# NCCI Circular

**AUGUST 26, 2004** **COUNTRYWIDE ITEM FILINGS** **CIF-2004-09**

## Countrywide--B-1393--Miscellaneous Values for Domestic Terrorism, Earthquakes, and Catastrophic Industrial Accidents

**ACTION NEEDED**

Please review the changes in the item filing status for state approval of proposed Item B-1393—Miscellaneous Values for Domestic Terrorism to become effective 12:01 a.m. on January 1, 2005 applicable to new and renewal business only.

**BACKGROUND**

Item B-1393 was filed in the following jurisdictions to produce catastrophe provisions to address losses resulting from domestic terrorism, earthquakes, and catastrophic industrial accidents.

Alabama
Arizona
Colorado
District of Columbia
Georgia
Illinois
Iowa
Kentucky
Louisiana
Maine
Mississippi
Nebraska
New Hampshire
Nevada
Rhode Island
Utah
Vermont

Item B-1393 has also been recommended to the Indiana Compensation Rating Bureau and the North Carolina Rate Bureau.

**IMPACT**

The impact of this item is detailed in Exhibit 8.

**NCCI ACTION**

NCCI will release national and state pages of all applicable manuals upon individual state approval.

**PERSON TO CONTACT**

If you have any questions regarding the rates or loss costs, please contact:

Jeff Eddinger
NCCI, Inc.
901 Peninsula Corporate Circle
Boca Raton, FL 33487
561-893-3133
jeff_eddinger@ncci.com

If you have any questions regarding the ***URE Statistical Plan Manual,*** please contact:

Richard Saltzman
NCCI, Inc.
901 Peninsula Corporate Circle
Boca Raton, FL 33487
561-893-3731
richard_saltzman@ncci.com

If you have any questions regarding ***Basic Manual*** rules and algorithms, the ***Retrospective Rating Plan Manual,*** or the ***Forms Manual of Workers Compensation and Employers Liability Insurance,*** please contact:

**AL, GA, KY**
Cathy Booth
NCCI, Inc.
212 Snake Hill Road
Trussville, AL 35173
205-655-2699
cathy_booth@ncci.com

**ME, NH, RI, VT**
Laura Backus Hall
NCCI, Inc.
1493 Maple Hill Road
Plainfield, VT 05667
802-454-1800
laura_backus_hall@ncci.com

**IA, IL, IN**
Larry Hochstetler
NCCI, Inc.
2050 West Iles Avenue
Suite B
Springfield, IL 62704
217-793-1100
larry_hochstetler@ncci.com

**AZ, LA, MS**
Dennis Kokulak
NCCI, Inc.
901 Peninsula Corporate Circle
Boca Raton, FL 33487
561-893-3184
dennis_kokulak@Ncci.com

**NE**
Terri Robinson
11430 Gravois Road
Suite 310
St. Louis, MO 63126-0530
314-843-4001
terri_robinson@ncci.com

**CO, NV, UT**
Maggie Karpuk
NCCI, Inc.
30501 Agoura Road
Suite 201
Agoura Hills, CA 91301
818-707-8374
maggie_karpuk@ncci.com

**DC, NC**
Lori Lovgren
NCCI, Inc.
901 Peninsula Corporate Circle
Boca Raton, FL 33487
561-893-3337
lori_lovgren@ncci.com

## FILING MEMORANDUM

## ITEM B-1393—MISCELLANEOUS VALUES FOR DOMESTIC TERRORISM, EARTHQUAKES, AND CATASTROPHIC INDUSTRIAL ACCIDENTS

**(To be effective 12:01 a.m. on January 1, 2005 applicable to new and renewal business only.)**

### PURPOSE

The purpose of this item is to produce catastrophe provisions, by state, to address losses resulting from domestic terrorism, earthquakes, and catastrophic industrial accidents.

### BACKGROUND

The treatment of catastrophes in workers compensation ratemaking has changed over the years. Prior to the 1970s, NCCI included a 1-cent catastrophe provision in every rate, which amounted to about a 1% provision. This provision was eventually removed from ratemaking.

As a result of the passage of the Terrorism Risk Insurance Act (TRIA) of 2002, NCCI filed catastrophe provisions for certified foreign terrorism losses in all NCCI states at the end of 2002. The catastrophe provisions were filed in recognition of the fact that NCCI would be excluding all foreign terrorism losses from ratemaking.

In addition to terrorism, earthquakes and catastrophic industrial accidents can result in losses of extraordinary magnitude for workers compensation. While the exposure is real, the absence of a large event in recent history means that the current loss costs and rates do not account for it. This filing proposes catastrophe provisions for these other exposures. As with foreign terrorism, NCCI is proposing to exclude losses resulting from these major catastrophes once these provisions have been approved. The threshold for each of these exposures is $50 million. This means that the modeling results assume that all events exceeding $50 million of loss for workers compensation would be removed from ratemaking.

For purposes of this item, the following definitions apply:

- ***Domestic terrorism:*** All acts of terrorism outside the scope of TRIA with aggregate workers compensation losses in excess of $50 million
- ***Earthquake:*** The shaking and vibration at the surface of the earth resulting from underground movement along a fault plane or volcanic activity where aggregate workers compensation losses from the single event are in excess of $50 million
- ***Catastrophic Industrial Accident:*** Any single event other than an act of terrorism or an earthquake resulting in workers compensation losses in excess of $50 million

### Catastrophe Modeling

As was the case with terrorism, there is a lack of historical data to support earthquake and catastrophic industrial accident loss estimates. As a result, NCCI has again relied on catastrophe modeling for evaluating and estimating the risk associated with these exposures. In order to complete the modeling, NCCI again contracted with EQECAT. Serving the global property and casualty industry, EQECAT is known as a technical leader and innovator in the development of analysis tools and methodologies to quantify insured exposure to natural and man-made catastrophic risk. For this filing, EQECAT developed two models for NCCI. These two models address the potential exposure to workers compensation for earthquake and catastrophic industrial accidents. The models are described in detail in the Appendix.

## ITEM B-1393—MISCELLANEOUS VALUES FOR DOMESTIC TERRORISM, EARTHQUAKES, AND CATASTROPHIC INDUSTRIAL ACCIDENTS

In addition to these models, NCCI also relied on the EQECAT terrorism model to quantify the domestic terrorism exposure. This process is described below.

### Domestic Terrorism

Item B-1383 was filed on December 27, 2002. The filing implemented catastrophe provisions in all NCCI states for foreign terrorism. A detailed description of EQECAT's terrorism model can be found in the Appendix. The model estimated the cost impact of all forms of terrorism on workers compensation. NCCI adjusted the model results to exclude domestic terrorism and to account for the impact of TRIA.

In this filing, NCCI is again relying on the results of EQECAT's terrorism model. This time, the domestic terrorism portion is used.

Exhibit 2 shows the terrorism loss costs per employee modeled by EQECAT. These loss costs are multiplied by 10% to produce domestic terrorism loss costs per employee. NCCI assumes that 90% of all terrorism losses are produced by foreign terrorism events. The state average weekly wage in column 4 is used to convert the loss cost per employee to a loss cost per $100 of payroll. Column 7 shows the selected loss costs for the modeled states.

As with Item B-1383, NCCI uses a proxy state approach to apply the domestic terrorism provisions to the remaining nonmodeled NCCI states.

The table of proxy states is shown below:

| Modeled States | Proxy States |
|---|---|
| Arizona | Colorado, Idaho, Louisiana, Montana, Nevada, Oregon, Rhode Island, Utah |
| Illinois | Maryland, Virginia |
| Iowa | Alabama, Alaska, Arkansas, Connecticut, Hawaii, Kansas, Kentucky, Maine, Mississippi, Missouri, Nebraska, New Hampshire, New Mexico, Oklahoma, South Carolina, South Dakota, Tennessee, Vermont |
| District of Columbia, Florida, Georgia, Indiana | None |

Based on this approach, Exhibit 3 shows the selected domestic terrorism provisions by state, excluding loss adjustment expense.

### Catastrophic Industrial Accidents

EQECAT developed a model to quantify the potential exposure to catastrophic industrial accidents. These are accidents that would produce workers compensation losses in excess of $50 million. A detailed description of the model is contained in the Appendix. The modeling was performed for Florida, Louisiana, North Carolina, Kansas, Kentucky, and Illinois.

Based on the modeling results, an industrial accident loss cost of .005 was selected in each state, excluding loss adjustment expense. This information is shown in Exhibit 4.

### Earthquake

EQECAT produced an earthquake model for each state with significant earthquake exposure. In addition, because of its unique nature, a tsunami model was also included for Alaska. The modeling was performed for Alaska, Arkansas, Hawaii, Missouri, Nevada, Oregon, South Carolina, Tennessee, and Utah. The selected earthquake loss costs excluding loss adjustment expense are shown in Exhibit 5.

