California Waste Classification Workshop

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CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

Waste Classification Workshop

- How are wastes classified in California?
  - Hazardous vs. Non-hazardous
    - California System (DTSC)
    - Federal System (RCRA)
  - Water Board System
    - Impact of Water Quality Standards
- How does waste classification affect waste management decisions?
- How is waste classification different for mining wastes?

California's Waste Classification System

Not Just Hazardous
or Non-Hazardous

Water Board Authority Over Discharges of Waste to Land

California Water Code §13172

"To ensure adequate protection of water quality . . . the state board shall do all of the following:

a) **Classify wastes** according to the risk of impairment to water quality . . .

b) **Classify types of disposal sites** according to the level of protection provided for water quality…

c) Adopt standards and regulations to implement . . .

d) Adopt standards and regulations for hazardous waste disposal sites which apply and ensure compliance with all applicable groundwater protection and monitoring requirements . . ."

Water Board Regulations Governing Waste Discharge to Land

- California Code of Regulations (CCR), **Title 27**, Division 2, Subdivision 1 Consolidated Regulations for Treatment, Storage, Processing, or Disposal of Solid Waste
  - combined with solid waste regulations of the Integrated Waste Management Board

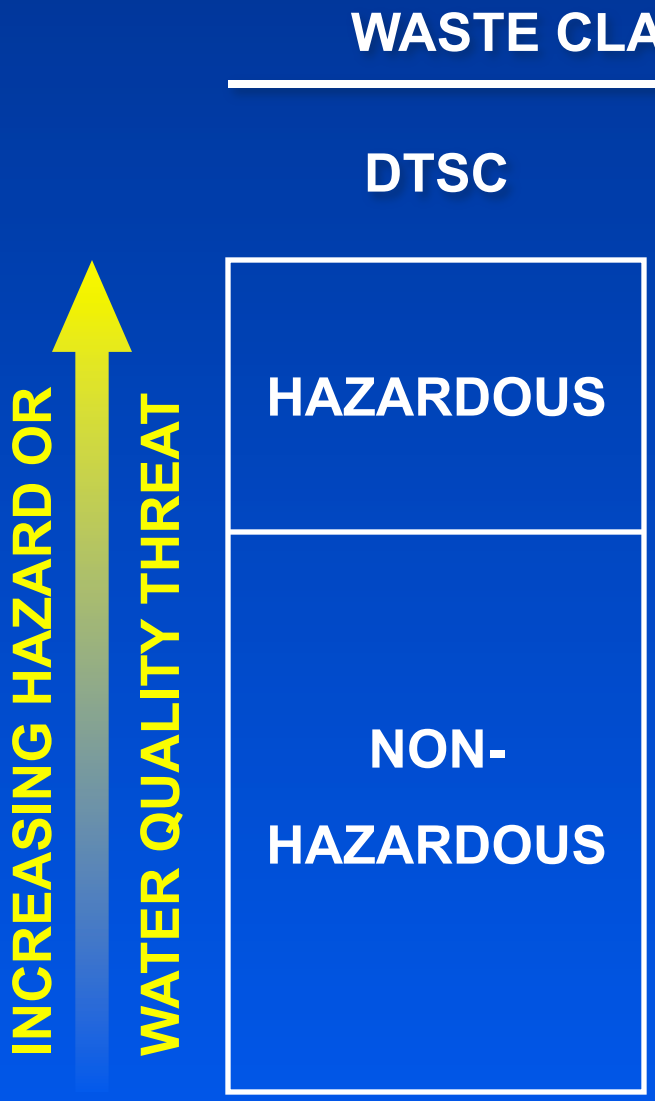
Water Board Regulations Governing Waste Discharge to Land

- CCR, Title 23, Division 3, **Chapter 15** Discharges of Hazardous Waste to Land
  - Regulations for Hazardous Waste Facilities
  - Cleanup Provisions Required by SWRCB Resolution No. 92-49

