



Risk Communication – It's Not Just About the Facts

July 25, 2017





Denise Hill



Marisa Kreider



Laurie Gneiding





Risk and the Impact of Global Chemical Regulatory Actions

Marisa Kreider, Ph.D., DABT
Cardno ChemRisk

July 25, 2017

Overview

- > How Scientists Evaluate Chemical Risk: What is Risk Assessment?
- > Chemicals and the General Population
- > Regulatory Initiatives and Impact on Risk Perception/Communication
 - Prop 65
 - REACH and SVHCs
 - NIOSH Carcinogen Policy
- > Challenges Facing Industry

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What is Risk Assessment?

A logical, objective, and quantitative approach to analyzing and interpreting data with the purpose of predicting the potential adverse health effects at specific levels of exposure to chemical or physical hazards.

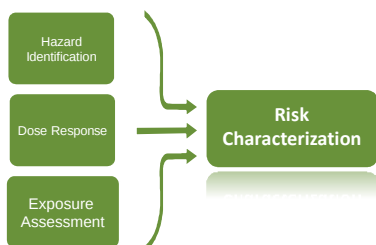
(Paustenbach, 2002)

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The "Four Steps" of Risk Assessment



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Hazard Identification

> What are the hazards associated with the chemical?

- Endpoints
- Relevant conditions for toxicity (e.g. route)
- Other properties for consideration (e.g. physical/chemical properties)



Dose Response Assessment

> How much of the chemical is needed to produce the adverse effect?

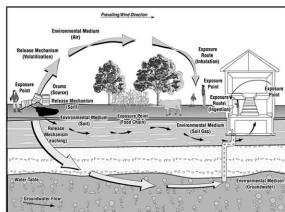
- Goal is to produce a health benchmark
- Threshold
- Non-threshold (cancer)



Exposure Assessment

> How much of the chemical are you exposed to?

- How long and at what concentration
- Relevant exposure scenarios
- Relevant routes of exposure



Risk Characterization

- > Integration of all steps of the risk assessment– is there an adverse effect likely at the determined exposure?
 - Risk requires both hazard AND exposure
 - Comparison of exposure to a health benchmark allows for quantitative understanding of risk
 - Consideration of uncertainty and limitations in risk assessment

Chemicals and the General Population



A Focus on Hazard

- > Understanding hazard is not sufficient for understanding risk, but is conceptually simple
- > All chemicals are inherently hazardous at some dose
- > NGOs, public and sometimes regulators focus on hazards themselves...and not the dose needed for there to be a risk
- > Perpetuation of the idea that chemicals are bad, regardless of situation



Petition to Ban DHMO

What is Dihydrogen Monoxide?

- DHMO is a colourless, odourless Chemical compound
- It is used as an industrial coolant
- It is added to many foods
- DM foods could not be produced without it

Why Ban DHMO?

- A thumbtack can be lethal to humans
- It is a major constituent of Acid Rain
- It has been linked to global climate change
- Many industries dump tonnes of it into the sea
- It has been found in almost all Cancer biopsies

For more information on DHMO visit <http://www.dhmo.org>

Regulatory Initiatives and Risk Communication Hurdles

- > Hazard-based regulations increasing
- > Impact of precautionary approach
- > Examples of regulation:
 - California Proposition 65
 - REACH and "Substances of Very High Concern"
 - Carcinogen Policies in EU and US



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California Proposition 65

- > Safe Drinking Water and Toxics Enforcement Act of 1996
- > Requires labeling of products that contain "chemicals known to the State of California to cause cancer, birth defects or other reproductive harm."
- > OEHHA regularly updates lists of carcinogens and reproductive toxicants for incorporation under Prop 65
- > Safe Harbor Limits- risk based screening values
 - No labeling requirement if exposure is below screening value-- risk based
 - But...not all chemicals have screening values



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Impact of Prop 65

- > Product labels
 - Public reminder about hazard, without context
 - Validation of focus on hazard
- > Bounty hunter lawsuits
 - "Any individual acting in the public interest may enforce Proposition 65 by filing a lawsuit against a business alleged to be in violation of this law"
 - Burden on manufacturers to prove there is no risk; default to labeling even without risk



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REACH and “Substances of Very High Concern”

- > Hazard-based list developed in EU under REACH regulation
 - Candidate list for authorization for use
- > Nominations for SVHC list come via Member States or European Commission
- > Chemicals on SVHC list are evaluated, prioritized and potentially designated for Annex XIV
 - Sunset date

SVHC Candidates
Carcinogens
Mutagens
Reproductive Toxicants
Persistent, Bioaccumulative, and Toxic Chemicals
Very Persistent, Very Bioaccumulative Chemicals
“Equivalent Concern” (sensitizers, endocrine disruptors, etc.)

