



Casualty Risk, Models, and Scenario Libraries

PREPARED FOR CAMBRIDGE SCENARIO CONFERENCE

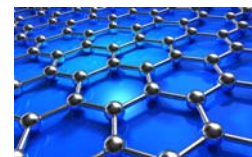
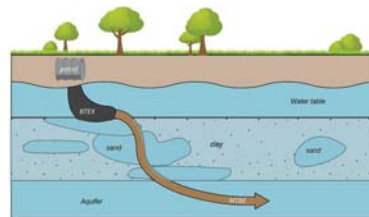
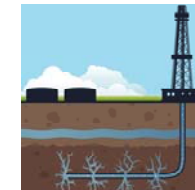
SEPTEMBER 6, 2017

Liability and the Vexing Problem of Emerging Risk

Coverage: All Perils with exclusions



What's Next?

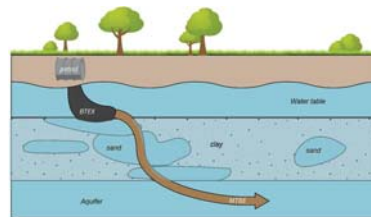


Liability and the Vexing Problem of Emerging Risk

Coverage: All Perils with exclusions



What's Next?



The Human Scale Solution: The Emerging Risk Group



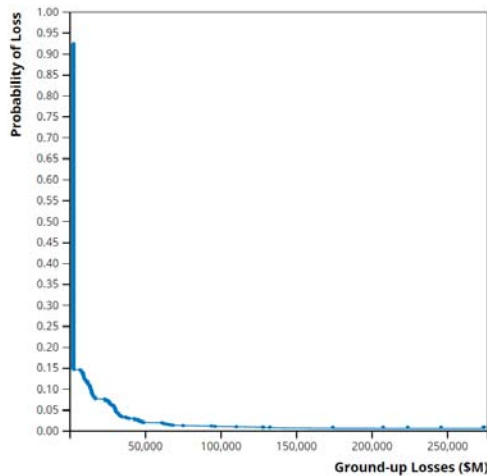
- Emerging Risk List
- The Underwriting Strategy
- The Casualty Realistic Disaster Scenario

The Human Scale Solution: The Emerging Risk Group



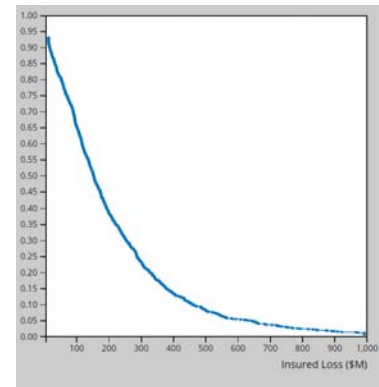
- ✓ Rise of Exclusions
- ✓ Lack of Alignment of Risk Management and Underwriting
- ✓ Shrinking Casualty Insurance Market

The Machine Scale Solution: The Latency Catastrophe Model



Named
Peril
latency cat
EP curve

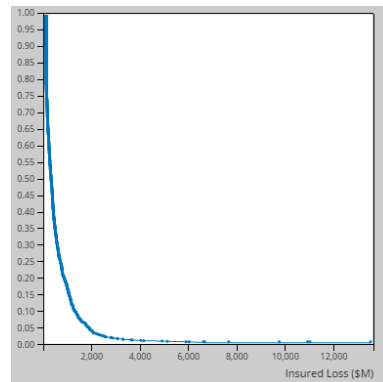
EL	\$5,394.46M
PML(5)	\$30,519.94M
PML(1)	\$116,285.50M



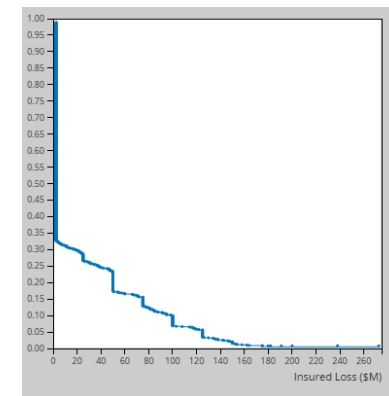
Paint company
latency cat EP
curve

 EXCEEDANCE PROBABILITY CURVE - Bisphenol A (BPA)

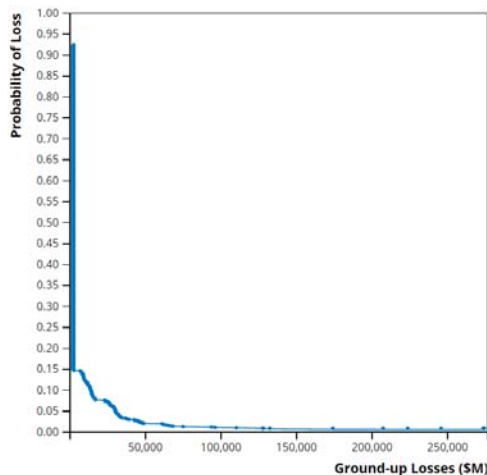
Adhesives
industry
latency cat EP
curve



Bermuda insurer
latency cat
EP curve



The Machine Scale Solution: The Latency Catastrophe Model



Named Peril latency cat EP curve

EL	\$5,394.46M
PML(5)	\$30,519.94M
PML(1)	\$116,285.50M

- Forward-looking modeling using peer-reviewed science
- Portfolio steering and aggregation management
- Epidemiology-based latency estimates to inform reserving
- Named-peril market solutions



EXCEEDANCE PROBABILITY CURVE - Bisphenol A (BPA)

- ✓ Black box?
- ✓ Unmodeled perils?
- ✓ Model risk?