## ITEM B-1393—MISCELLANEOUS VALUES FOR DOMESTIC TERRORISM, EARTHQUAKES, AND CATASTROPHIC INDUSTRIAL ACCIDENTS

### Catastrophe Loss Costs by State Including Loss Adjustment Expense
Exhibit 6 shows the total catastrophe loss cost by state excluding loss adjustment expense in column 1. The loss-based expense factor shown in column 2 is multiplied by column 1 to include loss adjustment expense and other loss-based expenses by state. The total catastrophe loss cost including loss adjustment expense is shown in column 3 for each state.

### Voluntary and Assigned Risk Rates by State
Exhibit 7 shows the final voluntary and assigned risk rates by state. Where applicable, the loss costs excluding loss adjustment expense by state have been divided by the permissible loss ratio (PLR) in order to load in expenses, including loss adjustment expense.

### Estimated Impact by State
Exhibit 8 shows the estimated impact of the proposed catastrophe provisions by state on both a percentage and a dollar amount basis.

### Carrier Use of Loss Cost Information
Exhibit 12 introduces a new statistical reporting code to use for reporting this charge. Exhibit 14 shows revised premium algorithms by state to illustrate how this item is to be used in the calculation of premium.

### PROPOSAL
It is proposed that the catastrophe provisions and accompanying rules and forms be applied in all states included in this item.

Note that while the analysis shown in Exhibits 2 through 8 includes all states where NCCI files loss costs and/or rates, this item only applies in those states listed above and included in Exhibits 1-A and 1-B. The information for other states is shown for comparative purposes only.

### IMPACT
The estimated impact in each state is shown in Exhibit 8.

### IMPLEMENTATION
The attached exhibits (listed in the Table of Contents below) include the proposed changes necessary to implement this item. In all states, this item will be implemented effective 12:01 a.m. on January 1, 2005 applicable to new and renewal business only.

## ITEM B-1393—MISCELLANEOUS VALUES FOR DOMESTIC TERRORISM, EARTHQUAKES, AND CATASTROPHIC INDUSTRIAL ACCIDENTS

### TABLE OF CONTENTS

## ITEM B-1393—MISCELLANEOUS VALUES FOR DOMESTIC TERRORISM, EARTHQUAKES, AND CATASTROPHIC INDUSTRIAL ACCIDENTS

### APPENDIX

### DESCRIPTION OF EQECAT CATASTROPHE MODELS

#### 1. Introduction

Separate EQECAT models have been developed to provide estimates of the risks to workers compensation insurers due to the following perils:

- Terrorism events
- Industrial accidents
- Earthquake ground shaking

All three models consist of the following primary components:

- Definition of the portfolio exposures
- Definition of the peril hazards
- Definition of the casualty vulnerability
- Calculation of loss due to casualty

Each of the above components is described separately below.

#### 2. Portfolio Exposures

The location, number, and types of employees are needed to characterize the risk exposures to all three perils listed above. Business information databases were used to obtain the addresses of businesses and the estimated number of employees assigned to each location. For the perils of terrorism events and industrial accidents, the exposures were aggregated to the census block level (typically a city block). This aggregation level was suitable for terrorist events and industrial accidents that span hundreds of meters. Since the definition of seismic hazard data is rather refined, the exposure data at each work site were used.

The number of workers at each aggregate level (census block or work site) was prorated to approximately account for part-time workers, workers absent for various reasons, and the self-employed. The workers were then grouped into five NCCI industry groupings: Goods & Services, Office & Clerical, Manufacturing, Construction, and All Others. Certain government classifications not covered by workers compensation were excluded.

In addition to the employee information, required exposure data for the earthquake peril include information on the buildings where the employees are located. Building information consists of the structure type and age. Furthermore, the number of employees for the earthquake peril were defined for four different work shifts:

- Day shift
- Swing shift
- Night shift
- Weekends and holidays

Since the number of casualties vary depending on the time of the day and day of the week when the earthquake strikes, it is necessary to determine the number of employees for the different work shifts. The day shift accounts for most of the workers compensation exposure.

The definition of exposure by work shift was only performed for the earthquake peril. Earthquakes are natural disasters and can occur at any time in a random manner. Therefore, it is considered important to "average" the losses from all possible outcomes. Conversely, terrorism events and industrial accidents can be considered to

occur most likely during the day shifts when there are more people and activities. Terrorism events are planned to inflict maximum casualties, and industrial accidents are more prone to occur during the peak hours of activities.

## 3. Peril Hazards

### 3.1 Terrorism Events

EQECAT assembled data on the insurers' exposure and subjected that exposure to a large number of simulated terrorist events. These simulated terrorist events consist of three primary elements:

- Weapon types
- Target selection
- Frequencies of weapon attacks
- A brief description of each element follows.

**Weapon Types**

Specific weapons were selected from the range of known or hypothesized terrorist weapons. The selection process considered weapons that have been previously employed, weapons that could cause large numbers of casualties, or weapons that would be more readily available. In some cases a "likely" or "practical" weapons size (or quantity of agent) was selected; in other cases, a range of weapons sizes was selected, in part, to reflect standard quantities that might be available. The selected weapons and their sizes are described below.

**Blast/Explosion**

- Conventional explosives—400 lb / 4,000 lb / 12,000 lb TNT
- Nuclear bomb—1 kiloton and 10 kiloton
- Aircraft impact—large passenger airline

**Chemical**

- Chlorine—15 ton truck, 90 ton railcar
- Anhydrous ammonia—15 ton truck, 90 ton railcar
- Hydrogen cyanide—50 gallons
- Sarin—1 gallon
- Mustard gas—50 gallons

**Biological**

- Anthrax—1 oz inside building, 1 oz outside building, 10 oz mobile dispersion
- Botulism—1 oz inside building

**Radiological**

- Nuclear power plant radioactive release due to sabotage—10% of core radioactivity
- Dirty bomb—10,000 curies

**Other**

- Dam failure—complete failure with full reservoir

## ITEM B-1393—MISCELLANEOUS VALUES FOR DOMESTIC TERRORISM, EARTHQUAKES, AND CATASTROPHIC INDUSTRIAL ACCIDENTS

**Target Selection**
A target is the location of a terrorist attack and, in the model, represents the locus of a casualty footprint. An inventory of targets is created by selecting locations with the following characteristics:

- Tall buildings—10 stories and higher
- Government buildings—with large number of employees or of a critical or sensitive nature (e.g., FBI office)
- Airports—major
- Ports—major
- Military bases—U.S. armed forces
- Prominent locations—capitol buildings, major amusement parks, etc.
- Nuclear power plants—operational
- Railroads, railroad yards and stations—freight lines for railroad cars carrying chemicals
- Dams—large ones near urban areas
- Chemical facilities—emphasizes those with chlorine and ammonia on site

Nuclear power plants, dams, and chemical facilities receive only specific casualty footprints. Other locations are assigned more than one type of terrorist weapon.

Some footprints have no specific target but are distributed at regular intervals throughout the urban area. This spreads out the effect to a larger population in the urban area.

Mobile release anthrax is not located at any target but located in the general downtown area in major metropolitan areas.

**Frequency of Weapon Attack**
The relative likelihood of a type of attack occurring at a target location is represented by an assigned (annual) frequency. The significance of an attack's frequency is in its relationship to other attacks. Attack frequency is based on the following considerations:

- Availability of weapon
- Attractiveness of target
- Relative attractiveness of the region to other regions based on various theories

For footprints that are atmospheric releases of chemical, biological, and radiological agents, wind direction affects the assigned frequency. The frequency for each wind direction is weighted by the likelihood of the wind blowing in that direction based on historical wind speed and direction measurements for the region.

**3.2 Industrial Accidents**
Industrial accidents are characterized by the following elements:

- Facilities where industrial accidents occur
- Accident types
- Frequencies of accidents

## ITEM B-1393—MISCELLANEOUS VALUES FOR DOMESTIC TERRORISM, EARTHQUAKES, AND CATASTROPHIC INDUSTRIAL ACCIDENTS

**Facilities**
Facilities capable of large industrial accidents resulting in casualties above a threshold were identified from several public and commercial data sources. The facilities considered as potential sources for large industrial accidents are identified below:

- Refineries
- Chemical plants (oil, gas, petrochemical, etc.)
- Water utilities
- Power utilities
- Other manufacturing plants

**Accident Types**
Depending on the peril, the atmospheric conditions, the plant configuration and location, etc., the footprint of an accident could reach beyond the plant boundaries and affect workers in adjacent facilities and beyond. The perils considered in the study were broadly classified into three categories: chemical releases, large explosions, and all other accidents.

**Chemical Releases:** Chemicals considered included chlorine, anhydrous ammonia, and other nonspecific chemicals. A range of potential atmospheric releases of chemicals was considered in the analysis. The range encompassed an upper quantity represented by the total amount of chemical stored on site and, in some cases, identified in the facility's Risk Management Program submittal as the worst-case scenario, and a lower-release quantity representing the minimum release quantity that could produce consequences to meet the threshold definition of large industrial accidents. A continuous range of release quantities was considered within the range.