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Impacts of SVHC Designations

- > Targeting hazard, not risk, for subsequent regulation (i.e. authorization or restriction)
 - Authorization can be granted via socioeconomic analysis, but with a sunset date
- > Manufacturer/supplier notifications to ECHA and customers required
- > Reinforces public concern about hazard
- > Support for precautionary principle in risk science



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Carcinogen Policy Changes

- > NIOSH Carcinogen Policy change in December 2016
 - Recognizes that “there is no known safe level of exposure to a carcinogen”
 - Reduction of worker exposure through elimination/substitution and engineering controls is the primary way to prevent occupational cancer
 - Change in the exposure limit terminology—Risk Management Limit for Carcinogens (RML-CA) (1 excess risk in 10,000 workers or analytical limit of quantification)
- > EU Directive “Carcinogens and Mutagens at Work” (2004) with proposed changes in 2016
 - Goal is to protect workers from exposure to carcinogens/mutagens at work
 - Prevention of exposure through replacement, use of closed system, or where infeasible, reduction of exposure to a minimum
 - Limit value for carcinogens established (13 chemicals)- to be updated soon with new chemicals added



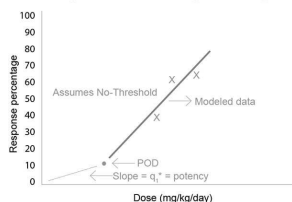
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Science of Cancer Risk- Probabilistic

Dose Response Relationship, Carcinogens



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Impacts of Carcinogen Policy Changes

- > Changes in occupational exposure limits
 - Risk management needs
 - Concerns about historical exposures
 - Litigation
- > Perception of workplace risks
 - Worker requests for monitoring (industrial hygiene, biomonitoring, medical)
 - Union engagement

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Summary and Conclusions

- > Disconnect between how scientists evaluate risk and how public perceives it
 - Hazard vs. Risk
- > Trend in regulatory community focusing on hazard
 - Hazard based lists (Prop 65, SVHCs, etc.)
- > Challenges facing chemical industry
 - Communication of Risks to Workers
 - Regulatory Pressure
 - NGOs
 - Corporate Reputation
 - Market Impact

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Community Concerns Regarding Onshore O&G Activities

Cardno ChemRisk Toxicology Practice
Denise Hill, PhD

Overview

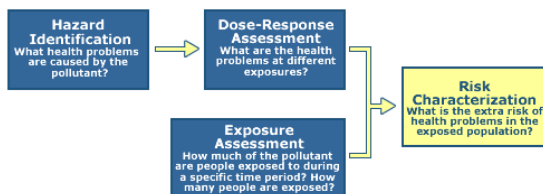
- >Risk perception as compared to risk assessment
- >Risk perception in O&G industry as compared to communities
- >Concern over chemicals used in unconventional O&G operations
- >Issues related to formulation disclosure

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Risk Assessment: EPA

$$\text{Risk} = \text{Hazard} \times \text{Exposure}$$

The 4 Step Risk Assessment Process



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http://www.epa.gov/risk_assessment/images/risk_assess_chart/step-five-4.gif

Risk Perception

- > **Hard-wired threat perception:** "For example, just the word "chemicals,"...has been shown to trigger an unconscious fear reaction in members of the general public."
- > **Judgement under uncertainty:** Using available information and known patterns
- > **Relative weights of risks:** Some risks cause more anxiety than others
- > **Cultural cognition:** shaping our views to match those of the group we most closely relate to

"The older view is that the public is emotional and hence irrational," Slovic says. "But that's not correct. Emotions are an extraordinarily sophisticated form of intelligence," he says, "born out of millennia of quickly assessing high risks."

