

ING Re Risk Management

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Regional Vice President
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Southeastern Actuaries Conference
Key West, Florida

- **Assessing catastrophe Risk.**
 - Questions for a L&H executive
- **Five steps used to manage and measure risk.**
- **Implications for life & health insurers.**
 - RMS Study
 - Exposure Analysis
 - ISO Terrorism Tiers
- **Role of reinsurance.**

Assessing Catastrophe Risk: Questions a Life & Health Insurance Executive Needs to Answer

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- What loss should I expect from catastrophes given my book of business?
- How can I explain my catastrophe risk management to rating agencies and my board of directors?
- How can I actively monitor accumulations of risk?
- How should my underwriting be carried out to protect the company?
- Can I handle the risk of expanding into a new market or adding business in an existing market?
- How should I set my rates considering the catastrophe risks?
- How should I use risk management techniques to protect my capital?

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Five Steps to Optimal Risk Management

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Five Steps to Optimal Risk Management



Step One

■ Define Risk Tolerance

Determine how much exposure your organization will accept in a particular geographic area.

A company's risk tolerance is dependent on management's risk appetite, but is often driven by factors such as:

- Rating agency standards
- Regulatory requirements
- Common industry practices
- Levels computed with RAROC methodology

Commonly expressed in terms such as:

- 250 yr loss return period should not exceed 10% of surplus
- No single event should cause more than \$150 million loss

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Five Steps to Optimal Risk Management



Step Two

■ Collect and Maintain Data

What information do you need to collect?

Organize in a database that allows you to determine exposures by:

- Street address
- Postal code
- City
- Metropolitan area
- Province
- Earthquake zone
- Landmark
- Terrorism zone

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Five Steps to Optimal Risk Management



Step Three

■ Monitor Exposure

Ensure your company adheres to risk tolerance levels by:

- Visual mapping of exposures by location.
- Proximity mapping to known threats.
- Specific landmarks.
- Target risks.

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Five Steps to Optimal Risk Management



Step Four

■ Disaster Scenarios

Reviewing potential scenarios.

Methodology for estimating a loss.

- High level of certainty.
- Credibility to senior management.

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Five Steps to Optimal Risk Management



Step Five

■ Model Losses

Risk Modeling software.

Exposure data to develop clear picture of the potential impact of a disaster.

- Disaster modeling – new to Life & Health industry.
- Common to P&C industry since Hurricane Andrew (1992).

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Implication for Life and Health Insurers



➤ RMS Study

Catastrophe Modeling

Hurricane Modeling

Multi-address issue

Scope of Disaster

➤ Exposure Analysis Mapping

Proximity Mapping

➤ Terrorism Tiers

Tiers 1, 2, 3, & 4

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Catastrophe Modeling

Hurricane Modeling

Multi-address issue

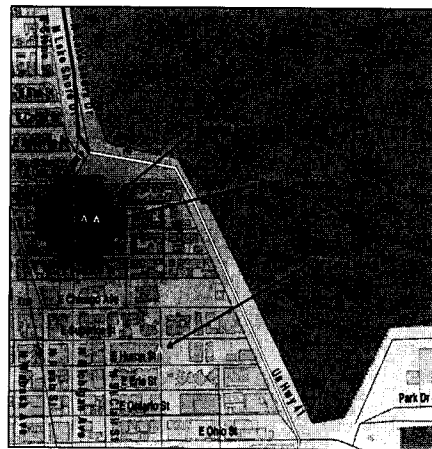
Scope of Disaster

**RMS Industry Study
Catastrophe Modeling**

**Status of Catastrophe Modeling
in the L&H Market**

Few L&H companies modeling CAT risk

- Few companies have handle on the magnitude of CAT risk
- RMS worked with key players in the industry to perform an L&H industry study of CAT risk
 - Earthquake
 - Terrorism
 - Life, health, ADD, LTD, workers comp



RMS Industry Study



Use exposure data to develop a clearer picture of the potential impact of a disaster. Earthquake and terrorism models currently available.