All of the scenarios considered were modeled probabilistically and included the likelihood of the releases and their consequences as described above.

**Large Explosions:** Explosion simulation software is used to estimate blast pressures and consequences of the explosion in terms of casualties. These footprints were varied probabilistically to simulate the variability in the effects of an explosion. The size of explosions varied by facility. The largest explosions were modeled to occur at oil refineries, where a significant potential for explosions exists.

**All Other Accidents:** In addition to the above accident types, a smaller event was considered at all modeled facilities to simulate all other industrial accidents such as fires, explosions, confined space accidents, structure and component collapse, and all other random accidents that meet the threshold damage criteria of large industrial accidents.

**Frequencies of Accidents**
The frequencies of occurrence of large industrial accidents in each of the modeled states were derived based on historical fatality and injury data available from BLS, OSHA and other sources. Frequencies of extreme events, which are very large and very rare, were based on ABS Consulting expert opinion. The consequences of such events were benchmarked to the Bhopal-type event.

The relative likelihood of the three categories of perils simulated in the analysis was derived from historical data and varies by state.

### 3.3 Seismic Hazard

**Regional Hazard**
The calculation of annualized losses requires a probabilistic representation of the location, frequency, and anticipated ground shaking of all earthquakes that can be expected to occur in the region. The characterization of the location and frequency of earthquakes comprise what is commonly known as a seismotectonic model.

## ITEM B-1393—MISCELLANEOUS VALUES FOR DOMESTIC TERRORISM, EARTHQUAKES, AND CATASTROPHIC INDUSTRIAL ACCIDENTS

One component of the seismic hazard model is the source zonation. Source zonation entails identifying potential seismogenic sources that can affect the site. These sources can either be faults or diffuse zones of seismic activity, commonly referred to as area sources and background seismicity. Each source zone represents a fault or area in which earthquakes are expected to be uniformly distributed with respect to location and size. Background seismicity is distinguished from an area source by the way that earthquake locations are treated. Earthquakes associated with background seismicity are allowed to have recurrence frequencies that smoothly vary over a region. Both area sources and background seismicity can include large earthquakes and are intended to model areas containing hidden or unknown faults or known faults, which are too numerous to be modeled individually. Earthquake source zones are identified from information on the geology, tectonics, and historical seismicity of the region.

The seismic hazard model also integrates the recurrence frequency of earthquakes. For each of the earthquake source zones, an earthquake recurrence relationship is developed. For area sources and background seismicity, this relationship is developed using an appropriate earthquake catalog, which is a listing of historically recorded or documented earthquakes. The catalog is analyzed for completeness by determining the time period over which all earthquakes of a given magnitude are believed to have been reported. Magnitudes are converted to a consistent magnitude measure (e.g., moment magnitude, $M_W$) for use with the strong-shaking attenuation relationships (described in the next section) and for the determination of earthquake recurrence relationships.

Faults are modeled by either a characteristic earthquake model or a Gutenberg-Richter recurrence relationship, or both, depending on the available geologic information. The characteristic earthquake model assumes that earthquakes of about the same magnitude occur at quasi-periodic intervals on the fault. Using both a characteristic earthquake and a Gutenberg-Richter model is similar to the characteristic earthquake recurrence relationship proposed by Youngs and Coppersmith (1985), which predicts relatively more frequent large-magnitude earthquakes than does the Gutenberg-Richter relationship by itself. The characteristic recurrence relationship is consistent with paleoseismic and historical earthquake data on individual faults (e.g., Coppersmith, 1991). For most faults, the recurrence relationships are constrained to be consistent with known geologic deformation along the fault, since there are usually very few historical earthquakes from which to develop a reliable earthquake recurrence relationship.

The maximum magnitude for each earthquake source zone is estimated from the published literature, from comparisons with similar tectonic regimes, from historical seismicity, and from the dimensions of mapped faults.

The seismic hazard model simulates approximately 2,000,000 stochastic events across the U.S.

**Site Hazard Severity**

Attenuation relationships are used to predict the expected amplitude of ground shaking at a site of interest knowing an earthquake's magnitude and the distance from the fault to the site. Ground shaking is characterized by one or more ground-shaking parameters, the most notable of which are peak ground acceleration (PGA), response-spectral acceleration ($S_a$), and Modified Mercalli intensity (MMI). These predictions are made for a uniform soil condition. Attenuation relationships are chosen to correspond as closely as possible to the tectonic environment of the region, since regional differences in earthquake source characteristics, crustal propagation properties, and site-response characteristics are known to have a significant effect on the observed ground shaking.

Soil amplification factors are used to modify the ground-shaking parameter calculated for a uniform soil condition for the specific soil conditions at the site of interest. These factors are different for each ground-shaking parameter. They are defined in terms of one or more site categories (or classes), each representing a specific set of site-response characteristics. Soil categories are defined in terms of simple qualitative or quantitative site descriptions, such as surface geology and shear-wave velocity (the speed at which seismic waves travel through the soil deposit, a measure of the strength of the deposit).

## ITEM B-1393—MISCELLANEOUS VALUES FOR DOMESTIC TERRORISM, EARTHQUAKES, AND CATASTROPHIC INDUSTRIAL ACCIDENTS

The effect of local soil conditions within each individual zip code was taken into account. In general, soft soil sites will experience higher earthquake motions than firm soil or rock sites for comparable locations relative to the earthquake fault rupture zone, thereby increasing the likelihood of damage to buildings on soft soil for a given earthquake.

### 4. Casualty Vulnerability

Casualty vulnerability establishes the casualty levels to various peril event magnitudes. While the casualty vulnerability for terrorism events and industrial accidents are rather similar, the casualty vulnerability for earthquakes is established rather differently.

#### 4.1 Terrorism Events

The casualty footprint of a weapon is a measure of the physical distribution of the intensity of the agent as it spreads out from its initial target. The effects of each type of weapon will vary with the size of the weapon, with atmospheric conditions, and in some cases with local terrain. If detailed knowledge is available, a correspondingly detailed simulation of the effects is possible, but it would be time-consuming to perform. In a large-scale nationwide analysis with millions of simulated events, where local atmospheric and terrain are only generally known, a simpler, more generalized simulation is necessary. The simplifications necessary to efficiently model footprints of weapons effects are described below.

For conventional blast loading, blast simulation software is used to estimate casualties in various urban settings where the geometry and height of the buildings are varied. The results of these detailed simulations are used to develop simplified blast attenuation functions that vary with distance and with the general terrain. For conventional blast loading, the footprint is defined as a decreasing function of distance from the source of the blast.

The casualties for nuclear blast can be estimated on the basis of empirical data resulting from wartime and nuclear test experience. Casualties are assumed to be a function of distance from ground zero with the source located either at ground level or at a relatively low altitude. A simplified, conservative casualty footprint was created to encompass the range of conditions that could exist. Long-term radiation effects were not considered.

The casualty effects for aircraft impact are very much dependent upon the details of the event, so much so that only a simple, conservative footprint can be employed. A simplifying assumption is made that the extent of the footprint is a function of the height of the building.

For chemical, biological, and radiological agent releases, a plume is formed that is influenced by atmospheric conditions and by the terrain. The footprint of the cumulative dose that is deposited by a plume over time was calculated using the simulation software, MIDAS-AT (Meteorological Information and Dispersion Assessment System—Anti-Terrorism™). Terrain conditions were assumed to be "rough" to conservatively approximate a general urban terrain. The wind direction was assumed to be unchanging. The plume footprint was calculated for low, medium, and high wind speeds and for three different atmospheric turbulence conditions. Any of the footprints could then be oriented in each of eight compass directions. Most of the footprints were truncated after an elapsed time of about two hours to account for successful evacuation.

Casualties due to dam failure are approximated using simple hydraulic relationships and assumptions made about the terrain over which the water will flow. The resulting footprint varies as depth of water (and casualty) decreases with distance away from the dam.

The analysis methodology is to apply a casualty footprint to an assigned target and to calculate the extent of casualties to the covered workers within the footprint. For chemical, biological, and radiological footprints, the dose to each employee is calculated, and a conversion is made to the degree of casualty (outpatient treatment, minor/temporary disability, major/permanent disability, and death). Degree of casualty is then converted to loss based upon the average costs by injury category provided by NCCI. The average costs provided vary by state.

## ITEM B-1393—MISCELLANEOUS VALUES FOR DOMESTIC TERRORISM, EARTHQUAKES, AND CATASTROPHIC INDUSTRIAL ACCIDENTS

### 4.2 Industrial Accidents

As discussed earlier in Section 3.2, three accident types were considered in the Industrial Accidents study: chemical releases, large explosions, and all other accidents. The latter category includes a variety of accidents that are localized in nature and affect workers in a small perimeter, the size of a building. These smaller scale accidents were simulated as small blasts.