Dr. Paul Slovic, U. of Oregon

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Risk Perception: It's Personal! <https://ehp.niehs.nih.gov/122-a276/>

Risk Perception Gap: Between Our Fears and the Facts

> Most **dreaded** diseases (2011%)

- **Cancer (41%)**
- Alzheimer's (31%)
- **Heart Disease (8%)**
- Stroke (8%)
- Diabetes (6%)

> Leading **causes** of death (2015 %)

- **Heart Disease (23.4%)**
- **Cancer (22%)**
- Chronic lower respiratory diseases (5.7%)
- Accidents (5.4%)
- Stroke (5.2%)



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MetLife: <https://www.metlife.com/assets/ciao/foundation/alzheimers-2011.pdf>
CDC - Health, United States, 2016: <https://www.cdc.gov/nchs/data/tables/hus16.pdf#049>

Risk Perception in O&G Industry

- > Perception of risk varies based on the company's current objective (e.g., permit to drill, selling assets, license to operate in an important community)
- > Industry usually had a decision-making hierarchy: **Vertically organized authority** results in top-down decision-making and implementation of projects
- > Sunk costs and economic risk: extensive resources are expended on the front-end of projects, far from the impacted communities

Transparency

The decisions and risks appear to reflect only the operators' internal considerations

James A. Kent, "A Social License to Operate in the 21st Century: Overcoming the Clash of Two Cultures (Aug. 2013).

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Be Afraid, Be Very Afraid: Dealing with Public Perceptions in Oil and Gas Development: <https://www.burroughes.com/images/content/000000020160802016081-ch-26-with-legend.pdf>

Risk Perception in Communities

> Costs/impact of oil and gas operations tend to be more locally concentrated than the benefits

> Communities consist of horizontally organized systems: **no vertical-authority** basis to simply "accept" the reasoning regarding the merits of a project

> Oil and gas operations currently embody two components that can drive negative public perception: technical risk and non-technical outrage



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Be Afraid, Be Very Afraid: Dealing with Public Perceptions in Oil and Gas Development: <https://www.bryancove.com/images/content/0002/0004/0001-Ch-26-with-legend.pdf>

O&G: Not In My Back Yard (NIMBY)?

The NIMBY Syndrome is often wide-spread, deeply ingrained, easily translatable into political actions, intentionally exclusionary and growth inhibiting. *NIMBY sentiment can variously reflect legitimate concerns* about property values, service levels, community ambience, the environment, or public health and safety. It can also reflect ... prejudice masquerading under the guise of these legitimate concerns. It can manifest itself as ... general opposition to changes in the character of the community, or as opposition to any and all development.

James A. Kent, "A Social License to Operate in the 21st Century: Overcoming the Clash of Two Cultures (Aug. 2013)

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Be Afraid, Be Very Afraid: Dealing with Public Perceptions in Oil and Gas Development: <https://www.bryancove.com/images/content/0002/0004/0001-Ch-26-with-legend.pdf>

Challenges of Maintaining Access to Land

> State Bans:

- Maryland: March 2017
- New York: 2015
- Vermont: May 2012

> Under discussion in many states

> Local fracking bans:

- Many local bans
- Conflict over state vs local control



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Concern Over Chemicals

> Requests for full chemical disclosure to facilitate better public understanding of hazard and risk

> Challenges:

- Chemical disclosure is inconsistent: no single approach to describing product formulation
- The same product may vary in description by different vendors, especially minor constituents
- Minor constituents, present below levels that require warning on product labels and Safety Data Sheets, may still be of high public concern
- The ability to draw meaningful conclusions from available disclosure is limited



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Poll Question

Do you have experience in product chemistry?