Losses shown by the following injury categories:

- Medical Only – injuries requiring medical aid without requiring hospitalization
- Serious Injury – injuries requiring a greater degree of medical care and hospitalization
- Permanent Total Disability – injuries that pose an immediate life threatening condition
- Death

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RMS Industry Study Results



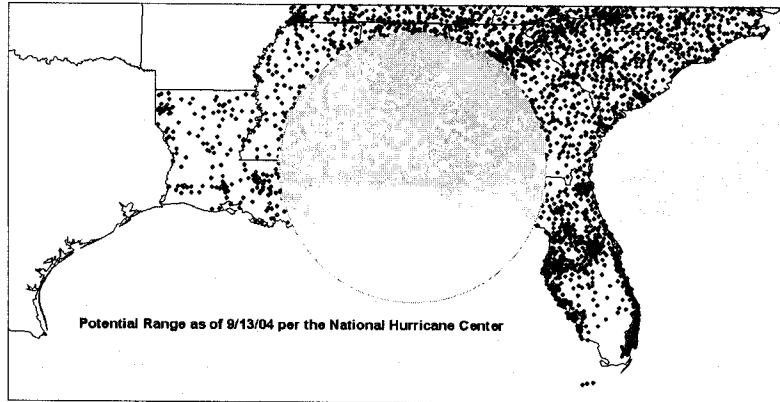
Scenario (US\$ Million)	Fatalities	Total casualties	Group Life	Individual Life	AD&D	Health
5 Terrorism Anthrax Large	106,700	942,900	\$8,930	\$7,240	\$4,230	\$2,040
7 Influenza Pandemic	200,000	10,000,000	\$2,680	\$6,430	\$0	\$30,520
4 Terrorism Anthrax	26,600	238,500	\$2,710	\$2,115	\$1,290	\$140
1 LA Earthquake M7.1	4,500	100,400	\$270	\$270	\$160	\$170
6 Individual Accident	10,200	42,600	\$580	\$590	\$230	\$1,150
3 Terrorism Triple Truckbombs	5,300	87,600	\$550	\$430	\$300	\$70
2 Chicago Earthquake M6.0	2,100	66,300	\$70	\$70	\$40	\$1,920

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Hurricane modeling

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Hurricane Ivan-Scenario
Net Reinsured Exposure
\$4.1 Billion Exposure within Radius



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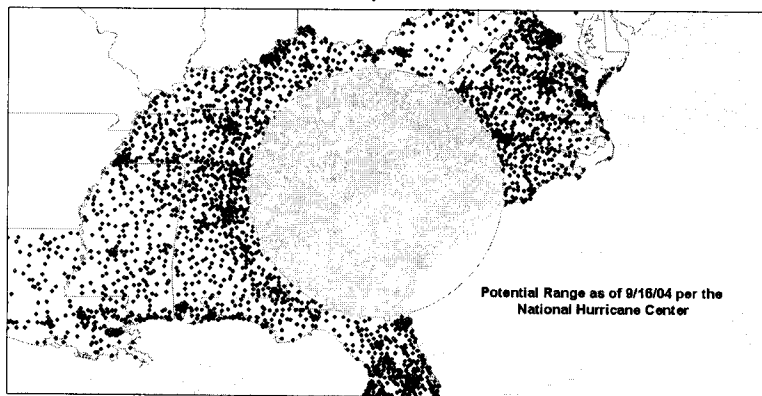
Date: 9/21/04

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Hurricane modeling

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Hurricane Ivan-Scenario
Net Reinsured Exposure
\$9.1 Billion Exposure within Radius



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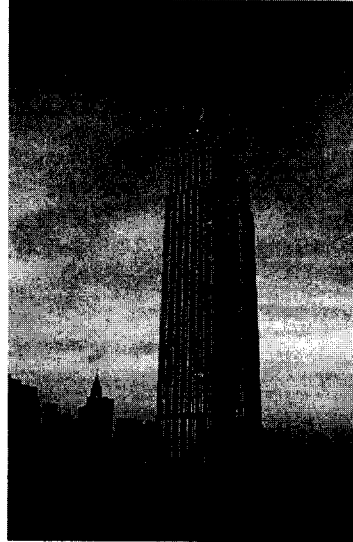
Date: 9/21/04

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Building Multiple Address Issue