Waste Classes & Site Classes

- Hazardous Waste → Class I Unit
- Designated Waste → Class II Unit
- Nonhazardous Solid Waste → Class III Landfill
- Inert Waste → Unclassified Unit

California Waste and Unit Classifications



California Waste and Unit Classifications

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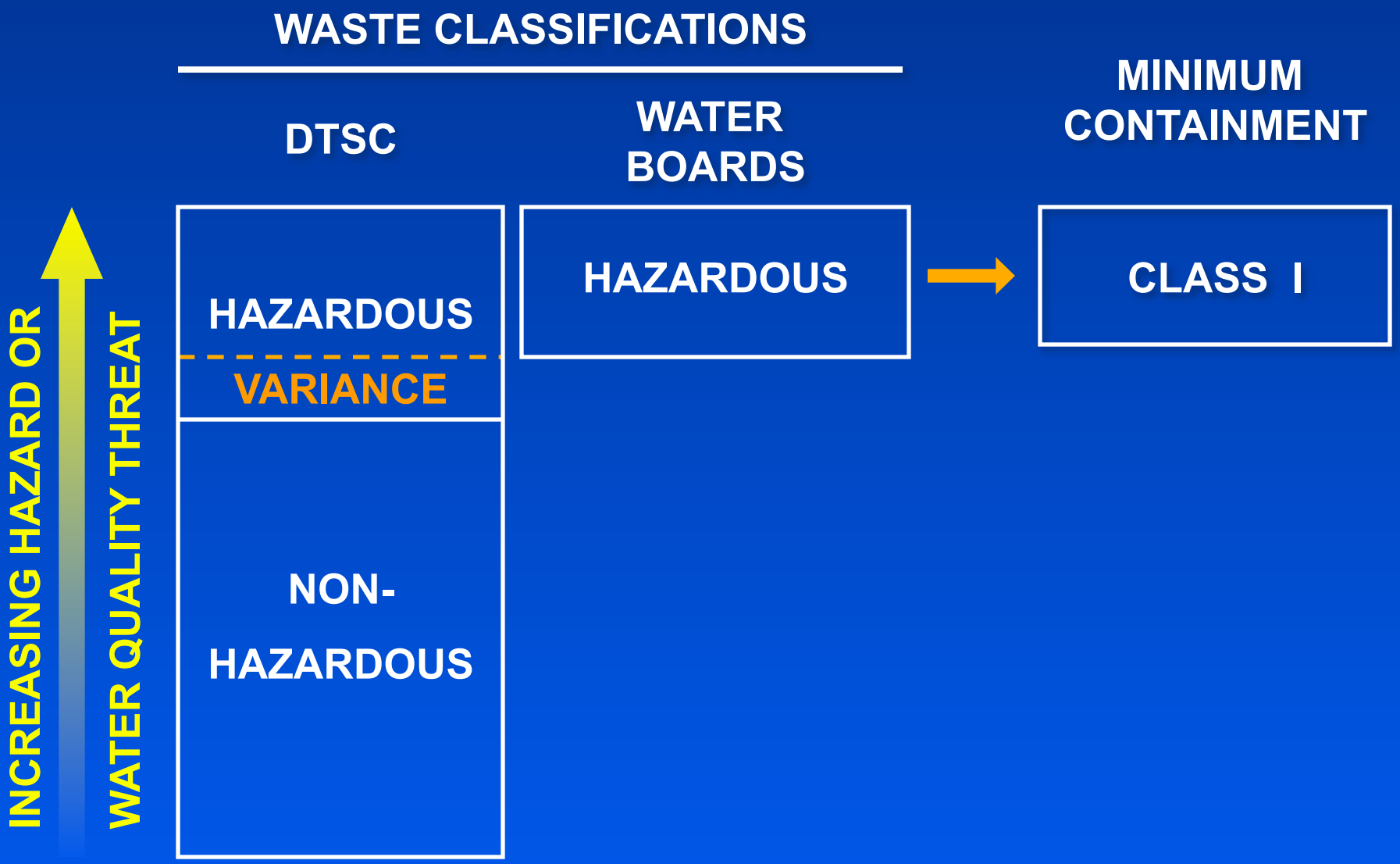