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Understanding Product Chemistry

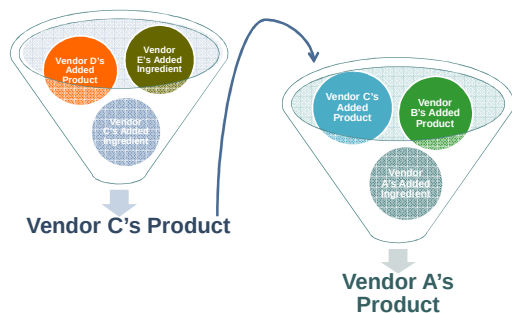
- Formulation as Recipe
- List of intentionally added ingredients
- Contribution of the components to the final product (%)



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<http://www.fda.gov/oc/ohrt/ohrt-report/ohrt-report-2014-2015.pdf> FDA Food Defect Levels Handbook

Formulation of a Typical Product



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Interpretation of the Product Formulation

- > Contaminants incidental to manufacture
 - Residual monomer ingredients remaining in polymer product
 - Chemicals of concern (CoC) in some ethoxylated alcohol surfactants
- > Constituents of an substance of Unknown or Variable Composition, Complex Reaction Products and Biological Materials (UVCB Substance)
 - Benzene, toluene, ethylbenzene and xylenes (BTEX) in petroleum distillate cuts
 - CoC in "natural" ingredients (plant based solvents)
- > Contaminants from unexpected sources
 - Added water: drinking water has acceptable contaminant thresholds for many CoCs such as benzene

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Precautionary Principle as Risk Management

- > The Precautionary Principle reflects the familiar adage that it is "better to be safe than sorry."
- > May result in demanding precautionary actions where risk is unclear, presuming harm
- > Inconsistent with our daily management of risk (e.g., driving)

"If someone had evaluated the risk of fire right after it was invented, they may well have decided to eat their food raw."

Julian Morris, Institute of Economic Affairs in London

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Be Afraid, Be Very Afraid: Dealing with Public Perceptions in Oil and Gas Development: https://www.bvancave.com/images/content/01v20242/A61_C1-25-with-legend.pdf
 Peter M. Santman: <http://www.pandman.com/articles/demsa.htm>
 Traffic Fatality Statistics: <http://www.ihss.org/ihss/topics/general-statistics/fatalities/facts/state-by-state-overview/2015>

Community Acceptance of Risk

> The public is less likely to accept perceived risks when community members

- Do not feel a connection to the operators and their operations
- Do not know or trust the producers or the industry
- Have not had access to the full range of information

"Even significant hazards are usually tolerated when outrage is low, and even insignificant hazards are usually rejected when outrage is high."

Peter M. Sandman

Be Afraid, Be Very Afraid: Dealing with Public Perceptions in Oil and Gas Development:
<https://www.bryanave.com/images/content/80/v2/80242/A61-Ch-26-with-legend.pdf>
 Peter M. Sandman: <http://www.psandman.com/articles/amsa.htm>

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Risk Communication: It's Not Just About the Facts



Laurie Gneiding, CEP
 Amec Foster Wheeler
 Somerset, NJ

Poll Question



Have you ever had to present at a public meeting?

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Poll Question



If so, what was their reaction?

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Poll Question



Have you ever gone to a public meeting and asked questions of the speaker?

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What is "Risk Communication"?



- "An organized process used to describe and estimate the likelihood of adverse health outcomes from environmental exposures to chemicals" (www.ITRCweb.org).
- Objective of risk communication
 - Aid affected public in
 - Understanding risk assessment/ management processes
 - Forming scientifically valid perceptions of likely hazards, and
 - Participation in risk management decisions.
 - Risk communication tools are written, verbal, or visual statements containing information about risk.



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Why Risk Communication is Important?



- **Stressed people lose 80% of ability to process information**
 - what they hear, understand and remember vs. what they hear/see
- **Public concerns on typically based on**
 - 5% fact
 - 95% perception (misperception)



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Definitions



- **Hazard = something that can cause harm**
- **Risk = potential for harm**

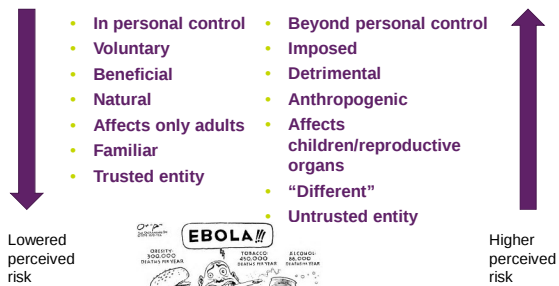
When dealing with risk communication (i.e., contact w/the public): Risk = Hazard + OUTRAGE