Scenario-Enhanced Modeling provides the ultimate solution

- Model foundations are needed to drive market solutions
- Internal consistency driven by model foundation reduces risk aversion and inform
- Scenario-based assumption stressing facilitates robust risk management
- Scenarios allow better communication of model results to management
- Scenarios with loss allocation to companies can be used in underwriting

Scenario-enhanced modeling is the use of scenario libraries built on top of models



Two Kinds of Model-based Scenarios: Realistic and Extreme

<p>SCENARIOS - 1,3-Butadiene: Leukemia (Realistic)</p> <p style="text-align: right;">Scenarios <input type="text"/></p> <hr/> <p>  Advances in toxicogenomics enable testing to determine which cases of leukemia are caused by 1,3-butadiene</p> <p>Updated: Sep 27 2016</p>	<p>SCENARIOS - Sugar: Addiction (Extreme)</p> <p style="text-align: right;">Scenarios <input type="text"/></p> <hr/> <p>  The addictive properties of sugar-sweetened beverages lead to tobacco-like mass litigation</p> <p>Updated: Sep 27 2016</p>
<ul style="list-style-type: none">• Realistic scenarios are consistent with event set data<ul style="list-style-type: none">• Designed for regulatory reporting, and results communication• Can be associated with probabilities to quantify realism	<ul style="list-style-type: none">• Extreme scenarios realistically break a model assumption<ul style="list-style-type: none">• Addresses model uncertainty, explores unmodeled parameters• Can be used to model legal change scenarios

Praedicat's scenario library: present and future

	1,3-Butadiene: Leukemia (Realistic)
	2,3-Pentanedione: Bronchiolitis Obliterans (Extreme)
	Aluminum: Neurodegenerative Disease (Extreme)
	Aluminum: Pneumoconiosis (Realistic)
	Atrazine: Birth Defects (Extreme)
	Atrazine: Infertility (Extreme)
	Benzene: Acute Myeloid Leukemia (Realistic)
	Benzene: Multiple Myeloma and Non-Hodgkin Lymphoma (Realistic)

- Currently have 50 scenarios in software
 - Focus on potential for latent bodily injury connected to product exposures
- Scenarios are the leading edge of our model development
 - Developing models to address property damage, latent and short-tail; exploring legal change



“Realistic”



“Extreme”



Underwriting with scenarios

- Scenarios by company can be built into underwriting platforms
 - Facilitates alignment of underwriting and risk management
 - Drives better communication of model results to clients
 - Reduces underwriter biases and blind spots

Glyphosate: Non-Hodgkin Lymphoma (Extreme) Scientists find a strong and specific link between glyphosate exposure and a specific type of non-Hodgkin lymphoma In this extreme disaster scenario: <ul style="list-style-type: none">• Scientists show that the link between glyphosate and non-Hodgkin lymphoma is significantly stronger than it is today• Scientists develop a method that can demonstrate whether an individual's cancer was caused by glyphosate• Thousands of workers suffering from non-Hodgkin lymphoma caused by exposure to glyphosate recover damages from manufacturers of glyphosate and completed herbicide formulations	Formaldehyde: Leukemia (Realistic) Limits Exposed: \$100.00M Losses: \$100.00M Latency: 24 years
Glyphosate: Non-Hodgkin Lymphoma (Extreme) Limits Exposed: \$100.00M Losses: \$100.00M Latency: 19 years	Pyrethroids: Parkinson's Disease (Realistic) Limits Exposed: \$100.00M Losses: \$100.00M Latency: 34 years
Dibutyl Phthalate: Infertility (Extreme) Limits Exposed: \$100.00M Losses: \$64.63M	

Company: Limits Exposed: \$100.00M
Losses: \$100.00M
Indemnity: \$87.05M
Defense: \$12.95M
Loss Latency: 19 years [View](#)

[EXPORT](#)



“It’s not about AI, it’s about IA
– intelligence amplification”
-- Sid Dalal

Best Practices for Casualty Scenario Development and Application

- Models provide a strong foundation for scenario development
 - Encourage product innovation and sound underwriting
 - Can drive scenario development at scale for broader coverage
 - Facilitate internal consistency in risk assessment
- Scenario-enhanced modeling reduces model risk and improves communication
- Shared scenario platforms for risk management and underwriting drives alignment



The Coming Golden Age of Scenario-Enhanced Cat-Modeled Casualty