The methodology used to model chemical releases and blasts is as in the terrorism model described above.

### 4.3 Earthquakes

Workers' casualties due to earthquakes are directly correlated to the damage extent incurred by the buildings in which they work. Therefore, casualties due to earthquakes are estimated in two sequential stages:

- Estimation of building damage
- Estimation of worker's casualties based on the building damage

#### Building Damage at the Workplaces

Individual building vulnerability functions, that is, the probability of building damage given a level of ground shaking at the site, depends of the structure type, the age of construction, and the building height. Vulnerability functions account for variability by assigning a probability distribution bounded by 0% and 100% with a prescribed mean value and standard deviation. The vulnerability functions were based on historical damage data and insurance claims data—including the analysis of over 50,000 claims from the Northridge and other earthquakes.

The probability distributions of ground shaking at the site and vulnerability functions are combined to estimate the probability of building damage for each earthquake event. The probability of damage at the site level is also combined probabilistically, accounting for correlation in ground shaking between zip codes and in damage level between the same and different structure types within and between zip codes.

Note that considerable randomness exists in earthquake damage patterns where randomness denotes the irreducible variability associated with the earthquake event. Randomness as characterized by the following parameters:

- Ground shaking
- Damage to the average structure of a given class at a given level of ground shaking
- Each structure's seismic vulnerability relative to the average structure of its class

Modeling uncertainty, the lack of knowledge in characterizing each element of the model, is statistically combined with randomness and correlation to estimate overall variability in damage and loss to the entire portfolio.

#### Casualties Due to Building Damage

Workers' casualty data resulting from earthquakes is very scarce in the U.S. EQECAT is constantly using data from the most recent earthquakes worldwide to update its casualty functions, which correlate building damage to casualties. Because of differences in building design codes and construction practices, data from earthquakes outside the U.S. is adapted to local U.S. conditions. This adaptation takes into consideration building damage state and its resulting casualties.

To illustrate this concept, let us assume that a Reinforced Concrete building in Country X sustains 50% damage and causes injuries to 15% of its occupants. We assume that a similar Reinforced Concrete building, for example in California, sustaining the same damage level will cause a similar level of casualties. However, because of differences in building design and construction practices between California and Country X, the 50% damage could be caused by an earthquake acceleration of 0.3g in Country X, and twice that acceleration in California. In this example, higher seismic design provisions and practices are assumed applicable in

## ITEM B-1393—MISCELLANEOUS VALUES FOR DOMESTIC TERRORISM, EARTHQUAKES, AND CATASTROPHIC INDUSTRIAL ACCIDENTS

California. The casualty rate functions used were developed using the most recent earthquake casualty data from Japan, Turkey, and Taiwan.

EQECAT's proprietary workers compensation casualty rate functions are defined for four injury types: death, severe/major, minor/light, and medical.

### 5. Losses Due to Casualties

Loss rates by injury type were provided by NCCI and used in calculating losses due to workers' casualties. The same loss rates were applied to all three perils.

As described in Section 2, earthquake exposures were defined for different work shifts. The number of casualties by work shift for each work site and earthquake event is estimated prior to the application of the loss rates.

### 6. Losses Due to Tsunami

Although all coastal states on the West Coast are prone to tsunamis, only Alaska was analyzed for this peril. Alaska has a higher worker rate near the shore in inundable zones and its coastline is in close proximity to the subduction zone capable of triggering tsunamis. In addition, in remote locations of Alaska, workers compensation extends coverage after the employee leaves the immediate worksite. Other states such as Oregon and Hawaii can benefit from a warning advantage that would reduce the impact of tsunamis generated distances far away.

A simplified model was formulated to estimate workers compensation loss due to tsunami inundation. This model is based on tsunami modeling developed for Japan, which makes use of historical data to derive a relationship between earthquake moment magnitude (Mw), distance from the earthquake rupture to the shore, and direct or indirect exposure to the wave to determine the run-up height of a tsunami wave. The quantity of historical data needed to develop such a relationship is not available for Alaska; however, the model adopts the Japanese method where the detailed physics of the wave are not being calculated.

#### Injury Rate

Casualties due to tsunami run-up are estimated by assuming a simple relationship between depth of inundation and the likelihood of being in one of four NCCI injury classes (outpatient treatment, minor/temporary disability, major/permanent disability, and death). There is scarce data available and the conditions under which the casualties occur is extremely variable. For this simplified approach, the injury relationships were subjected to the 1964 Mega-Thrust earthquake and the relationships calibrated to produce roughly the casualties suffered in the event.

#### Earthquake Modeling

The source of tsunami in Alaska is limited to the lengthy subduction zone that lies along the undersea trench that stretches from about Seward to the tip of the Aleutians. This subduction zone produces earthquake magnitudes estimated to be as large as Mw 9.2. Only the larger magnitude events have a potential for causing tsunami. For this analysis, magnitudes down to Mw 7.7 were considered.

Based on the geometry of the subduction zone adopted from the USGS, ruptures of magnitudes between Mw 9.2 and Mw 7.7 were placed along the length of the trench. The frequency of each event, as a function of magnitude, was derived from an analysis of the earthquake catalog for the region.

For each earthquake rupture, the surface distance between any location on the rupture plane and each near-shore business location was calculated.

#### Analysis

The computations were performed for each earthquake rupture and for each site. Given the magnitude of the rupture and the distance from the ruptures to the site, the simplified equation estimates the run-up height. The difference between the elevation above sea level and the run-up height determines the depth of inundation.

## ITEM B-1393—MISCELLANEOUS VALUES FOR DOMESTIC TERRORISM, EARTHQUAKES, AND CATASTROPHIC INDUSTRIAL ACCIDENTS

Inundation depth is then used to determine the percentage of employees who are in each injury category. From the number of employees at the location, the total casualty cost is estimated using NCCI-provided mean costs for each injury category. The cost is multiplied by the event frequency, and aggregated by NCCI occupancy class and by county.

The losses from earthquake shaking and tsunami were combined through summation. This conservative treatment neglects the potential for overlap in casualties caused by shaking and by tsunami.

## ITEM B-1393—MISCELLANEOUS VALUES FOR DOMESTIC TERRORISM, EARTHQUAKES, AND CATASTROPHIC INDUSTRIAL ACCIDENTS

### EXHIBIT 1-A

### BASIC MANUAL

### APPLICABLE TO VOLUNTARY POLICIES

### MISCELLANEOUS VALUES

Domestic Terrorism, Earthquakes and Catastrophic Industrial Accidents .....See below:

| State | Loss Cost | Rate |
|---|---|---|
| Alabama | 0.01 | N/A |
| Arizona | N/A | 0.01 |
| Colorado | 0.01 | N/A |
| DC | 0.01 | N/A |
| Georgia | 0.01 | N/A |
| Illinois | 0.01 | 0.02 |
| Iowa | N/A | 0.01 |
| Kentucky | 0.01 | N/A |
| Louisiana | 0.01 | N/A |
| Maine | 0.01 | N/A |
| Mississippi | 0.01 | N/A |
| Nebraska | 0.01 | N/A |
| Nevada | 0.01 | N/A |
| New Hampshire | 0.01 | N/A |
| Rhode Island | 0.01 | 0.01 |
| Utah | 0.01 | N/A |
| Vermont | 0.01 | N/A |

## ITEM B-1393—MISCELLANEOUS VALUES FOR DOMESTIC TERRORISM, EARTHQUAKES, AND CATASTROPHIC INDUSTRIAL ACCIDENTS

### EXHIBIT 1-B

### BASIC MANUAL

### APPLICABLE TO ASSIGNED RISK POLICIES

### MISCELLANEOUS VALUES

Domestic Terrorism, Earthquakes and Catastrophic Industrial Accidents .....See below:

| State | Assigned Risk Rate |
|---|---|
| Alabama | 0.01 |
| Arizona | 0.01 |
| DC | 0.02 |
| Georgia | 0.01 |
| Illinois | 0.02 |
| Iowa | 0.01 |
| Mississippi | 0.01 |
| Nevada | 0.01 |
| New Hampshire | 0.01 |
| Vermont | 0.01 |