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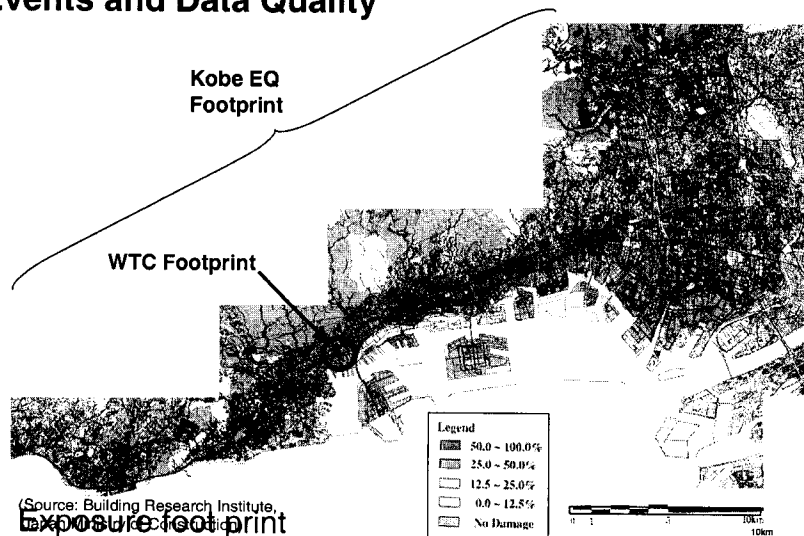
- Sample Co. writes 9 accounts in the ESB: each coded under a different address.
 - 350 5th Ave.
 - 350 5th Ave., 14th floor
 - 1 West 33rd St.
 - 17 West 33rd St.
 - 25 West 33rd St.
 - 25 W. 33rd St.
 - 20 West 34th St.
 - Empire State Bldg., 11th floor
 - Empire State Bldg., suite 5901



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Geographic Scope of Catastrophic Events and Data Quality

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Exposure Analysis

- > **Geographic**
- > **National**
- > **Regional**
- > **State**
- > **City**
- > **Street**

Proximity Mapping

- > **Nuclear Reactors**
- > **Chemical Plants**
- > **Earthquake Zones**

Exposure Analysis – Geographic & Proximity to Target Risk(s)

Geographic

- > **National**
- > **State**
- > **Regional**
- > **City**
- > **Street**
- > **Building**

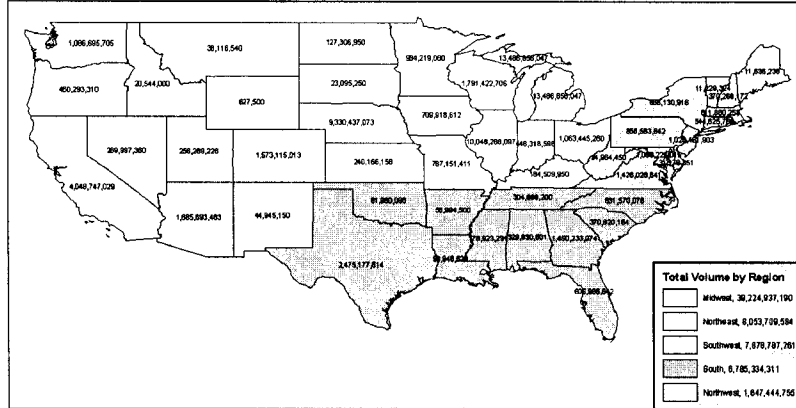
Proximity to target risks

- > **Nuclear Power Plants**
- > **Chemical Plants**
- > **Public Office Buildings (20 tallest in US)**
- > **Government Buildings**
- > **Earthquake Zone**
- > **Terrorism Tiers (defined by ISO)**
- > **Landmarks**
- > **Retail Centers & Recreational Areas**
- > **Airports**

