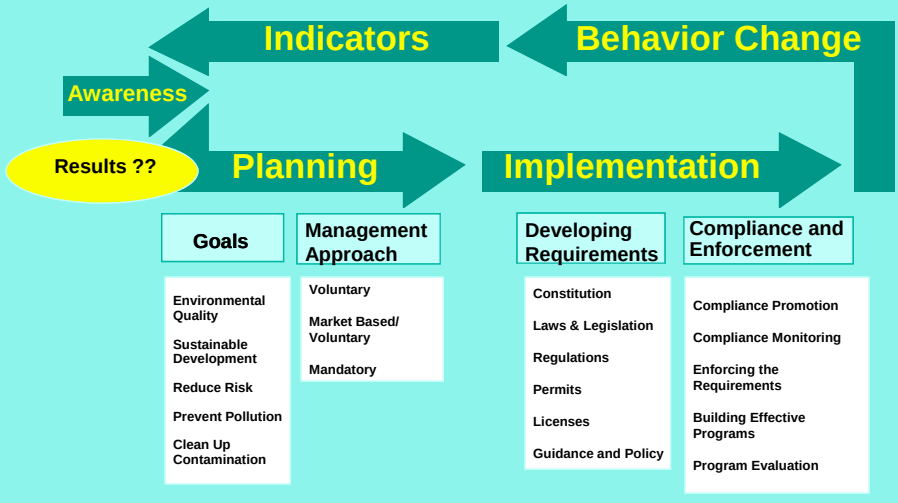
PRINCIPLES OF ENVIRONMENTAL ENFORCEMENT

AN OVERVIEW

- ORIGINS AND CONTEXT
- DEFINITIONS AND BASIS FOR COMPLIANCE AND ENFORCEMENT
- FRAMEWORK: STRATEGIES AND PROGRAM ELEMENTS
- BUILDING AN EFFECTIVE PROGRAM

ENVIRONMENTAL MANAGEMENT CYCLE



Mathematical Model for Deterrence

Enforcement Disincentive =

$$Pd \times Pa|d \times Pp|a \times Pc|p \times \text{Fine} \times e^{-rt}$$

Where:

- P = probability
- d = detection
- $a|d$ = arrest given detection
- $p|a$ = prosecution given arrest
- $c|p$ = conviction given prosecution
- e = a mathematical constant, the exponential function of 1
- r = interest rate
- t = time from detection to fi ne

Akella & Cannon, 2004

Illegal Blast Fishing in Philippines

Enforcement Disincentive =

$$0.062 \times 0.003 \times 0.85 \times 0.62 \times 0.24 \times \$4{,}463 \times e^{-r\,210} = \$0.09$$

PROFIT = $70.57

Where:

- Probability Detection = 0.062
- Probability Arrest given Detection = 0.003
- Probability of Filing given Arrest = 0.85
- Probability Prosecution given Filing = 0.62
- Probability of Conviction given Prosecution = 0.24
- Average Penalty = $4,463.32
- e = a mathematical constant, the exponential function of 1
- r = interest rate
- Time from detection to fine = 210

Akella & Cannon, 2004

BASIS FOR COMPLIANCE AND ENFORCEMENT

COMPLIANCE AND ENFORCEMENT DEFINED

COMPLIANCE :

GOAL OF MEETING ENVIRONMENTAL REQUIREMENTS IN STANDARDS, REGULATIONS, PERMITS

ENFORCEMENT:

ACTIONS TO ENCOURAGE OR COMPEL COMPLIANCE

Inspections and Investigations (Compliance Monitoring)
Legal Sanction (Enforcement Response)
Negotiation
.....Plus Incentives and Assistance (Compliance Promotion)

