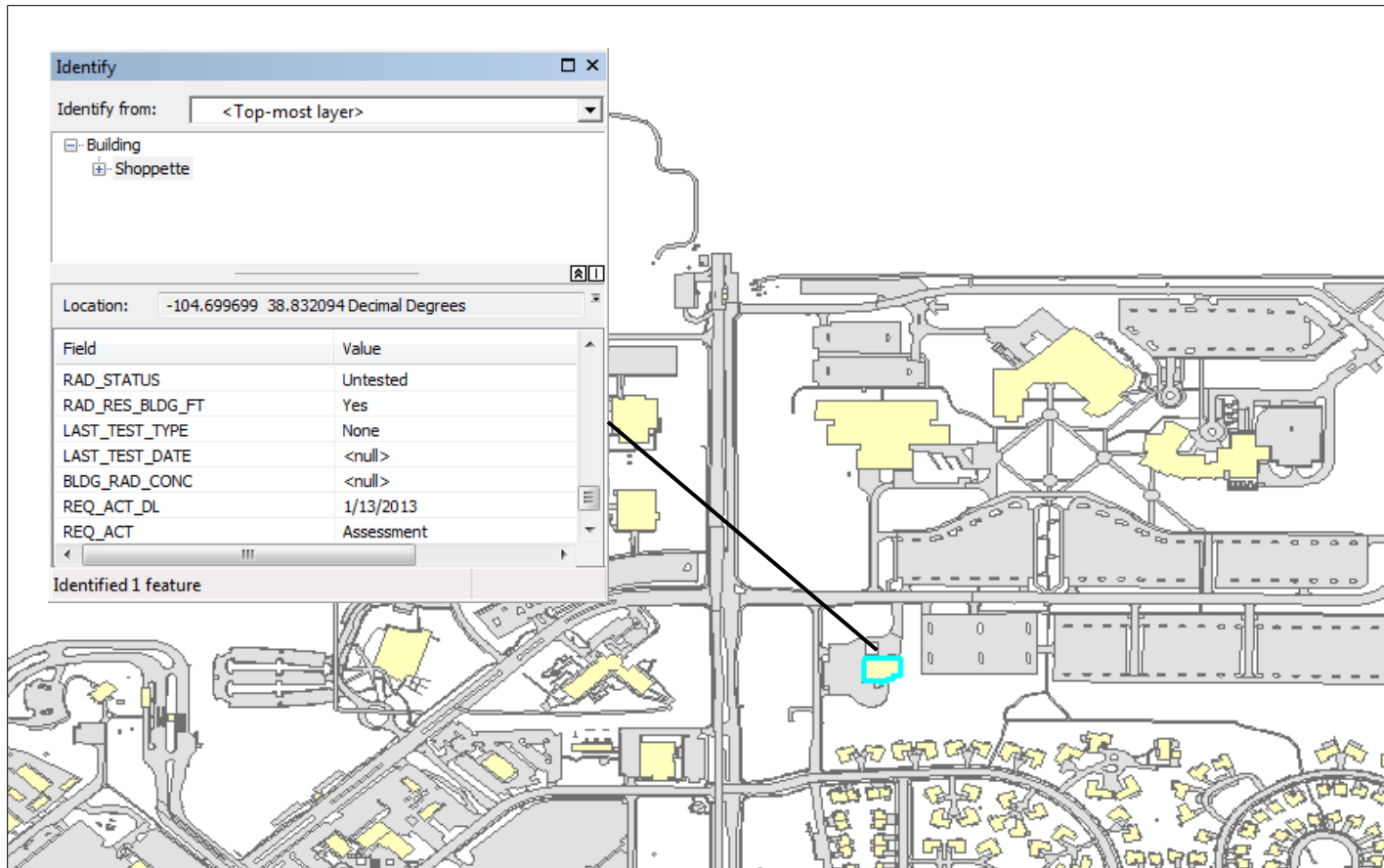
- Proactive
- Comprised of two feature classes
  - Building Radon Levels
  - Radon Control Systems
- Provide status of buildings with respect to
  - Radon concentration
  - Testing status
  - Required action deadlines
  - State of compliance