## ITEM B-1393—MISCELLANEOUS VALUES FOR DOMESTIC TERRORISM, EARTHQUAKES, AND CATASTROPHIC INDUSTRIAL ACCIDENTS

### EXHIBIT 2

### DOMESTIC TERRORISM LOSS COSTS FOR STATES MODELED BY EQECAT

| State | Loss Cost per Employee (excluding LAE) Lower Range* (1) | Loss Cost per Employee (excluding LAE) Upper Range* (2) | Domestic Terrorism as a Percentage of Total** (3) | State Average Weekly Wage*** (4) | Loss Cost per $100 of payroll (exc. LAE) Lower Range (5) = (1)x(3)/((4)x52/100) | Loss Cost per $100 of payroll (exc. LAE) Upper Range (6) = (2)x(3)/((4)x52/100) | Selected Loss Cost (exc. LAE) (7) |
|---|---|---|---|---|---|---|---|
| Arizona | 2.33 | 11.63 | 10% | 629.42 | 0.001 | 0.004 | 0.002 |
| Dist of Col | 168.25 | 841.24 | 10% | 761.82 | 0.042 | 0.212 | 0.006 |
| Florida | 2.33 | 11.66 | 10% | 597.80 | 0.001 | 0.004 | 0.002 |
| Georgia | 2.49 | 12.43 | 10% | 642.38 | 0.001 | 0.004 | 0.002 |
| Illinois | 6.45 | 32.27 | 10% | 662.98 | 0.002 | 0.009 | 0.006 |
| Indiana | 1.08 | 5.39 | 10% | 614.00 | 0.000 | 0.002 | 0.001 |
| Iowa | 1.71 | 8.54 | 10% | 558.75 | 0.001 | 0.003 | 0.002 |

* Source: Loss cost information developed by EQECAT for terrorism events
** Percentage of total terrorism losses caused by domestic terrorism over $50 million
*** 2002 U.S. Bureau of Labor Statistics, Current Population Survey

## ITEM B-1393—MISCELLANEOUS VALUES FOR DOMESTIC TERRORISM, EARTHQUAKES, AND CATASTROPHIC INDUSTRIAL ACCIDENTS

### EXHIBIT 3

### DOMESTIC TERRORISM LOSS COSTS EXCLUDING LAE BY STATE

| State | Proxy State | Selected Domestic Terrorism Loss Cost (exc. LAE) |
|---|---|---|
| Alabama | Iowa | 0.002 |
| Alaska | Iowa | 0.002 |
| Arizona | Arizona | 0.002 |
| Arkansas | Iowa | 0.002 |
| Colorado | Arizona | 0.002 |
| Connecticut | Iowa | 0.002 |
| District of Columbia | DC | 0.006 |
| Florida | Florida | 0.002 |
| Georgia | Georgia | 0.002 |
| Hawaii | Iowa | 0.002 |
| Idaho | Arizona | 0.002 |
| Illinois | Illinois | 0.006 |
| Iowa | Iowa | 0.002 |
| Kansas | Iowa | 0.002 |
| Kentucky | Iowa | 0.002 |
| Louisiana | Arizona | 0.002 |
| Maine | Iowa | 0.002 |
| Maryland | Illinois | 0.006 |
| Mississippi | Iowa | 0.002 |
| Missouri | Iowa | 0.002 |
| Montana | Arizona | 0.002 |
| Nebraska | Iowa | 0.002 |
| Nevada | Arizona | 0.002 |
| New Hampshire | Iowa | 0.002 |
| New Mexico | Iowa | 0.002 |
| Oklahoma | Iowa | 0.002 |
| Oregon | Arizona | 0.002 |
| Rhode Island | Arizona | 0.002 |
| South Carolina | Iowa | 0.002 |
| South Dakota | Iowa | 0.002 |
| Tennessee | Iowa | 0.002 |
| Utah | Arizona | 0.002 |
| Vermont | Iowa | 0.002 |
| Virginia | Illinois | 0.006 |

## ITEM B-1393—MISCELLANEOUS VALUES FOR DOMESTIC TERRORISM, EARTHQUAKES, AND CATASTROPHIC INDUSTRIAL ACCIDENTS

### EXHIBIT 4

### INDUSTRIAL ACCIDENT LOSS COSTS FOR STATES MODELED BY EQECAT

| State | Loss Cost per $100 of Payroll (exc. LAE) | Payroll |
|---|---|---|
| Florida | 0.005 | 125,933,373 |
| Illinois | 0.007 | 142,330,452 |
| Kansas | 0.003 | 26,072,395 |
| Kentucky | 0.019 | 27,566,149 |
| Louisiana | 0.018 | 28,849,629 |
| North Carolina | 0.004 | 70,542,222 |
| All States | 0.007 | 421,294,220 |

## ITEM B-1393—MISCELLANEOUS VALUES FOR DOMESTIC TERRORISM, EARTHQUAKES, AND CATASTROPHIC INDUSTRIAL ACCIDENTS

### EXHIBIT 5

### CATASTROPHE LOSS COSTS EXCLUDING LAE BY STATE

| State | Selected Domestic Terrorism Loss Cost (exc. LAE) (1) | Selected Industrial Accident Loss Cost (exc. LAE) (2) | Selected Earthquake Loss Cost (exc. LAE) (3) | Total Catastrophe Loss Cost (exc. LAE) (4)=(1)+(2)+(3) |
|---|---|---|---|---|
| | 0.002 | 0.005 | 0 | 0.007 |
| | 0.002 | 0.005 | 0.024 | 0.031 |
| | 0.002 | 0.005 | 0 | 0.007 |
| | 0.002 | 0.005 | 0.007 | 0.014 |
| | 0.002 | 0.005 | 0 | 0.007 |
| | 0.002 | 0.005 | 0 | 0.007 |
| | 0.006 | 0.005 | 0 | 0.011 |
| | 0.002 | 0.005 | 0 | 0.007 |
| | 0.002 | 0.005 | 0 | 0.007 |
| | 0.002 | 0.005 | 0.014 | 0.021 |
| | 0.002 | 0.005 | 0 | 0.007 |
| | 0.006 | 0.005 | 0 | 0.011 |
| | 0.002 | 0.005 | 0 | 0.007 |
| | 0.002 | 0.005 | 0 | 0.007 |
| | 0.002 | 0.005 | 0 | 0.007 |
| | 0.002 | 0.005 | 0 | 0.007 |
| | 0.002 | 0.005 | 0 | 0.007 |
| | 0.006 | 0.005 | 0 | 0.011 |
| | 0.002 | 0.005 | 0 | 0.007 |
| | 0.002 | 0.005 | 0.008 | 0.015 |
| | 0.002 | 0.005 | 0 | 0.007 |
| | 0.002 | 0.005 | 0 | 0.007 |
| | 0.002 | 0.005 | 0.003 | 0.010 |
| | 0.002 | 0.005 | 0 | 0.007 |
| | 0.002 | 0.005 | 0 | 0.007 |
| | 0.002 | 0.005 | 0 | 0.007 |
| | 0.002 | 0.005 | 0.005 | 0.012 |
| | 0.002 | 0.005 | 0 | 0.007 |
| | 0.002 | 0.005 | 0.003 | 0.010 |
| | 0.002 | 0.005 | 0 | 0.007 |
| | 0.002 | 0.005 | 0.009 | 0.016 |
| | 0.002 | 0.005 | 0.005 | 0.012 |
| | 0.002 | 0.005 | 0 | 0.007 |
| | 0.006 | 0.005 | 0 | 0.011 |

## ITEM B-1393—MISCELLANEOUS VALUES FOR DOMESTIC TERRORISM, EARTHQUAKES, AND CATASTROPHIC INDUSTRIAL ACCIDENTS

### EXHIBIT 6

### CATASTROPHE VOLUNTARY LOSS COSTS INCLUDING LAE BY STATE

| State | Total Catastrophe Loss Cost (exc. LAE ) (1) | Loss-Based Expense Factor (2) | Total Catastrophe Loss Cost (inc. LAE) (3)=(1)x(2) |
|---|---|---|---|
| Alabama | 0.007 | 1.1774 | 0.01 |
| Alaska | 0.031 | 1.1620 | 0.04 |
| Arizona | 0.007 | 1.1410 | 0.01 |
| Arkansas | 0.014 | 1.1740 | 0.02 |
| Colorado | 0.007 | 1.1450 | 0.01 |
| Connecticut | 0.007 | 1.1580 | 0.01 |
| District of Columbia | 0.011 | 1.1480 | 0.01 |
| Florida | 0.007 | 1.2200 | 0.01 |
| Georgia | 0.007 | 1.0000 | 0.01 |
| Hawaii | 0.021 | 1.1840 | 0.02 |
| Idaho | 0.007 | 1.1780 | 0.01 |
| Illinois | 0.011 | 1.0000 | 0.01 |
| Iowa | 0.007 | 1.1460 | 0.01 |
| Kansas | 0.007 | 1.1770 | 0.01 |
| Kentucky | 0.007 | 1.0000 | 0.01 |
| Louisiana | 0.007 | 1.0839 | 0.01 |
| Maine | 0.007 | 1.1540 | 0.01 |
| Maryland | 0.011 | 1.0000 | 0.01 |
| Mississippi | 0.007 | 1.1930 | 0.01 |
| Missouri | 0.015 | 1.1720 | 0.02 |
| Montana | 0.007 | 1.1270 | 0.01 |
| Nebraska | 0.007 | 1.1450 | 0.01 |
| Nevada | 0.010 | 1.1800 | 0.01 |
| New Hampshire | 0.007 | 1.1675 | 0.01 |
| New Mexico | 0.007 | 1.1460 | 0.01 |
| Oklahoma | 0.007 | 1.1850 | 0.01 |
| Oregon | 0.012 | 1.0000 | 0.01 |
| Rhode Island | 0.007 | 1.0000 | 0.01 |
| South Carolina | 0.010 | 1.1730 | 0.01 |
| South Dakota | 0.007 | 1.0000 | 0.01 |
| Tennessee | 0.016 | 1.1700 | 0.02 |
| Utah | 0.012 | 1.1580 | 0.01 |
| Vermont | 0.007 | 1.1310 | 0.01 |
| Virginia | 0.011 | 1.1200 | 0.01 |