BASIS FOR COMPLIANCE AND ENFORCEMENT

FACTORS AFFECTING COMPLIANCE

DETERRENCE THEORY

CREDIBLE LIKELIHOOD OF DETECTION
SWIFT AND SURE RESPONSE
APPROPRIATE SANCTION
PERCEPTION OF THE FIRST THREE ELEMENTS

ECONOMIC THEORY

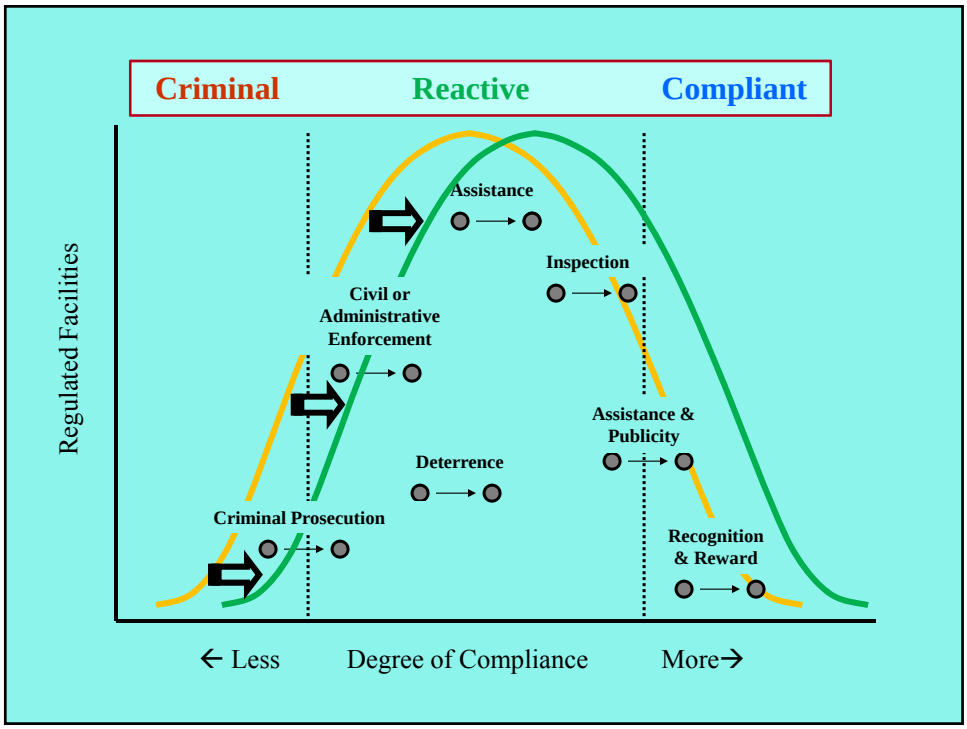
BEHAVIOR THEORY

SOCIAL FACTORS
PSYCHOLOGICAL FACTORS
KNOWLEDGE AND TECHNICAL FACTORS
ORGANIZATIONAL BEHAVIOR

ELEMENTS OF A COMPLIANCE STRATEGY/ ENFORCEMENT PROGRAM

FRAMEWORK:

- CREATING ENFORCEABLE REQUIREMENTS
- ESTABLISHING PROGRAM PRIORITIES
- COMPLIANCE PROMOTION
- COMPLIANCE MONITORING
- ENFORCEMENT RESPONSE TO VIOLATIONS
- CLARIFYING ROLES AND RESPONSIBILITIES
- MANAGEMENT ACCOUNTABILITY AND EVALUATION



ELEMENTS OF COMPLIANCE AND ENFORCEMENT STRATEGIES

COMPLIANCE PROMOTION

- **PROVIDING EDUCATION AND TECHNICAL ASSISTANCE**

TYPE OF INFORMATION:	*WAYS TO PROVIDE INFORMATION:*
Who is Subject to Requirement What is Required and Why What Changes are Necessary What are the Consequences of Not Complying	Publications, Hot Lines Training, Conferences Universities Trade and Professional Associations

- **BUILDING PUBLIC SUPPORT**
- **PUBLICIZING SUCCESS STORIES**
- **CREATIVE FINANCING ARRANGEMENTS**
- **PROVIDING ECONOMIC INCENTIVES**
- **BUILDING ENVIRONMENTAL MANAGEMENT CAPABILITY**