# Selection query by attribute identifies buildings exceeding guidelines



# Status using “Identify” tool



# GIS Tools and Techniques Utilized

- Selection query by attribute
- Selection query by location
- Identify

# Key Benefits

- Means of analyzing indoor radon exposure
- Easy identification of buildings out of compliance or requiring follow-up
- Basis for prioritizing and scheduling testing and mitigation
- Enhanced communication between BE and CE personnel
- Should ultimately reduce radon exposure

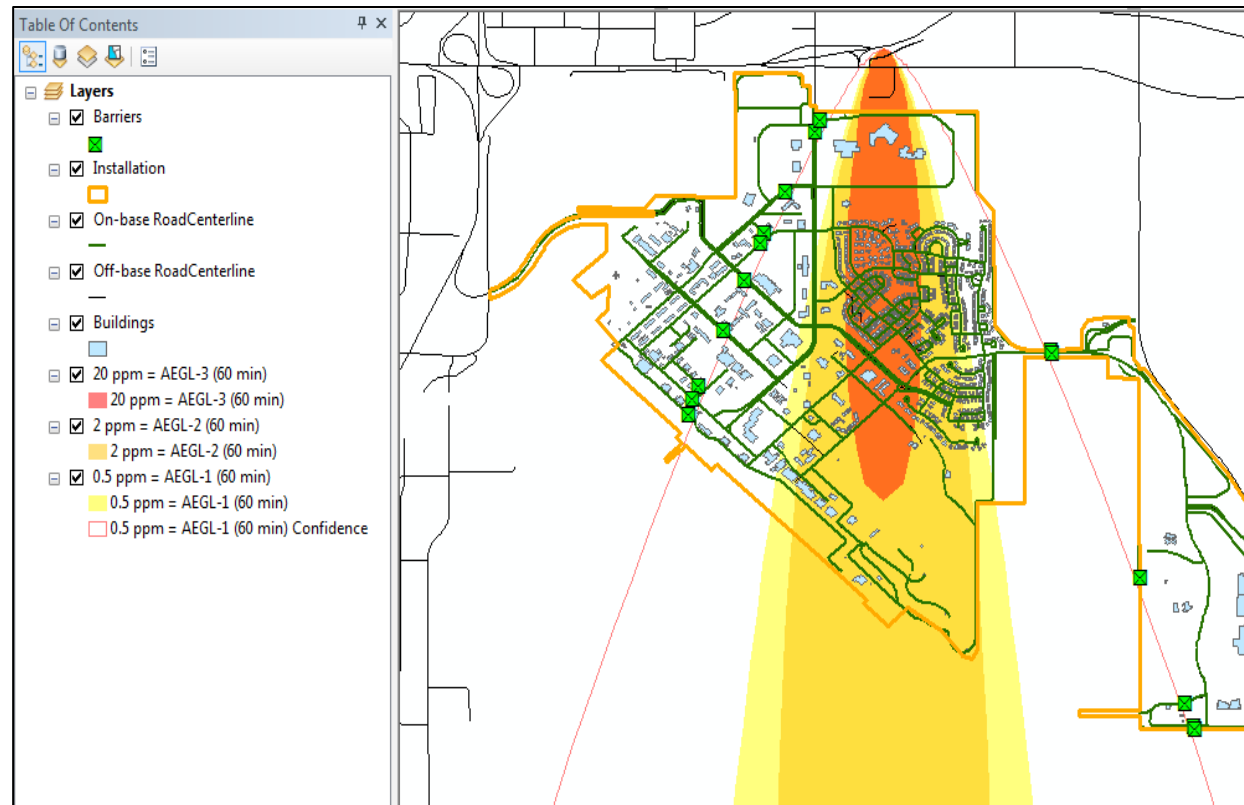
# EMERGENCY RESPONSE

# Key Features

- Comprised of 18 feature classes
- Proactive/reactive application
- Airborne chemical release
- Plume is simulated and mapped
- Street names and road blocks identified
- Buildings and personnel impacted by threat zone identified