## ITEM B-1393—MISCELLANEOUS VALUES FOR DOMESTIC TERRORISM, EARTHQUAKES, AND CATASTROPHIC INDUSTRIAL ACCIDENTS

### EXHIBIT 7

### CATASTROPHE VOLUNTARY AND ASSIGNED RISK RATES BY STATE

| State | (1) | Voluntary PLR | Selected Catastrophe Voluntary Rate (3)=(1)/(2) | Assigned Risk PLR | Selected Catastrophe Assigned Risk Rate (5)=(1)/(4) |
|---|---|---|---|---|---|
| Alabama | 0.007 | | N/A | | 0.01 |
| Alaska | 0.031 | | N/A | | 0.06 |
| Arizona | 0.007 | | 0.01 | | 0.01 |
| Arkansas | 0.014 | | N/A | | 0.03 |
| Colorado | 0.007 | | N/A | | N/A |
| Connecticut | 0.007 | | N/A | | 0.01 |
| District of Columbia | 0.011 | | N/A | | 0.02 |
| Florida | 0.007 | | 0.01 | | N/A |
| Georgia | 0.007 | | N/A | | 0.01 |
| Hawaii | 0.021 | | N/A | | N/A |
| Idaho | 0.007 | | 0.01 | | N/A |
| Illinois | 0.011 | | 0.02 | | 0.02 |
| Iowa | 0.007 | | 0.01 | | 0.01 |
| Kansas | 0.007 | | N/A | | 0.01 |
| Kentucky | 0.007 | | N/A | | N/A |
| Louisiana | 0.007 | | N/A | | N/A |
| Maine | 0.007 | | N/A | | N/A |
| Maryland | 0.011 | | N/A | | N/A |
| Mississippi | 0.007 | | N/A | | 0.01 |
| Missouri | 0.015 | | N/A | | N/A |
| Montana | 0.007 | | N/A | | N/A |
| Nebraska | 0.007 | | N/A | | N/A |
| Nevada | 0.010 | | N/A | | 0.01 |
| New Hampshire | 0.007 | | N/A | | 0.01 |
| New Mexico | 0.007 | | N/A | | 0.01 |
| Oklahoma | 0.007 | | N/A | | N/A |
| Oregon | 0.012 | | N/A | | 0.02 |
| Rhode Island | 0.007 | | 0.01 | | N/A |
| South Carolina | 0.010 | | N/A | | 0.02 |
| South Dakota | 0.007 | | N/A | | 0.01 |
| Tennessee | 0.016 | | N/A | | N/A |
| Utah | 0.012 | | N/A | | N/A |
| Vermont | 0.007 | | N/A | | 0.01 |
| Virginia | 0.011 | | N/A | | 0.02 |

## ITEM B-1393—MISCELLANEOUS VALUES FOR DOMESTIC TERRORISM, EARTHQUAKES, AND CATASTROPHIC INDUSTRIAL ACCIDENTS

### EXHIBIT 8

### ESTIMATED IMPACT OF CATASTROPHE PROVISIONS BY STATE

| State | Selected Catastrophe Loss Cost (inc.) LAE (1) | Avg. Non-Catastrophe Loss Cost (inc.) LAE (2) | Percentage Impact of Catastrophe Loss Cost (3)=(1)/(2) | CY 2003 WC Written Premium ($ 000) (4) | Estimated Premium Impact ($ 000) (5)=(3)x(4) |
|---|---|---|---|---|---|
| Alabama | 0.01 | 2.46 | 0.4% | 285,217 | 1,159 |
| Alaska | 0.04 | 3.43 | 1.2% | 241,444 | 2,816 |
| Arizona | 0.01 | 1.13 | 0.9% | 548,722 | 4,856 |
| Arkansas | 0.02 | 1.51 | 1.3% | 256,245 | 3,394 |
| Colorado | 0.01 | 1.80 | 0.6% | 869,253 | 4,829 |
| Connecticut | 0.01 | 1.47 | 0.7% | 648,783 | 4,413 |
| District of Columbia | 0.01 | 0.58 | 1.7% | 140,371 | 2,420 |
| Florida | 0.01 | 2.75 | 0.4% | 3,180,126 | 11,564 |
| Georgia | 0.01 | 1.33 | 0.8% | 1,037,142 | 7,798 |
| Hawaii | 0.02 | 2.45 | 0.8% | 308,374 | 2,517 |
| Idaho | 0.01 | 1.92 | 0.5% | 252,791 | 1,317 |
| Illinois | 0.01 | 1.63 | 0.6% | 2,221,684 | 13,630 |
| Indiana | 0.01 | 1.10 | 0.9% | 742,460 | 6,750 |
| Iowa | 0.01 | 1.66 | 0.6% | 444,228 | 2,676 |
| Kansas | 0.01 | 1.37 | 0.7% | 341,619 | 2,494 |
| Kentucky | 0.01 | 2.22 | 0.5% | 452,499 | 2,038 |
| Louisiana | 0.01 | 2.28 | 0.4% | 601,341 | 2,637 |
| Maine | 0.01 | 2.28 | 0.4% | 240,298 | 1,054 |
| Maryland | 0.01 | 1.02 | 1.0% | 788,999 | 7,735 |
| Mississippi | 0.01 | 2.07 | 0.5% | 212,506 | 1,027 |
| Missouri | 0.02 | 1.98 | 1.0% | 904,286 | 9,134 |
| Montana | 0.01 | 4.13 | 0.2% | 218,522 | 529 |
| Nebraska | 0.01 | 1.69 | 0.6% | 294,278 | 1,741 |
| Nevada | 0.01 | 2.42 | 0.4% | 400,646 | 1,656 |
| New Hampshire | 0.01 | 1.77 | 0.6% | 256,611 | 1,450 |
| New Mexico | 0.01 | 1.70 | 0.6% | 180,236 | 1,060 |
| North Carolina | 0.01 | 1.68 | 0.6% | 1,057,538 | 6,295 |
| Oklahoma | 0.01 | 2.25 | 0.4% | 556,006 | 2,471 |
| Oregon | 0.01 | 1.73 | 0.6% | 592,344 | 3,424 |
| Rhode Island | 0.01 | 1.83 | 0.5% | 202,876 | 1,109 |
| South Carolina | 0.01 | 1.45 | 0.7% | 469,057 | 3,235 |
| South Dakota | 0.01 | 1.48 | 0.7% | 124,888 | 844 |
| Tennessee | 0.02 | 2.24 | 0.9% | 834,609 | 7,452 |
| Utah | 0.01 | 1.38 | 0.7% | 303,711 | 2,201 |
| Vermont | 0.01 | 2.20 | 0.5% | 166,390 | 756 |
| Virginia | 0.01 | 0.88 | 1.1% | 776,001 | 8,818 |

## ITEM B-1393—MISCELLANEOUS VALUES FOR DOMESTIC TERRORISM, EARTHQUAKES, AND CATASTROPHIC INDUSTRIAL ACCIDENTS

### EXHIBIT 9

### BASIC MANUAL

## RULE 3—RATING DEFINITIONS AND APPLICATION OF PREMIUM ELEMENTS

## A. EXPLANATION AND APPLICATION

**11. Expense Constant**

a. The expense constant is:

- Not subject to premium discount, experience rating modification, retrospective rating adjustment, or additional charges for the ~~Terrorism Risk Insurance Act of 2002~~ catastrophe provisions detailed in Rule 3-A-24
- Included in the minimum premium for each classification and must not be added to the minimum premium if the minimum premium becomes the final premium for the policy
- Shown on the Information Page of the policy. For details, *refer to* ***User's Guide*** *D-2-g(6).*

*Refer to* ***User's Guide*** *for an example.*

**20. Standard Premium**

Standard Premium is the premium before the application of the premium discount.

It is the state premium determined on the basis of:

- Authorized rates
- Disease loadings
- Nonratable elements
- Aircraft seat surcharges
- Premium for increased limits of liability
- Experience rating modification
- Applicable schedule rating modification
- Minimum premiums

Total Standard Premium is the total premium for all states covered by the policy excluding expense constant, additional charges for the ~~Terrorism Risk Insurance Act of 2002~~ catastrophe provisions detailed in Rule 3-A-24, and any disease charge subject to the Federal Coal Mine Health and Safety Act before the application of the premium discount.