Need for Effective Targeting

- Over 800,000 regulated facilities with very limited inspection resources
- Random inspections not efficient means to find violations
- Must dedicate inspections to most problematic sources that present greatest risks to community

We Must Understand Universe

- Facility Information
  - ➢Permit / license data
- Population statistics
  - ➢Census data
- Pollution / Emission data
  - ➢Pollutant Release and Toxics Registry (TRI)
- Compliance history / potential for violation
  - ➢Inspection reports / self monitoring
- Environmental conditions
  - ➢Ambient monitoring

How to Access ECHO

Visit ECHO online
http://www.epa.gov/echo

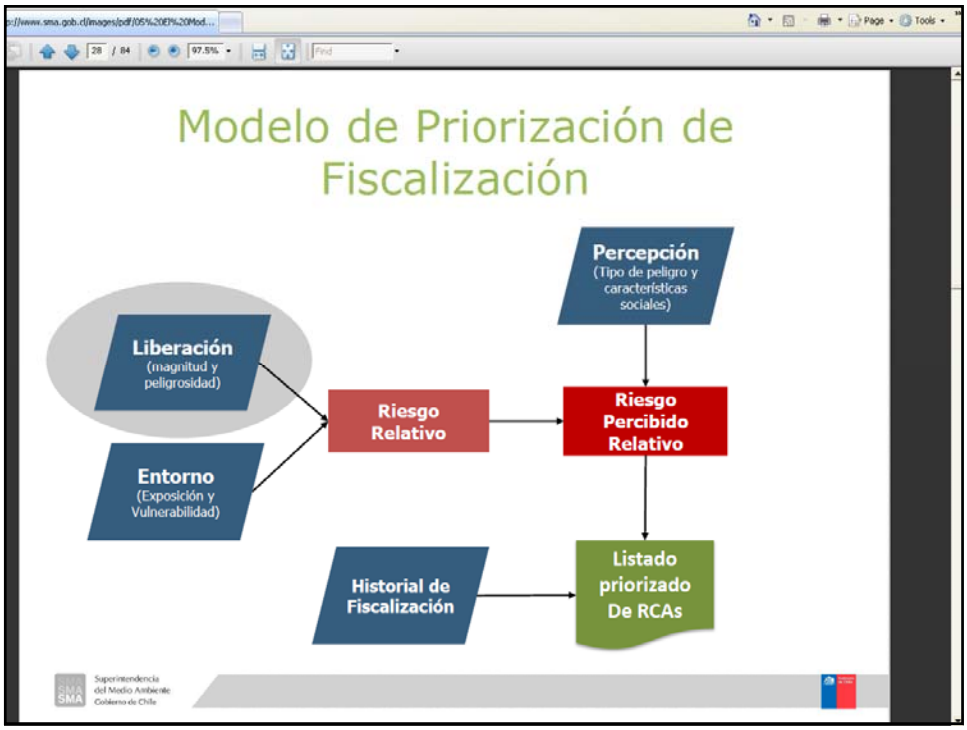
EPA Compliance and Enforcement Program

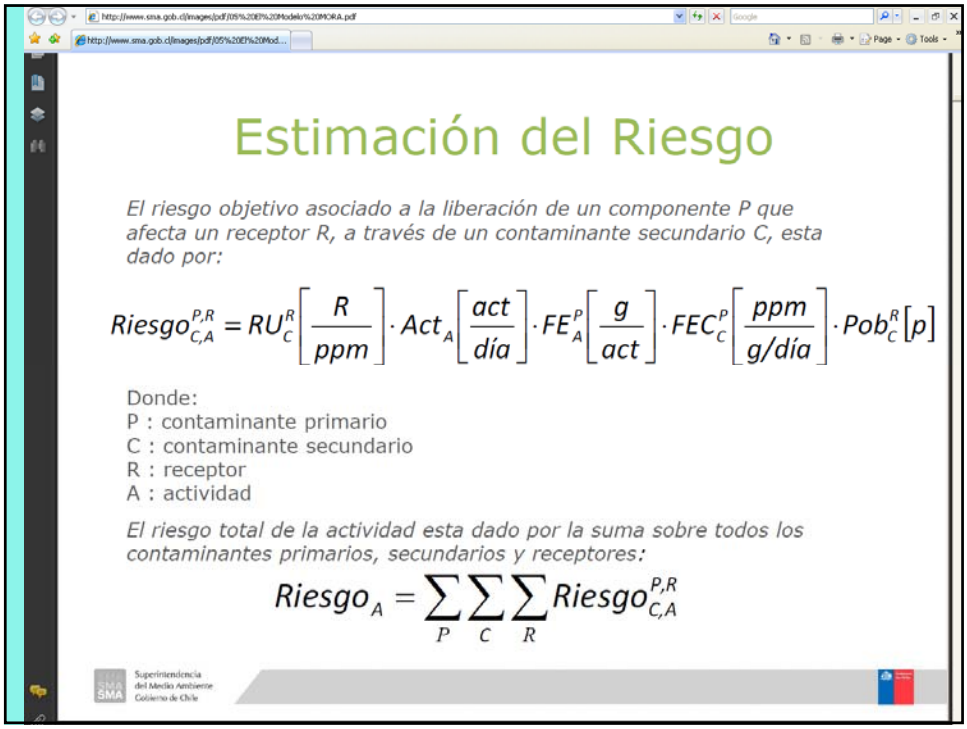
www.epa.gov/compliance

"Law without enforcement is only good advice."
Abraham Lincoln

The following pages traces an ECHO search

1. ECHO Home Page: “Search for Facilities,” “All Data”