National by Volume



ACME Insurance Company Group Life Volume

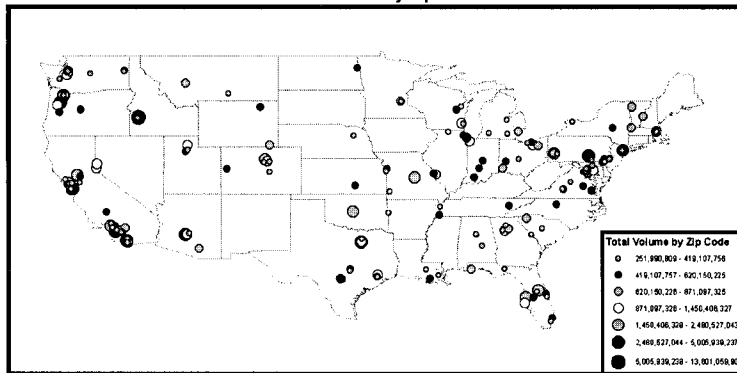


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National by Zip



Mapping Example: National Acme Insurance Company Total Volume by Zip Code

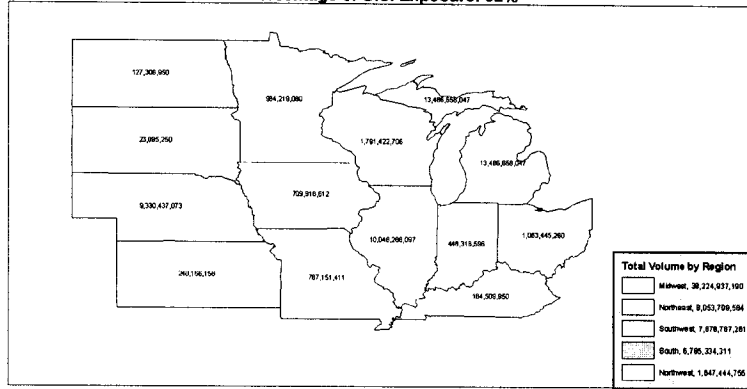


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Regional by rank & %



ACME Insurance Company
Group Life Volume
Midwest-Exposure Ranking: #1
Percentage of U.S. Exposure: 62%

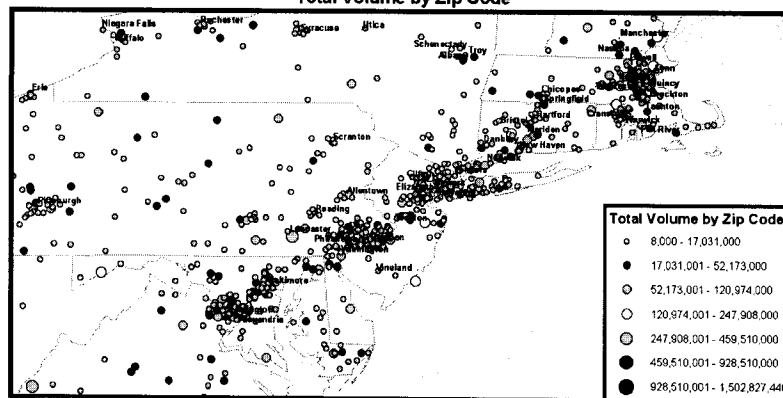


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Regional by Zip



Mapping Example: Regional
Acme Insurance Company
Total Volume by Zip Code

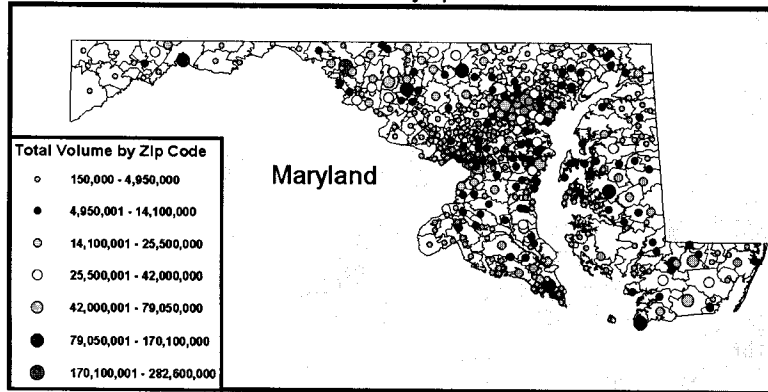


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State by Zip

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Mapping Example: State Acme Insurance Company Total Volume by Zip Code

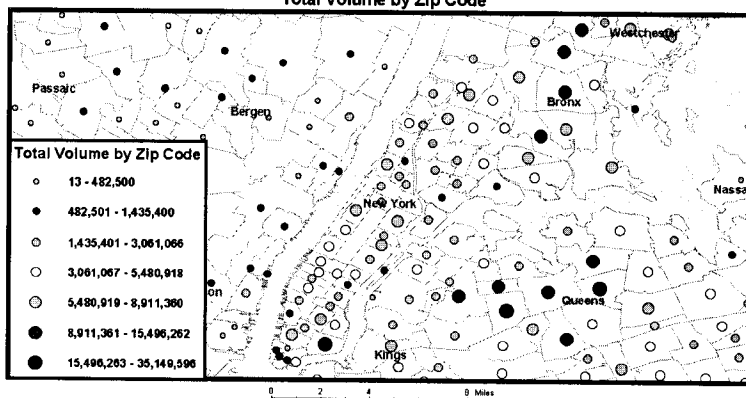


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City by Zip

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Mapping Example: City Acme Insurance Company Total Volume by Zip Code