*Refer to state pages concerning the application of the above rating elements, or any state special rating elements.*

**Note:** The Annual Financial Calls for experience, which are used for ratemaking, contain a different definition of standard premium.

**24. Catastrophe Provisions**

**a. Terrorism Risk Insurance Act (TRIA) of 2002**

Premium for the Terrorism Risk Insurance Act of 2002 is calculated on the basis of total payroll according to Rule 2. A risk's total payroll in each state is divided by units of $100 and multiplied by the ~~Terrorism Rate~~appropriate value found in the state pages. The calculation is expressed as (Payroll/100 x ~~Terrorism~~ ~~Rate~~ TRIA Value = Premium). This premium is applied after

## ITEM B-1393—MISCELLANEOUS VALUES FOR DOMESTIC TERRORISM, EARTHQUAKES, AND CATASTROPHIC INDUSTRIAL ACCIDENTS

### EXHIBIT 9 (Cont'd)

standard premium and is not subject to any other modifications including, but not limited to, premium discount, experience rating, schedule rating, or retrospective rating.

Unless an "If Any" policy develops premium during the policy term or at audit, policies issued on an "If Any" basis will not be charged ~~a terrorism rate~~this premium.

Per capita charges are not subject to premium under this Act.

**b. Domestic Terrorism, Earthquakes, and Catastrophic Industrial Accidents (DTEC)**

Premium for Domestic Terrorism, Earthquakes, and Catastrophic Industrial Accidents is calculated on the basis of total payroll according to Rule 2. A risk's total payroll in each state is divided by units of $100 and multiplied by the appropriate value found in the state pages. The calculation is expressed as (Payroll/100 x DTEC Value = Premium). This premium is applied after standard premium and is not subject to any other modifications including, but not limited to, premium discount, experience rating, schedule rating, or retrospective rating.

Unless an "If Any" policy develops premium during the policy term or at audit, policies issued on an "If Any" basis will not be charged this premium.

Per capita charges are not subject to premium under this Act.

## C. DOMESTIC WORKERS—RESIDENCES

**5. Advisory Loss Costs, Rates and Premium**

**d. Catastrophe Provisions ~~Terrorism Risk Insurance Act~~**

Premium for ~~the Terrorism Risk Insurance Act of 2002~~catastrophe provisions as detailed in Rule 3-A-24 does not apply to per capita classifications.

## ITEM B-1393—MISCELLANEOUS VALUES FOR DOMESTIC TERRORISM, EARTHQUAKES, AND CATASTROPHIC INDUSTRIAL ACCIDENTS

### EXHIBIT 10

### RETROSPECTIVE RATING PLAN MANUAL

### PART ONE

## PART ONE—DESCRIPTION OF THE PLAN

## II. DEFINITIONS

**E. Standard Premium**

For the purpose of this Plan, standard premium means the premium for the risk determined on the basis of authorized rates, any experience rating modification, loss constants where applicable, and minimum premiums. Determination of standard premium shall exclude:

1. Premium Discount.
2. The Expense Constant.
3. Premium resulting from the Non-Ratable Element Codes listed in the Experience Rating Plan Manual.
4. Premium developed by the passenger seat surcharge under Code 7421—Aircraft Operation—flying crew.
5. Premium developed by the occupational disease rates for risks subject to the Federal Coal Mine Health and Safety Act.
6. Premium developed by the Terrorism Risk Insurance Act of 2002.
7. Premium developed by the Domestic Terrorism, Earthquakes, and Catastrophic Industrial Accidents catastrophe provision located in the ***Basic Manual.***

## ITEM B-1393—MISCELLANEOUS VALUES FOR DOMESTIC TERRORISM, EARTHQUAKES, AND CATASTROPHIC INDUSTRIAL ACCIDENTS

### EXHIBIT 11

### WORKERS COMPENSATION AND EMPLOYERS LIABILITY INSURANCE POLICY WC 00 04 21

### DOMESTIC TERRORISM, EARTHQUAKES, AND CATASTROPHIC INDUSTRIAL ACCIDENTS PREMIUM ENDORSEMENT

This endorsement is notification that your insurance carrier is charging premium to cover the losses that may occur in the event of domestic terrorism, earthquakes and/or a catastrophic industrial accident.

The premium charge provides funding for the risk of earthquakes, catastrophic industrial accidents, and certain acts of domestic and foreign terrorism. It does not provide funding for acts of terrorism certified as such by the Terrorism Risk Insurance Act (TRIA) of 2002, but rather provides funding for all other acts of terrorism specifically excluded by TRIA.

For purposes of this endorsement, the following definitions apply:

Domestic terrorism: All acts of terrorism outside the scope of TRIA with aggregate workers compensation losses in excess of $50 million

Earthquake: The shaking and vibration at the surface of the earth resulting from underground movement along a fault plane of from volcanic activity where aggregate workers compensation losses from the single event are in excess of $50 million

Catastrophic Industrial Accident: Any single event resulting in aggregate workers compensation losses in excess of $50 million

Schedule

| Payroll | Rate | Premium |
|---|---|---|

## ITEM B-1393—MISCELLANEOUS VALUES FOR DOMESTIC TERRORISM, EARTHQUAKES, AND CATASTROPHIC INDUSTRIAL ACCIDENTS

### EXHIBIT 12-A

### URE WORKERS COMPENSATION STATISTICAL PLAN

### PART 3

**14. STATISTICAL CODES--PREMIUM AMOUNT NOT SUBJECT TO EXPERIENCE MODIFICATION FACTOR**

Report the premium credit or debit amount not subject to experience modification. These premiums should be reported separately from class code exposures and premiums under the designated class code or statistical code. These premiums are generated from the following premium programs or coverages:

- Aircraft Operation--Passenger Seat Surcharge (refer to Item 6.b. in this section for further instructions)
- Alternate Preferred Plan
- Assigned Risk Adjustment Program (ARAP)
- Assigned Risk Flat Charge
- Assigned Risk Surcharge
- Assigned Risk Tabular Surcharge
- Atomic Energy
- Catastrophe Provisions for Domestic Terrorism, Earthquakes, and Industrial Accidents
- Claims Deductible Coverage
- Contracting/Construction Class Code Program--Premium Debit Offset to Experience Rating
- Contracting/Construction Premium Adjustment Program
- Deductible Reporting
- Disease Experience--Coal Mining Risks
- Disease Experience--Supplemental
- Drug-Free Workplace
- Employee Leasing Rating Adjustment
- Expense Constant
- Group Supplemental Rating Plan
- Increased Limits for Admiralty and/or FELA Coverage--Balance to Minimum Premium
- Independent Carrier Filing
- Injury Management Program
- Large Deductible Coverage
- Loss Constant
- Managed Care
- Merit Rating Debits
- Merit Rating Program
- Minimum Premium (Balance to)
- Nonratable Portion of Class Code Rate

EXHIBIT 12-A (Cont'd)

- Non-Rated Premium Credit
- Premium Discount: Stock Company/Nonstock
- Premium Transition Program
- Pulpwood Transition Program--Credit/Debit
- Rate Deviation Premium Adjustment
- Rehiring Employees With Permanent Partial Disabilities
- Risk Management Premium Credit Program
- Safety Certification Premium Credit
- Schedule Rating Program
- Small Employer Loss Free Credit Program
- Small New Employer Credit
- Supplemental Disease Experience--in Connection with Asbestos Exposure
- Supplemental Experience Rating Plan Credit Premium Adjustments
- Terrorism Risk Insurance Act of 2002--Certified Losses
- Transition Program
- Waiver of Subrogation
- Workplace Safety Credit/Debit

## PART 7

## CODING SPECIFICATIONS

**9. STATISTICAL CODES—PREMIUM AMOUNT *NOT* SUBJECT TO EXPERIENCE MODIFICATION FACTOR**

| Description | Stat Code | Premium Credit (–) or Debit (+) | Applicable States (1) | Effective Date | Discontinuation Date |
|---|---|---|---|---|---|
| Catastrophe Provisions for Domestic Terrorism, Earthquakes, and Industrial Accidents | 9741 | + | All States | | |

## ITEM B-1393—MISCELLANEOUS VALUES FOR DOMESTIC TERRORISM, EARTHQUAKES, AND CATASTROPHIC INDUSTRIAL ACCIDENTS

### EXHIBIT 12-B

### STATISTICAL REPORTING INSTRUCTIONS

**General**
Premium debit generated from the designated catastrophe provisions is reported under Statistical Code 9741.

**Policies**
*Electronic Reporting*
Statistical Code 9741 and the resulting premium are reported on an Exposure Record (Record Type 05). This premium is reported in the Estimated State Standard Premium Total (Record Type 04) and the Policy Estimated Standard Premium Total (Record Type 01).

*Hard Copy Reporting*
Statistical Code 9741 and the resulting premium are reported on the Policy Information Page. This premium is applied after the experience modification.