2. Search query for facilities in Significant Non Compliance in Houston, Texas
3. 38 facilities found and mapped
4. Detailed Facility Report for “Houston Refining” facility with significant violations in 5 environmental statues and $800,000 in penalties over past 5 years.
5. Map / Arial photograph of the facility





Estimación del Riesgo

El riesgo objetivo asociado a la liberación de un componente P que afecta un receptor R, a través de un contaminante secundario C, esta dado por:

$$Riesgo_{C,A}^{P,R} = RU_C^R\left[\frac{R}{ppm}\right] \cdot Act_A\left[\frac{act}{día}\right] \cdot FE_A^P\left[\frac{g}{act}\right] \cdot FEC_C^P\left[\frac{ppm}{g/día}\right] \cdot Pob_C^R[p]$$

Donde:
P : contaminante primario
C : contaminante secundario
R : receptor
A : actividad

El riesgo total de la actividad esta dado por la suma sobre todos los contaminantes primarios, secundarios y receptores:

$$Riesgo_A = \sum_P \sum_C \sum_R Riesgo_{C,A}^{P,R}$$

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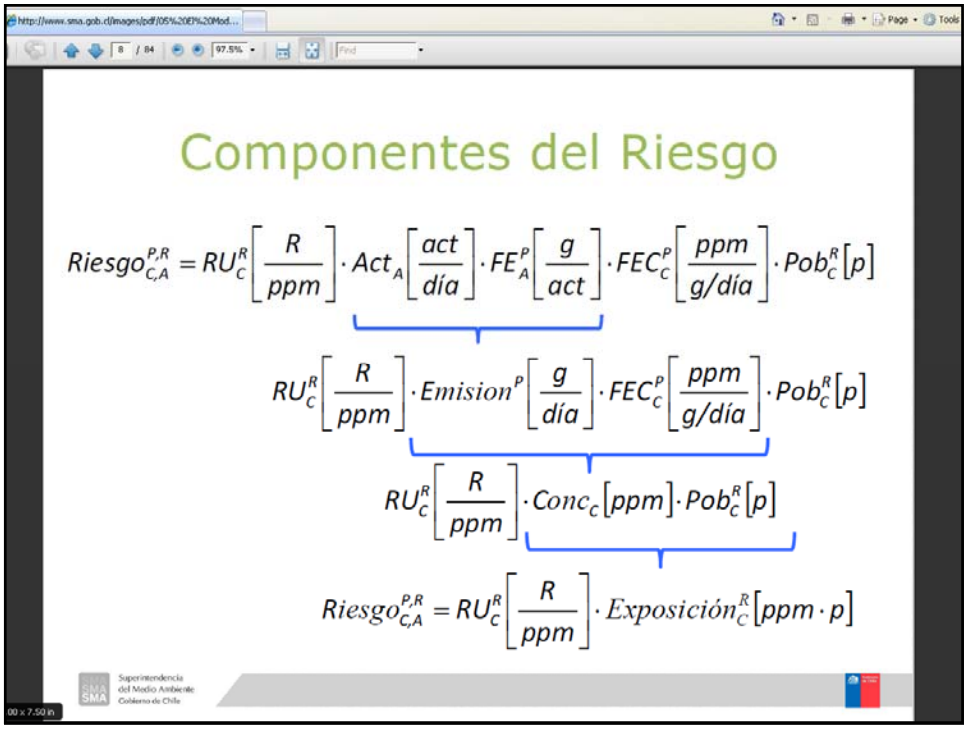