Outrage Factors

Controllability	Familiarity	Fairness
Benefits	Catastrophic potential	Understanding
Uncertainty	Delayed effects	Victim identity
Effects on children/future generations	Trust	Media attention
Accident history	Reversibility	Personal stake
Ethical/moral nature	Human vs. natural origin	Voluntary exposure

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Personal Outrage Factors



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Risk Communication



Three aspects:

1. Understanding the hazards/risks, then controlling them
2. Community preparation
3. Demonstrate sensitivity/responsiveness to audience concerns



Understanding Hazards/Risks



PRESENTATION

Actual scenario:

- **What is the credible worst case?**
 - We think a small amount of oil is leaking...



Public perception

- **What is the worst imaginable case?**
 - The Gulf oil spill....again.



Understanding Risk – Presentation (cont.)



- Don't be pre-occupied with statistics & calculations

Data Performance Report													
Report Period: Q3 2023													
Report Date: 2023-10-27													
Section	Category	Sub-Category	Item Name	Value A	Value B	Value C	Value D	Value E	Value F	Value G	Value H		
Module Overview	General Info	System ID	System ID-001	12345	67890	11111	22222	33333	44444	55555	66666		
			System ID-002	54321	98765	33333	44444	55555	66666	77777	88888	99999	
			System ID-003	98765	43210	66666	77777	88888	99999	101010	111111	121212	
	Operational Metrics	Performance	Performance-001	100%	95%	90%	85%	80%	75%	70%	65%	60%	
			Performance-002	95%	90%	85%	80%	75%	70%	65%	60%	55%	50%
			Performance-003	90%	85%	80%	75%	70%	65%	60%	55%	50%	45%
Resource Allocation	Team A	Team A-001	10	20	30	40	50	60	70	80	90	100	
		Team A-002	20	30	40	50	60	70	80	90	100	110	
		Team A-003	30	40	50	60	70	80	90	100	110	120	
Detailed Analysis	Data Trends	Trend A	Trend A-001	100	200	300	400	500	600	700	800	900	
			Trend A-002	200	300	400	500	600	700	800	900	1000	1100
			Trend A-003	300	400	500	600	700	800	900	1000	1100	1200
	Data Trends	Trend B	Trend B-001	500	600	700	800	900	1000	1100	1200	1300	1400
			Trend B-002	600	700	800	900	1000	1100	1200	1300	1400	1500
			Trend B-003	700	800	900	1000	1100	1200	1300	1400	1500	1600
Data Trends	Trend C	Trend C-001	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	
		Trend C-002	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	
		Trend C-003	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	
Summary & Totals	Summary	Overall	Overall-001	1500	1600	1700	1800	1900	2000	2100	2200	2300	
			Overall-002	1600	1700	1800	1900	2000	2100	2200	2300	2400	2500
			Overall-003	1700	1800	1900	2000	2100	2200	2300	2400	2500	2600
	Summary	Overall	Overall-004	1800	1900	2000	2100	2200	2300	2400	2500	2600	2700
			Overall-005	1900	2000	2100	2200	2300	2400	2500	2600	2700	2800
			Overall-006	2000	2100	2200	2300	2400	2500	2600	2700	2800	2900
Summary	Overall	Overall-007	2100	2200	2300	2400	2500	2600	2700	2800	2900	3000	
		Overall-008	2200	2300	2400	2500	2600	2700	2800	2900	3000	3100	
