

# Regulatory Philosophy:

## Understanding Risk vs. Uncertainty



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# Technology-Based vs. Environmental-Based Regulatory Approaches

- **Technology-Based Regulation**
  - Best available technology economically achievable
  - Eliminate pollutant discharges
  - Consistent regulation across industry sector
- **Environmental-Based Regulation**
  - Protects the environment
  - Specific to the pollutant (organism)
  - Unique to location or operating area



# Technology-Based vs. Environmental-Based Regulatory Approaches

## Technology-Based

- Minimal consideration of environmental impact; assumes less is better
- Cost and feasibility are factors in the standard
- Broad applicability due to consistent factors and limited uncertainties

## Environmental-Based

- Focus is environmental results
- Cost and feasibility are not factors in the standard; only in implementation
- Narrow applicability due to varying factors and uncertainties

Which approach makes sense for ballast water?



# Ballast water regulation will require both approaches

## Examples:

- Technology-based - US Coast Guard Regulation and US Environmental Protection Agency VGP 1 (does it provide appropriate environmental protection?)
- Environment-based - State 401 Certification for VGP 1 (does it allow feasible implementation?)

We must recognize and address the uncertainties of both approaches!

# Terms and word choice matter!

- *"...there are known knowns; there are things we know we know. We also know there are known unknowns; that is to say we know there are some things we do not know. But there are also unknown unknowns—the ones we don't know we don't know."*—Donald Rumsfeld
- *"Ah, what a dusty answer gets the soul, When hot for certainties in this our life"*—George Meredith
- *"Intuitive Risk Evaluation is called fear."*—Anonymous

There are different definitions of "risk" for different applications; its widely inconsistent and ambiguous use creates conflict in efforts of "risk management."

# Terms: a simplified approach

- **Risk** has an unknown outcome, but we know what the underlying outcome distribution looks like.
- **Uncertainty** also implies an unknown outcome, but we don't know what the underlying distribution looks like.
- Knight & Keynes said: **objective probability is the basis for risk**, while **subjective probability underlies uncertainty** (based on subjectively-assigned expressions of beliefs).
- Intellectual honesty requires us to try and define "risk vs uncertainty," even though the debate is far from resolved over the appropriate use of these basic tools for decision making (When does an action truly "reduce risk" or provide "protection," and when does it just make us feel good.