Componentes del Riesgo

$$Riesgo_{C,A}^{P,R} = RU_C^R\left[\frac{R}{ppm}\right] \cdot Act_A\left[\frac{act}{día}\right] \cdot FE_A^P\left[\frac{g}{act}\right] \cdot FEC_C^P\left[\frac{ppm}{g/día}\right] \cdot Pob_C^R[p]$$

$$RU_C^R\left[\frac{R}{ppm}\right] \cdot Emision^P\left[\frac{g}{día}\right] \cdot FEC_C^P\left[\frac{ppm}{g/día}\right] \cdot Pob_C^R[p]$$

$$RU_C^R\left[\frac{R}{ppm}\right] \cdot Conc_C[ppm] \cdot Pob_C^R[p]$$

$$Riesgo_{C,A}^{P,R} = RU_C^R\left[\frac{R}{ppm}\right] \cdot Exposición_C^R[ppm \cdot p]$$

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ELEMENTS OF COMPLIANCE AND ENFORCEMENT STRATEGIES

COMPLIANCE MONITORING

- **PURPOSES:**

  Detect Violations
  Support Source Compliance
  Evidence for Enforcement Response
  Compliance Statistics

- **SOURCES:**

  Self-Monitoring
  Inspections
  Citizen Complaints, Area Monitoring

- **STRATEGY ISSUES:**

  Extent of Self-Monitoring
  Inspection Targeting, Frequency, Announced VS. Unannounced,
  Single VS. Multi-Media, Training
  Access to Information

ELEMENTS OF COMPLIANCE AND ENFORCEMENT STRATEGIES

ENFORCEMENT RESPONSE TO VIOLATIONS

- **RANGE OF ENFORCEMENT RESPONSES: TYPES OF AUTHORITY**

REMEDIAL ACTION:

Impose Compliance Schedule
Shut Down Facility
Deny or Revoke Permit
Require Environmental Cleanup
Enter and Correct Immediate Dangers
Seek Compensation for Damages

INFORMATION GATHERING:

Require Testing, Monitoring, Reporting
Impose Labeling Requirements
Require an Environmental Audit

SANCTIONS AND CONSEQUENCES:

Impose Monetary Penalty
Seek Imprisonment -- Jail Terms
Seize Property
Bar from Government Loans, Guarantees, Etc.
Seek Reimbursement for Government Clean Up
Require Service or Community Work
Supplemental Environmental Projects

ELEMENTS OF COMPLIANCE AND ENFORCEMENT STRATEGIES

ENFORCEMENT RESPONSE TO VIOLATIONS

- **ENFORCEMENT RESPONSE AND PENALTY POLICIES:**

PRINCIPLES:

Escalation and Follow Through
Timely and Appropriate Response
Fair, Consistent Application

ISSUES:

Civil vs. Criminal Enforcement
Circumstances for Sanctions
First Response
Type of Sanctions