		Overall-009	2300	2400	2500	2600	2700	2800	2900	3000	3100	3200	
Summary	Overall	Overall-010	2400	2500	2600	2700	2800	2900	3000	3100	3200	3300	
		Overall-011	2500	2600	2700	2800	2900	3000	3100	3200	3300	3400	
		Overall-012	2600	2700	2800	2900	3000	3100	3200	3300	3400	3500	
Summary	Overall	Overall-013	2700	2800	2900	3000	3100	3200	3300	3400	3500	3600	
		Overall-014	2800	2900	3000	3100	3200	3300	3400	3500	3600	3700	
		Overall-015	2900	3000	3100	3200	3300	3400	3500	3600	3700	3800	
Summary	Overall	Overall-016	3000	3100	3200	3300	3400	3500	3600	3700	3800	3900	
		Overall-017	3100	3200	3300	3400	3500	3600	3700	3800	3900	4000	
		Overall-018	3200	3300	3400	3500	3600	3700	3800	3900	4000	4100	
Summary	Overall	Overall-019	3300	3400	3500	3600	3700	3800	3900	4000	4100	4200	
		Overall-020	3400	3500	3600	3700	3800	3900	4000	4100	4200	4300	
		Overall-021	3500	3600	3700	3800	3900	4000	4100	4200	4300	4400	
Summary	Overall	Overall-022	3600	3700	3800	3900	4000	4100	4200	4300	4400	4500	
		Overall-023	3700	3800	3900	4000	4100	4200	4300	4400	4500	4600	
		Overall-024	3800	3900	4000	4100	4200	4300	4400	4500	4600	4700	
Summary	Overall	Overall-025	3900	4000	4100	4200	4300	4400	4500	4600	4700	4800	
		Overall-026	4000	4100	4200	4300	4400	4500	4600	4700	4800	4900	
		Overall-027	4100	4200	4300	4400	4500	4600	4700	4800	4900	5000	
Summary	Overall	Overall-028	4200	4300	4400	4500	4600	4700	4800	4900	5000	5100	
		Overall-029	4300	4400	4500	4600	4700	4800	4900	5000	5100	5200	
		Overall-030	4400	4500	4600	4700	4800	4900	5000	5100	5200	5300	
Summary	Overall	Overall-031	4500	4600	4700	4800	4900	5000	5100	5200	5300	5400	
		Overall-032	4600	4700	4800	4900	5000	5100	5200	5300	5400	5500	
		Overall-033	4700	4800	4900	5000	5100	5200	5300	5400	5500	5600	
Summary	Overall	Overall-034	4800	4900	5000	5100	5200	5300	5400	5500	5600	5700	
		Overall-035	4900	5000	5100	5200	5300	5400	5500	5600	5700	5800	
		Overall-036	5000	5100	5200	5300	5400	5500	5600	5700	5800	5900	
Summary	Overall	Overall-037	5100	5200	5300	5400	5500	5600	5700	5800	5900	6000	
		Overall-038	5200	5300	5400	5500	5600	5700	5800	5900	6000	6100	
		Overall-039	5300	5400	5500	5600	5700	5800	5900	6000	6100	6200	
Summary	Overall	Overall-040	5400	5500	5600	5700	5800	5900	6000	6100	6200	6300	
		Overall-041	5500	5600	5700	5800	5900	6000	6100	6200	6300	6400	
		Overall-042	5600	5700	5800	5900	6000	6100	6200	6300	6400	6500	
Summary	Overall	Overall-043	5700	5800	5900	6000	6100	6200	6300	6400	6500	6600	
		Overall-044	5800	5900	6000	6100	6200	6300	6400	6500	6600	6700	
		Overall-045	5900	6000	6100	6200	6300	6400	6500	6600	6700	6800	
Summary	Overall	Overall-046	6000	6100	6200	6300	6400	6500	6600	6700	6800	6900	
		Overall-047	6100	6200	6300	6400	6500	6600	6700	6800	6900	7000	
		Overall-048	6200	6300	6400	6500	6600	6700	6800	6900	7000	7100	
Summary	Overall	Overall-049	6300	6400	6500	6600	6700	6800	6900	7000	7100	7200	
		Overall-050	6400	6500	6600	6700	6800	6900	7000	7100	7200	7300	
		Overall-051	6500	6600	6700	6800	6900	7000	7100	7200	7300	7400	
Summary	Overall	Overall-052	6600	6700	6800	6900	7000	7100	7200	7300	7400	7500	