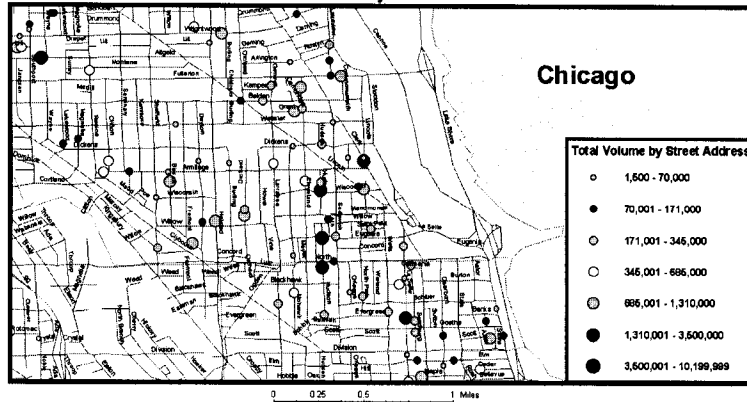


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Street by Address



Mapping Example: City Streets Acme Insurance Company Total Volume by Street Address



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20 Tallest US Office Buildings



NAME	STREET_ADDRESS	CITY	STATE	ZIP
Trump Building	40 Wall Street	New York	NY	10005
Chrysler Building	405 Lexington Ave	New York	NY	10017
Citigroup Center	153 East 53rd Street	New York	NY	10022
Empire State Building	350 Fifth Avenue	New York	NY	10118
American International Build	70 Pine Street	New York	NY	10270
One Liberty Place	1650 Market Street	Philadelphia	PA	19103
Bank of America Plaza	600 Peachtree Street NE	Allanta	GA	30308
Key Tower	127 Public Square	Cleveland	OH	44115
Aon Center	200 East Randolph	Chicago	IL	60601
Two Prudential Plaza	180 North Stetson Ave	Chicago	IL	60601
311 South Wacker Drive	311 South Wacker Drive	Chicago	IL	60606
AT&T Corporate Center	227 West Monroe Street	Chicago	IL	60606
Sears Tower	233 South Wacker Drive	Chicago	IL	60606
John Hancock Center	875 North Michigan Avenue	Chicago	IL	60611
Bank of America Plaza Dallas	901 Main Street	Dallas	TX	75202
Chase Tower	600 Travis Street	Houston	TX	77002
Wells Fargo Plaza	1000 Louisiana Street	Houston	TX	77002
Williams Tower	2800 Post Oak Blvd	Houston	TX	77056
Library Tower	633 West Fifth Street	Los Angeles	CA	90071
Bank of America Tower	701 Fifth Ave	Seattle	WA	98104

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Chemical Plants

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2144 locations – classified as plants or office

City-Zip Code-Number of Employees-Location Type-Line of Business

Simsbury
CT
6070
600
Headquarters
MFG EXPLOSIVES MFG ADHESIVES/SEALANTS MFG UNSUPPORT PLSTC
FILM NONFRS WIREDRWNG/INSLTNG REAL ESTATE AGENT/MGR
Office
Simsbury
CT
6070
MFG EXPLOSIVES MFG ADHESIVES/SEALANTS MFG UNSUPPORT PLSTC
FILM NONFRS WIREDRWNG/INSLTNG REAL ESTATE AGENT/MGR
Plant
Buford
GA
30518
245
Headquarters
MFG INDUSTRIAL INORGANIC CHEMICALS MFG PRESSED/BLOWN GLASS
Plant

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Nuclear Power Reactors

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Total Reactors 69

States with one or more reactors 30

Illinois	6
Pennsylvania	5
NY & SC	4
NJ, NC & FI	3

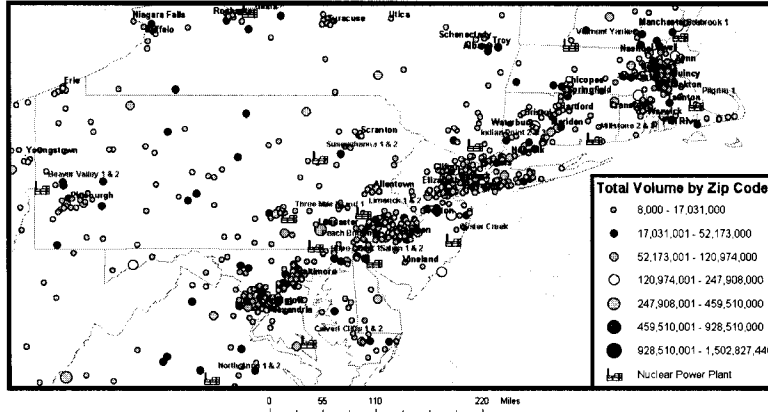
Source WWW:NRC.ORG

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Nuclear reactors



Mapping Example: Regional Acme Insurance Company Proximity to Nuclear Power Plants