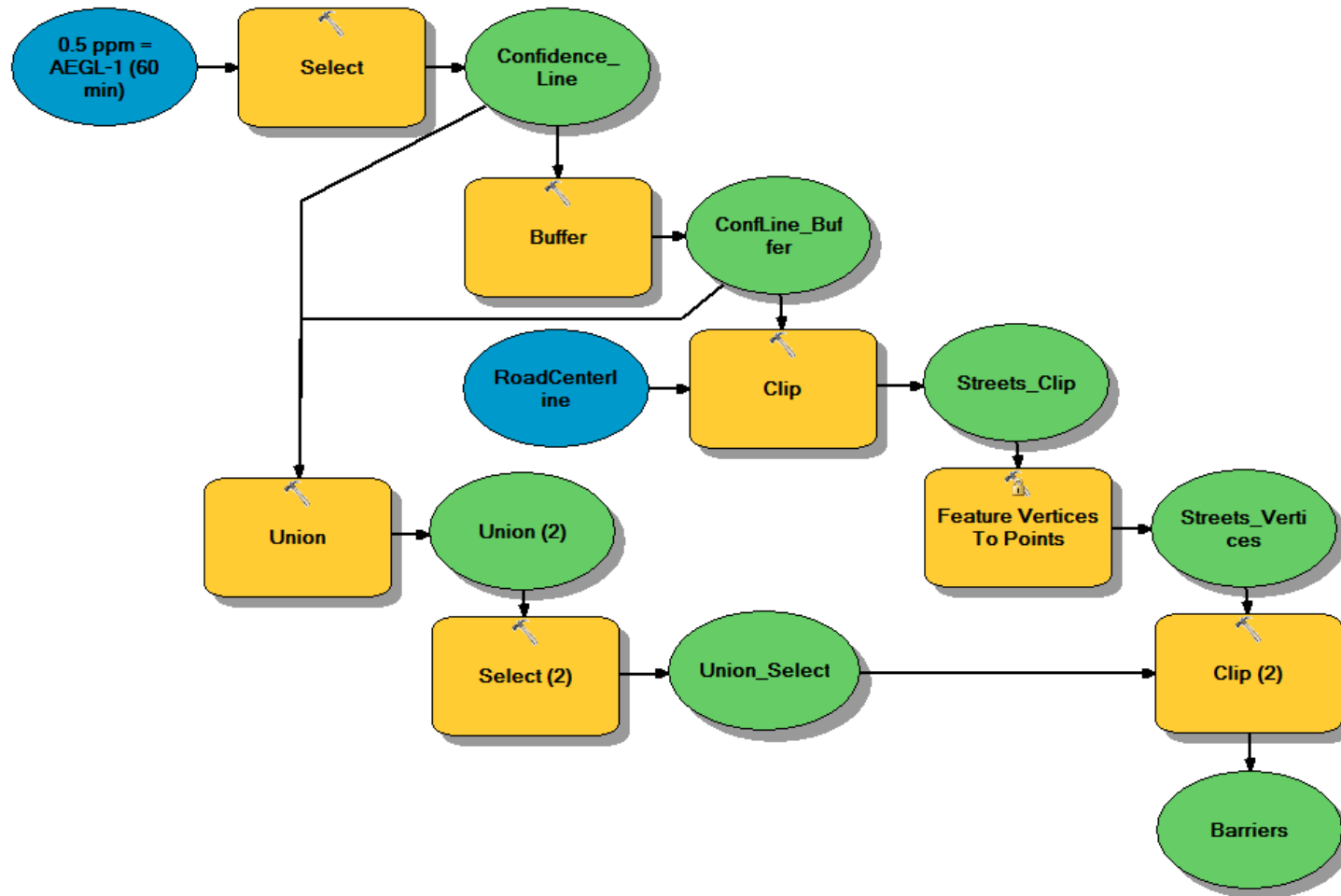
# Emergency Response Scenario

- Accidental transport release
- Chlorine gas
- ALOHA dispersion model



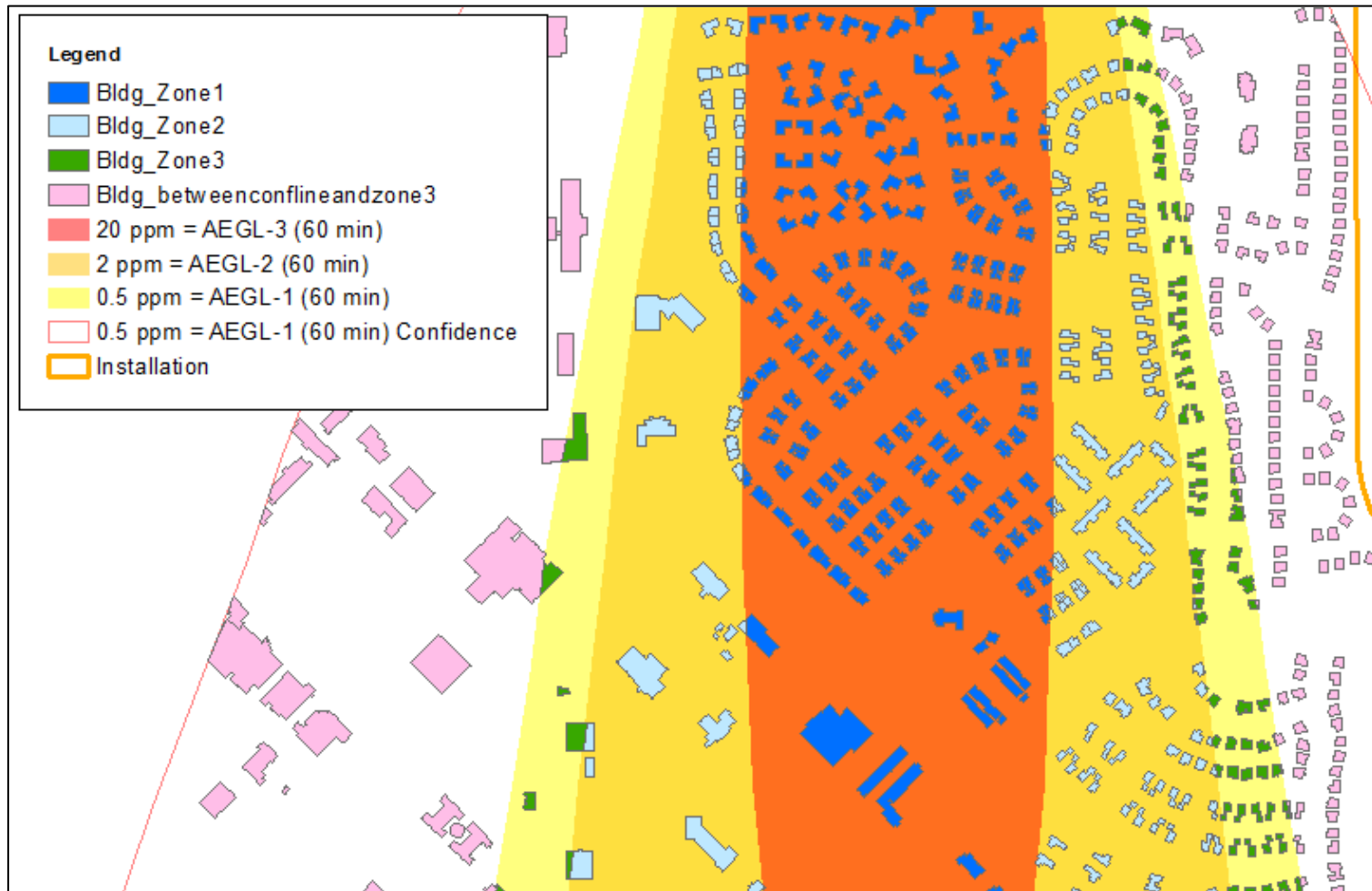
Road Blocks

# Road Block Barrier Model – Model Builder



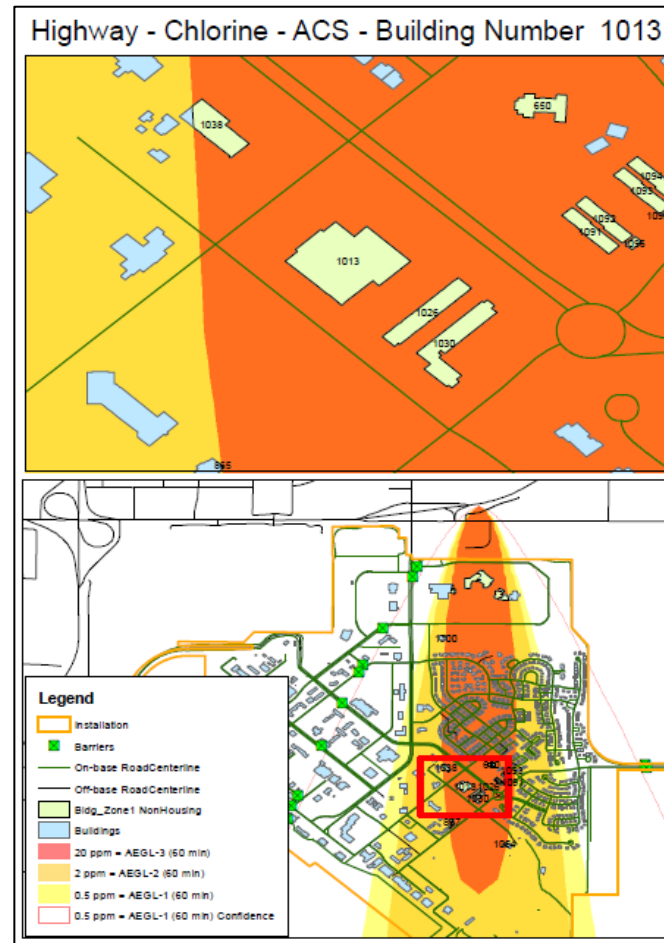


# Buildings in Threat Zone



# Identification of Buildings within Threat Zone

- Chlorine gas release
- ALOHA .pas file exported
- Two data frames
- Data driven pages
- Map exported to pdf form



# GIS Tools and Techniques Utilized

- Selection query by location
- Selection query by attribute
- Split feature class by field
- Clip features
- Symmetrical difference
- Data driven pages
- Reports
- Model builder

# Key Benefits

- Proactive and reactive application
- Threat zones effectively displayed
- Road blocks identified
- Buildings impacted by threat zones identified
- Enhanced decision-making and communication capabilities