		Overall-053	6700	6800	6900	7000	7100	7200	7300	7400	7500	7600	
		Overall-054	6800	6900	7000	7100	7200	7300	7400	7500	7600	7700	
Summary	Overall	Overall-055	6900	7000	7100	7200	7300	7400	7500	7600	7700	7800	
		Overall-056	7000	7100	7200	7300	7400	7500	7600	7700	7800	7900	
		Overall-057	7100	7200	7300	7400	7500	7600	7700	7800	7900	8000	
Summary	Overall	Overall-058	7200	7300	7400	7500	7600	7700	7800	7900	8000	8100	
		Overall-059	7300	7400	7500	7600	7700	7800	7900	8000	8100	8200	
		Overall-060	7400	7500	7600	7700	7800	7900	8000	8100	8200	8300	
Summary	Overall	Overall-061	7500	7600	7700	7800	7900	8000	8100	8200	8300	8400	
		Overall-062	7600	7700	7800	7900	8000	8100	8200	8300	8400	8500	
		Overall-063	7700	7800	7900	8000	8100	8200	8300	8400	8500	8600	
Summary	Overall	Overall-064	7800	7900	8000	8100	8200	8300	8400	8500	8600	8700	
		Overall-065	7900	8000	8100	8200	8300	8400	8500	8600	8700	8800	
		Overall-066	8000	8100	8200	8300	8400	8500	8600	8700	8800	8900	
Summary	Overall	Overall-067	8100	8200	8300	8400	8500	8600	8700	8800	8900	9000	
		Overall-068	8200	8300	8400	8500	8600	8700	8800	8900	9000	9100	
		Overall-069	8300	8400	8500	8600	8700	8800	8900	9000	9100	9200	
Summary	Overall	Overall-070	8400	8500	8600	8700	8800	8900	9000	9100	9200	9300	
		Overall-071	8500	8600	8700	8800	8900	9000	9100	9200	9300	9400	
		Overall-072	8600	8700	8800	8900	9000	9100	9200	9300	9400	9500	
Summary	Overall	Overall-073	8700	8800	8900	9000	9100	9200	9300	9400	9500	9600	
		Overall-074	8800	8900	9000	9100	9200	9300	9400	9500	9600	9700	
		Overall-075	8900	9000	9100	9200	9300	9400	9500	9600	9700	9800	
Summary	Overall	Overall-076	9000	9100	9200	9300	9400	9500	9600	9700	9800	9900	
		Overall-077	9100	9200	9300	9400	9500	9600	9700	9800	9900	10000	
		Overall-078	9200	9300	9400	9500	9600	9700	9800	9900	10000	10100	
Summary	Overall	Overall-079	9300	9400	9500	9600	9700	9800	9900	10000	10100	10200	
		Overall-080	9400	9500	9600	9700	9800	9900	10000	10100	10200	10300	
		Overall-081	9500	9600	9700	9800	9900	10000	10100	10200	10300	10400	
Summary	Overall	Overall-082	9600	9700	9800	9900	10000	10100	10200	10300	10400	10500	
		Overall-083	9700	9800	9900	10000	10100	10200	10300	10400	10500	10600	
		Overall-084	9800	9900	10000	10100	10200	10300	10400	10500	10600	10700	
Summary	Overall	Overall-085	9900	10000	10100	10200	10300	10400	10500	10600	10700	10800	
		Overall-086	10000	10100	10200	10300	10400	10500	10600	10700	10800	10900	
		Overall-087	10100	10200	10300	10400	10500	10600	10700	10800	10900	11000	
Summary	Overall	Overall-088	10200	10300	10400	10500	10600	10700	10800	10900	11000	11100	
		Overall-089	10300	10400	10500	10600	10700	10800	10900	11000	11100	11200	
		Overall-090	10400	10500	10600	10700	10800	10900	11000	11100	11200	11300	
Summary	Overall	Overall-091	10500	10600	10700	10800	10900	11000	11100	11200	11300	11400	
		Overall-092	10600	10700	10800	10900	11000	11100	11200	11300	11400	11500	
		Overall-093	10700	10800	10900	11000	11100	11200	11300	11400	11500	11600	
Summary													