**Unit Reports**
*Electronic Reporting*

**Premium**—Statistical Code 9741 and the resulting premium are reported on an Exposure Record (Record Type 4).

**Losses**—Any resulting losses from the catastrophe provisions would be assigned a unique Catastrophe Number and should be reported on a Loss Record (Record Type 5).

*Hard Copy Reporting*

**Premium**—Statistical Code 9741 and the resulting premium are reported after the experience modification and Total Standard Premium amount, on lines J, K, or L.

**Losses**—Any resulting losses from the catastrophe provisions would be assigned a unique Catastrophe Number that should be reported on the Loss Information section.

**Financial Calls**

**Premium**—Premium generated from Statistical Code 9741 is excluded from the standard Financial Calls.

**Losses**—Any resulting losses from the catastrophe provisions would be reported on Large Loss and Catastrophe Call (#31), identified with the unique Catastrophe Number assigned to the event.

**Detailed Claim Information**
In the event of any losses from the catastrophe provisions, NCCI will issue DCI reporting instructions.

## ITEM B-1393—MISCELLANEOUS VALUES FOR DOMESTIC TERRORISM, EARTHQUAKES, AND CATASTROPHIC INDUSTRIAL ACCIDENTS

### EXHIBIT 13-A

### ASSIGNED RISK MANDATORY LOSS SENSITIVE RATING PLAN (LSRP)

**II. DEFINITIONS**

**E. STANDARD PREMIUM**

For the purpose of this Plan, *standard premium* means the premium for the risk determined on the basis of authorized rates, any experience rating modification, ARAP, assigned risk surcharge programs other than LSRP, and minimum premiums. Determination of standard premium shall exclude:

1. Premium discount,
2. The expense constant,
3. Premium resulting from the nonratable element codes listed in the ***Experience Rating Plan Manual for Workers Compensation and Employers Liability Insurance,***
4. Premium developed by the passenger seat surcharge under Code 7421—Aircraft Operation—Flying Crew, and
5. Premium developed by the occupational disease rates for risks subject to the Federal Coal Mine Health and Safety Act.
6. Premium developed by the Terrorism Risk Insurance Act of 2002 as defined in Rule 3-A of the ***Basic Manual for Workers Compensation and Employers Liability Insurance.***
7. Premium developed by the Domestic Terrorism, Earthquakes, and Catastrophic Industrial Accidents catastrophe provision located in the ***Basic Manual for Workers Compensation and Employers Liability Insurance.***

## ITEM B-1393—MISCELLANEOUS VALUES FOR DOMESTIC TERRORISM, EARTHQUAKES, AND CATASTROPHIC INDUSTRIAL ACCIDENTS

### EXHIBIT 13-B

**WORKERS COMPENSATION AND EMPLOYERS LIABILITY INSURANCE POLICY** **WC 00 04 18 B**

**ASSIGNED RISK MANDATORY LOSS SENSITIVE RATING PLAN ENDORSEMENT**

This endorsement is added to Part Five (Premium) to explain the rating plan and how the Assigned Risk Loss Sensitive Rating Plan premium will be determined.

This endorsement applies where the LSRP has been approved. It determines the Assigned Risk Loss Sensitive Rating Plan premium for the insurance provided during the rating plan period of this policy. The rating plan period is the one-year period beginning with the effective date of the policy.

**A. Assigned Risk Loss Sensitive Rating Plan Premium Elements**

The amount of Assigned Risk Loss Sensitive Rating Plan premium depends on the six standard elements which are explained below:

1. Standard premium is the premium we would charge during the rating plan period if the insurance was not subject to this endorsement. We determine your standard premium based upon authorized rates, any experience rating modification and minimum premiums, including the effect of any other residual market rating plan or program.
   Standard premium does not include the expense constant charge, the premium discount credit, and premium developed by the:
   a. Passenger seat surcharge under Code 7421—Aircraft Operation—Flying Crew~~, premium developed by the~~
   b. Occupational disease rates for risks subject to the Federal Coal Mine Health and Safety Act, ~~or premium developed by the~~
   c. Terrorism Risk Insurance Act of 2002~~.~~
   d. Domestic Terrorism, Earthquakes, and Catastrophic Industrial Accidents catastrophe provision
2. Basic premium is calculated by multiplying the standard premium by a basic premium factor. The basic premium factor is shown in the Schedule.
3. Incurred losses are all amounts we will pay or estimate we will pay for losses, interest on judgments, expenses to recover against third parties and employers liability loss adjustment expenses.
4. A converted loss is an incurred loss multiplied by a percentage called the loss conversion factor. The Assigned Risk Loss Sensitive Rating Plan loss conversion factor is shown in the Schedule.
5. Taxes are a part of the premium we collect. Taxes are determined as a percentage of expense and development premium and converted losses. The percentage is called the tax multiplier. The tax multiplier covers assessments, fees, licenses, and taxes that we must pay on the premium we collect. It varies by Federal and non-Federal classifications. The tax multiplier(s) for each state is shown in the Schedule.
6. Development premium is calculated by multiplying the standard premium by the product of the appropriate premium development factor, the loss conversion factor and the tax multiplier. The premium development factors are shown in the Schedule.

**B. Assigned Risk Loss Sensitive Rating Plan Formula**

1. Assigned Risk Loss Sensitive Rating Plan premium is the sum of the basic premium, development premium and converted losses, multiplied by the tax multiplier. The payment, if any, attributable to the ~~four~~ six items excluded from standard premium in A.1. above, is a separate obligation of yours in addition to the Assigned Risk Loss Sensitive Rating Plan premium.
2. The Assigned Risk Loss Sensitive Rating Plan premium is subject to a minimum premium and a maximum premium. The minimum premium is determined by multiplying the total audited standard premium by the minimum premium factor. The maximum premium is determined by multiplying the total audited standard premium for the qualifying states by the applicable maximum premium factor. The minimum premium factor and maximum premium factor for each state are shown in the Schedule.

**C. Premium Calculation and Payments**

1. You will pay a premium which amounts to 120% of the estimated annual premium. If you obtain an acceptable clean, unconditional, Irrevocable Letter of Credit (ILOC), containing an automatic renewal clause, to secure the 20% additional deposit premium, the premium will be 100% of the estimated annual premium.

## ITEM B-1393—MISCELLANEOUS VALUES FOR DOMESTIC TERRORISM, EARTHQUAKES, AND CATASTROPHIC INDUSTRIAL ACCIDENTS

### EXHIBIT 13-B (Cont'd)

2. Your rating plan premium will be determined after the rating plan period ends. We will issue an endorsement to show any change in the premium for your insurance if your annual audited standard premium equals or exceeds the premium eligibility level in one or more states where this plan has been approved.
3. The first calculation of Assigned Risk Loss Sensitive Rating Plan premium shall be determined using all loss information valued as of 18 months after the month in which the rating plan period became effective. Three additional annual premium adjustment calculations shall be made based on loss information valued as of 30, 42, and 54 months after the month in which the rating plan period became effective.
We may make a special valuation of the Assigned Risk Loss Sensitive Rating Plan premium as of any date that you become bankrupt or insolvent, make an assignment for the benefit of creditors, are involved in reorganization, receivership or liquidation, or dispose of all your interest in work covered by the insurance. You will pay the amount due us if the Assigned Risk Loss Sensitive Rating Plan premium is more than the total standard premium as of the special valuation date.
4. After each valuation, you shall promptly pay to us the amount due, or we will refund the amount to you. If you fail to pay any premium due under this plan, your current policy will be canceled and you will be disqualified from future assignments through the assigned risk plan.

**D. Cancelation**

1. If the policy is canceled by you or by us, a determination shall be made as to whether this program shall apply. The Assigned Risk Loss Sensitive Rating Plan shall apply only to those policies where the payroll extended to an annual basis and multiplied by the manual rates and experience modification, equals or exceeds the premium eligibility level in any of the states where this program has been approved.
2. The Assigned Risk Loss Sensitive Rating Plan will not apply if you obtain coverage outside the residual market within 120 days after the effective date of the policy.
3. If you cancel, the standard premium for the rating plan period will be based on our short rate table and procedure. This short rate premium will be used to determine the Assigned Risk Loss Sensitive Rating Plan premium.
4. Section D.3. will not apply if you cancel because:
   a. all work covered by the insurance is completed;
   b. all interest in the business covered by the insurance is sold;
   c. you retire from all business covered by the insurance, or
   d. you obtain coverage in the voluntary market.

Schedule

| | | |
|---|---|---|
| 1. | Basic Premium Factor | _____ |
| 2. | Loss Conversion Factor | _____ |
| 3. | Tax Multiplier | _____ |
| 4. | Minimum Premium Factor | _____ |
| 5. | Maximum Premium Factor | _____ |
| 6. | LSRP Development Factors: | _____ |
| | 1st Adjustment | _____ |
| | 2nd Adjustment | _____ |
| | 3rd Adjustment | _____ |
| | Subsequent Adjustments | 0.00 |