# DRINKING WATER SAMPLING PROGRAM

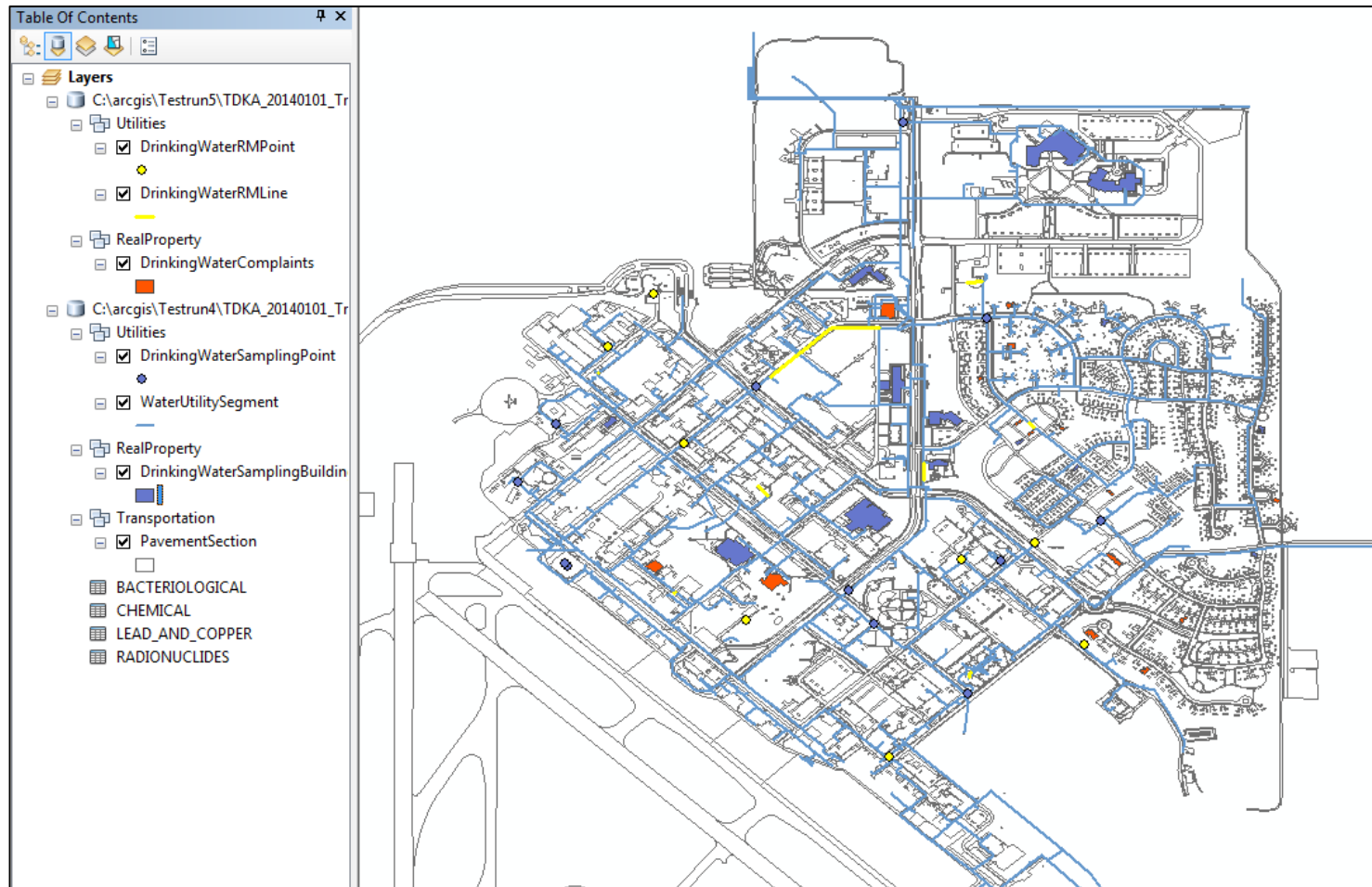
# Key Features

- Proactive application
- Comprised of five feature classes and four tables
- Supports rigorous USAF drinking water surveillance program
- Repository for sample results, analysis