Understanding Hazards/Risks & Control



- **PRESENTATION**
 - General public will likely not understand statistics i.e., "acceptable risk" is 1E-06 or 1/1,000,000
 - Comments
 - Would you like it if your child was the 1,000,0001?
- **CONTROL**
 - State that risk can be reduced by.....
 - Control measures
 - Procedural changes
 - Management oversight
 - Additional training, etc.

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Community Preparation: Building Trust/Credibility



- Trust is earned **BEFORE** a crisis
- Build relationships **BEFORE** you need them!
- Factors that determine trust/credibility
 - Knowledge/expertise
 - Openness/honesty
 - Concern/care
- What to do?
 - Take action(s) that maintain trust.
 - Enables population to take appropriate actions.
 - Recognize uncertainty, avoid false hopes
 - Include public in decisions, actions
 - Ask more of people

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Transparency



- Explain decision-making process
- Be straightforward w/FACTS
- Maintain your confidence
 - Related to quality, authenticity and clarity of information.
- Limits to transparency
 - Balance rights vs information

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Consequences of Ambiguity?



- Rumors fill the information void
- Promotes protective (paranoid) behavior
- You can't hide mistakes indefinitely
-



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Communication w/Community/Stakeholders



- **Responsiveness/sensitivity to community concern may differ**
 - Company worst case scenario may not be same/relevant to public
 - CONCERNS:
 - Company XYZ: major fire/minor toxic gas release
 - Public A: child in road getting hit by truck during cleanup
 - Public B: recent death in family. Suspect contamination of air/water no matter how minor the release
- **What is the perception if the community is not included early?**
 - Not an open, caring process!
 - Distrust/skepticism!
 - Loss of credibility!



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Audience Concerns: Reconnaissance



- Is the public worried and in need of reassurance?
- Is the public too calm and in need of warning?
- Are they angry and in need of calming?
- Crisis + heightened public emotions + limited access to facts + rumor/gossip/speculation/assumption/inference = ?
 - Unstable information environment
 - Panic,
 - Bad decisions,
 - Danger,
 - Loss of credibility



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Recent Disaster Examples



Solar energy

12/14/15: NC town council rejected plans to rezone land for a solar farm as the town would have been completely surrounded by solar farms.

- Citizen allegations about the solar farm
 - Would "suck up all energy from sun" & businesses would not come to the town
 - Photosynthesis would be impaired (from former science teacher)
 - Cause cancer
- Solar panel company
 - "panels don't draw additional sunlight"
 - "no effect on property values"
 - "toxic substances would not be kept onsite"

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Flint MI



- **State financial emergency resulted switching water supply from Lake Huron (pay Detroit) to Flint River (free!)**
 - Sold 9-mile segment of pipeline
- **Flint River low pH, hi Fe**
 - Sent through to homes w/o anti-corrosive agent to prevent leaching of lead.
 - Anti-corrosive cost ~\$100/day
 - ~50% of homes in Flint have lead plumbing
- **Adults/children now have elevated lead levels (2-3x normal)**
- **State officials (MI Governor, DEQ, Dept. of Health & Human Services) denied water was unsafe**
 - "relax...no broad problem of lead" in Flint drinking water
 - Did not provide water for affected residents
- MDEQ
 - Ignored problem
 - Disparaged persons who produced test results.

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How Would You Approach It Differently?



USEPA Risk Communication Guidelines

1. **The public is an equal partner**
 - ▶ Build relationships BEFORE you need them
2. **Listen to your audience**
3. **Be honest**
4. **Coordinate/collaborate w/other credible sources**
5. **What are the needs of the media?**
6. **Speak clearly and simply.**
7. **Plan carefully and evaluate performance**



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Conclusion



- Risk communication is not a news release, poster or public relations
- Fundamental for development of risk communication strategy is understanding and analyzing real/perceived risk.
- If the public doesn't perceive a risk, they won't respond adequately to prevent it. The perception also can impede the response.
- Risk communication must include the public, the community, in their own languages and cultural norms.

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USEPA



Best risk communication

- participants are informed,
- process is fair,
- participants are free and able to solve whatever communication difficulties arise.

Ideally,

- 2-way conversation in which agency/organization informs, and is informed by, affected community members



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Laurie Gneiding, CEP
Associate Toxicologist/Project
Manager
Amec Foster Wheeler Environment
& Infrastructure

W +1 (732) 302-9500x125
C +1(732) 556-8018
E laurie.gneiding@amec.com

connected excellence in all we do

www.amecfw.com/reach
<https://www.linkedin.com/company/amecfw>
www.youtube.com/user/amecfw
<https://www.facebook.com/amecfw>

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