- **ENFORCEMENT PROCESS**

TYPES OF MECHANISMS

Informal and Formal
Civil and Criminal
Administrative and Judicial

SUPPORTING THE ENFORCEMENT CASE

Proof
Fair Application of Policies

PROTECTING BASIC RIGHTS

Notice
Appeals
Dispute Resolution

Factors Governing **Civil** Penalties

- Economic benefit derived from violation
- Gravity of violation
  - Harm, both actual and potential
  - Importance to regulatory scheme
  - Prior compliance history of the facility
  - Degree of willfulness and/or negligence
  - Degree of cooperation
- Ability to pay
- Other factors as justice may require

Calculating Economic Benefit

- Three major types of economic benefit
  - Benefit from delayed costs (e.g. install the equipment 2 years late)
  - Benefit from avoided costs (e.g. skipping all the operation and maintenance expense on that equipment for those two years)
  - Benefit from an illegal competitive advantage (e.g. selling banned pesticides to pesticide applicators on the black market)

The BEN Model

- BEN calculates the economic benefit of noncompliance with pollution control requirements, based on generally accepted financial principles.
- The model does not calculate required expenditures; engineers and operators determine costs to comply as inputs.

Ability to Pay Models

- Most violators claim they cannot afford the compliance costs, clean up costs and penalties
- EPA uses three computer models to evaluate claims of inability to pay
  - ABEL: corporations and partnerships
  - INDIPAY: individuals
  - MUNIPAY: municipalities

$$Multa = B + \left[(\alpha * i) * (1 + \mathrm{A}) + Ca\right] * Cs$$

Donde:

B:	*Beneficio ilícito*
α:	*Factor de temporalidad*
i:	*Grado de afectación ambiental y/o evaluación del riesgo*
A:	*Circunstancias agravantes y atenuantes*
Ca:	*Costos asociados*
Cs:	*Capacidad socioeconómica del infractor.*

Cada una de las variables representa las condiciones que como mínimo, se deben tener en cuenta para el cálculo de la multa. Sin embargo, como producto de la infracción a las normas ambientales, se pueden presentar dos tipos de situaciones:

- *Infracción que se concreta en **afectación ambiental***
- *Infracción que no se concreta en afectación pero que genera un **riesgo***

La aplicación de la fórmula permite considerar una o ambas situaciones, evaluando cada una de las variables que permitan estimar la importancia de la afectación o el riesgo (también denominado nivel de afectación potencial).

Supplemental Environmental Projects (SEP)

A SEP is an environmentally beneficial project that:

- offsets part of penalty in consideration of project costs
- must go beyond compliance (is in addition to activities needed to achieve compliance)
- Is voluntary with the violator (violators can choose to do a SEP or not)

MONETARY PENALTY WORKSHEET

Economic Benefit (Money the facility saved by not complying with the requirements)

Cost Avoided		_____ (a)
Cost Postponed		_____ (b)
Cost Postponed saved	(b) X 0.5% per month	_____ (c)
Total money facility saved	(a) + (c)	_____ (d)

Gravity (Punitive part of penalty)

		EXTENT OF DEVIATION FROM REQUIREMENT	
		HIGH	LOW
POTENTIAL FOR HARM	HIGH	_____	_____
	LOW	_____	_____

Seriousness of violation	(from matrix above)	_____ (e)
Number of days of violation		_____ (f)
Penalty portion for Gravity	(e) X (f)	_____ (g)

Total unadjusted penalty

Economic benefit plus Gravity	(d) + (g)	_____ (h)

Penalty Adjustment Factors (+ or -)

Degree of cooperation	high (up to -20%) low (up to +20%)	_____% (i)
History of Compliance	good (up to -20%) poor (up to +20%)	_____% (j)
Ability to pay(-100% to 0%)		_____% (k)
Total percent adjustment	[(i) + (j) + (k) + 100]/100 If negative enter "0"	_____ (l)
TOTAL PENALY	(h) X (l)	_____