# Regulatory Guidance

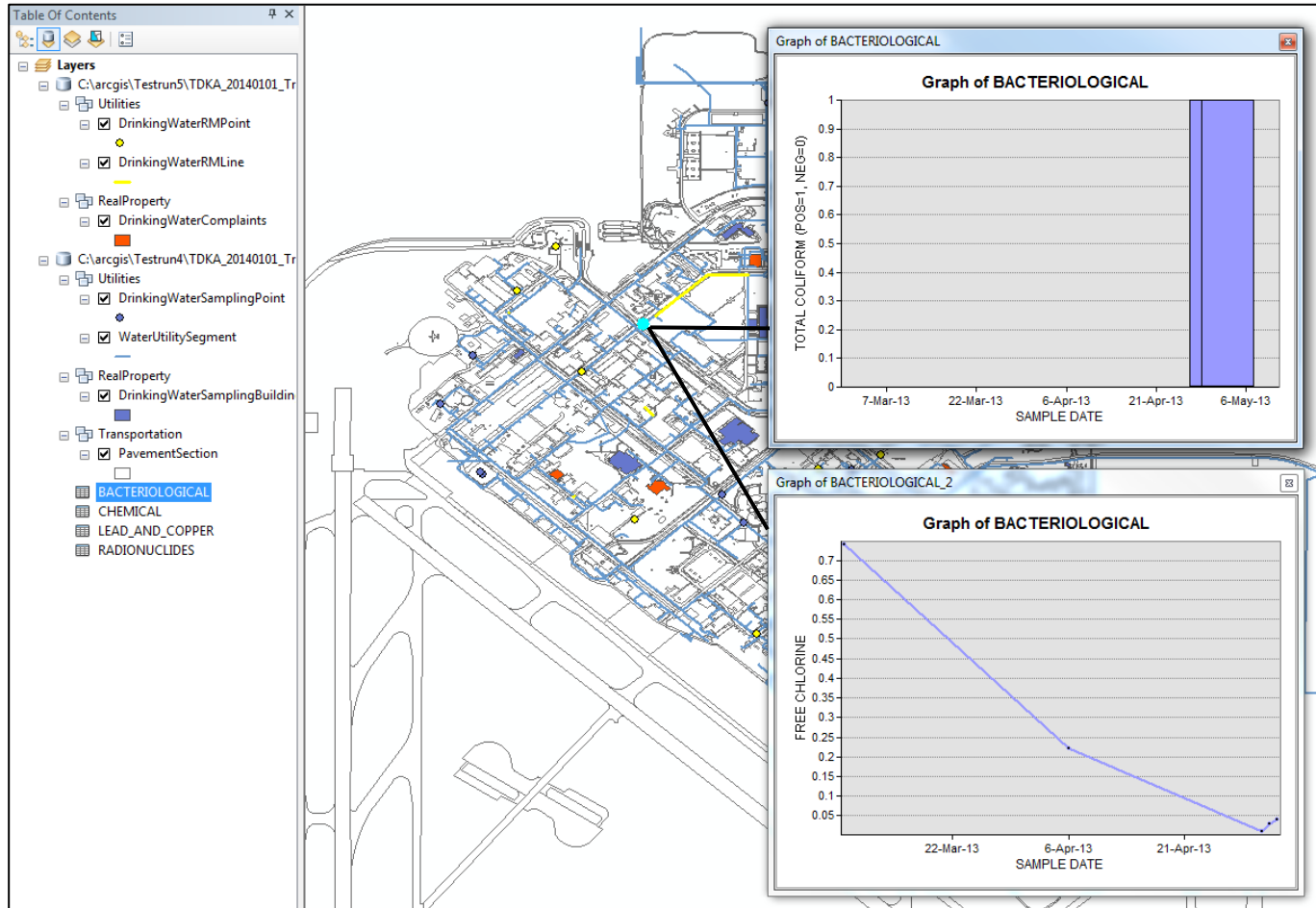
- Recently updated AFI48-144 describes element of SAM plan as follows:
  - “A current map of each water distribution system showing locations of bacteriological, chemical, lead and copper, disinfection byproducts and radiological monitoring points. BE shall request CE include this information as part of a Geographical Information System and track locations of water system maintenance and complaint reports.”

# Display Example: Feature Classes





# Tables Utilized for Analysis



# GIS Tools and Techniques Utilized

- Selection query by location
- Selection query by attribute
- “Identify” tool
- Relate function
- Graphing function

# Key Benefits

- Feature classes and tables provide means of collecting and analyzing a large amount of sampling information
- Graphical analysis provides additional insights
- Additional layers provide further insights
- Threat identification should be enhanced
- Facilitates communication and coordination between BE and CE

# Conclusions

- The mission-specific data sets and layers developed for the U.S. Air Force (USAF):
  - Augment GeoBase
  - Enhance utilization of GeoBase for prediction, identification, analysis, management, and communication of OEH risks at USAF bases.
  - Build critical OEH components of an evolving, GIS-centric knowledge management approach for USAF and the U.S. military

## Contact Information

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