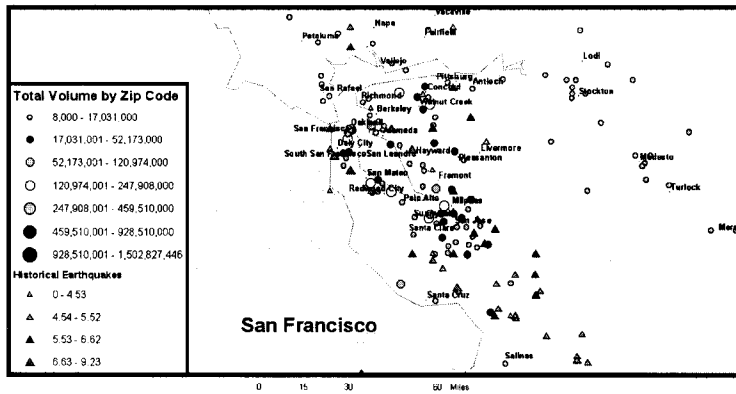


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Earthquake Zone



Mapping Example: Metro Area Acme Insurance Company Proximity to Historical Earthquakes



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Terrorism

Modeling for Future Losses

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ISO Terrorism Pricing Tier Definitions

Effective and fully approved as of July 24, 2003

The terrorism risk tiers were produced by the Insurance Services Office Inc. (ISO) from a model created by its AIR Worldwide Corp. subsidiary.

It is being used as part of terrorism insurance rate filings that ISO is making on behalf of commercial property/casualty insurers.

ISO's analysis organized geographic areas into four tiers based on modeling their potential for future terrorism losses. The higher the risk tier (1 the highest), the more jurisdictions will be charged for terrorism coverage.

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ISO Terrorism Tiers

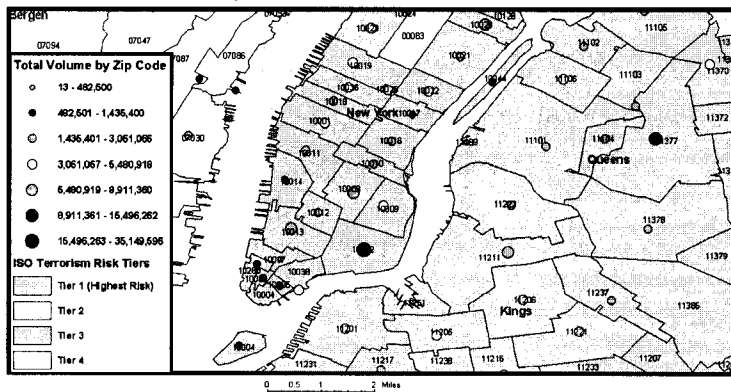
**Tier 1 – Manhattan – 59th Street and below
 District of Columbia
 City of Chicago
 San Francisco**

**Tier 2 – New York above 59th Street
 Los Angeles, Boston,
 Philadelphia, Houston, Seattle**

Tier 3 – Greater D.C. area

Tier 4 – Remainder of United States

**Mapping Example: City
 Acme Insurance Company
 Exposure within ISO Terrorism Risk Tiers**



Role of Reinsurance

- >Risk Concentration Services**
- >Risk Transfer**

**And a bonus...Pandemic's U.S.
Toll Estimate**

Role of Reinsurance

Risk Concentration Services

- Risk Concentration Studies
- Exposure geo-mapping
- Proximity mapping
- Modeling

Risk Transfer

- Catastrophe Coverage
- > Cost & exclusions
- Reinsurance Pool/Risk Pooling
- > Not risk transfer. Risk of Assessment exceeding recovery.
- Alternative Reinsurance Structures
- Accidental Death Carve Out

Flu Pandemic



- 31 pandemics in past 500 years.
- 3 in past century
- 1918-1919 "Spanish Flu" killed 20 to 40 million worldwide and 500,000 in the United States.
- The Spanish Flu and the Avian virus (H5N1) strains share disturbing characteristics.
- Fatal and hitting the healthiest people hardest.

Source: Best's Review, March 2005 – Flu Pandemic: A Real Threat – Eric Rasmussen, ING Re

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Pandemic's U.S. Toll Estimate 1,763,664



Based on current population and deaths in 1918-1919

Age in Years	Projected Deaths
< 5	233,200
5-14	74,553
15-24	214,582
25-34	378,639
35-44	268,602
45-54	43,948
>65	426,689

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