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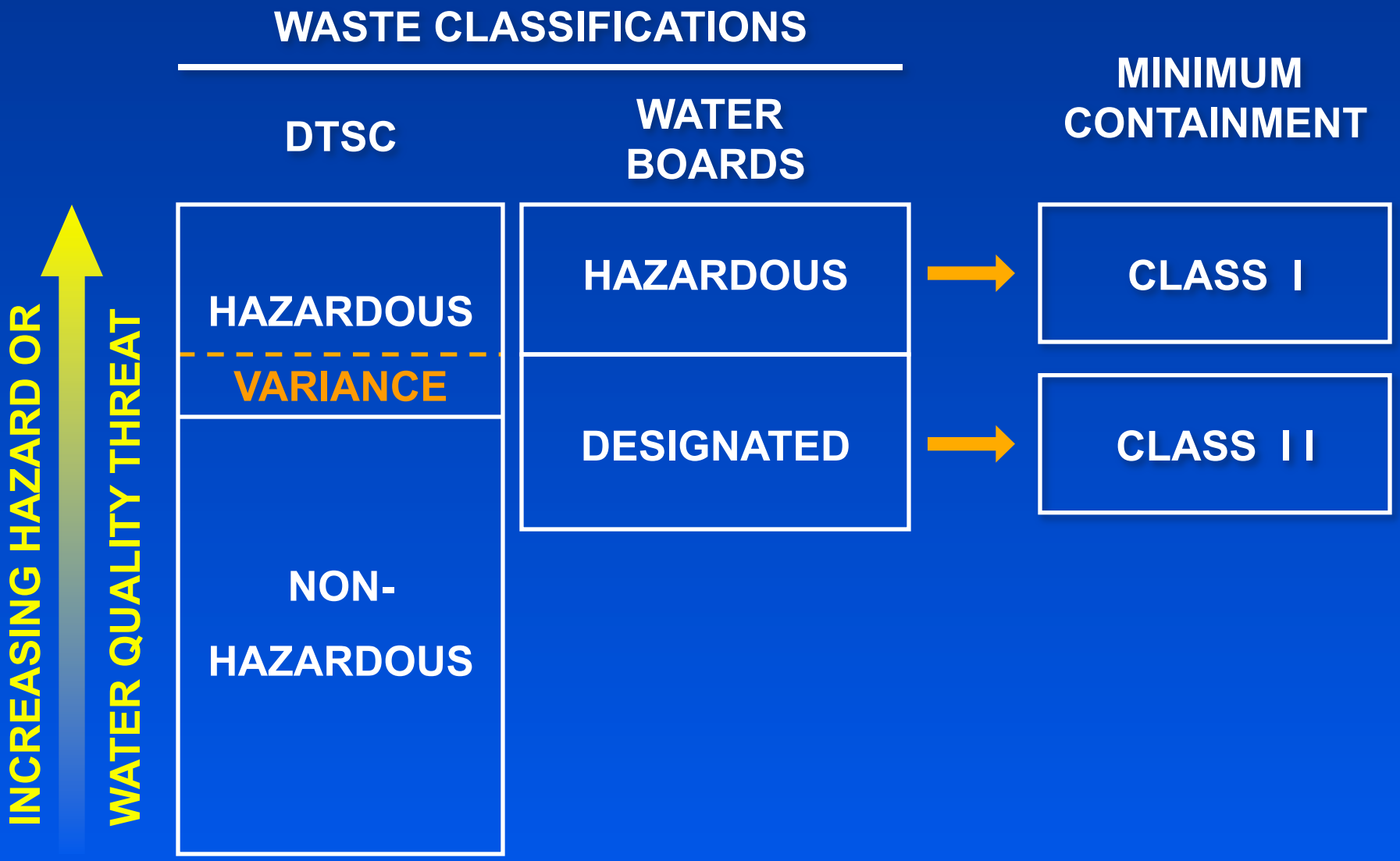

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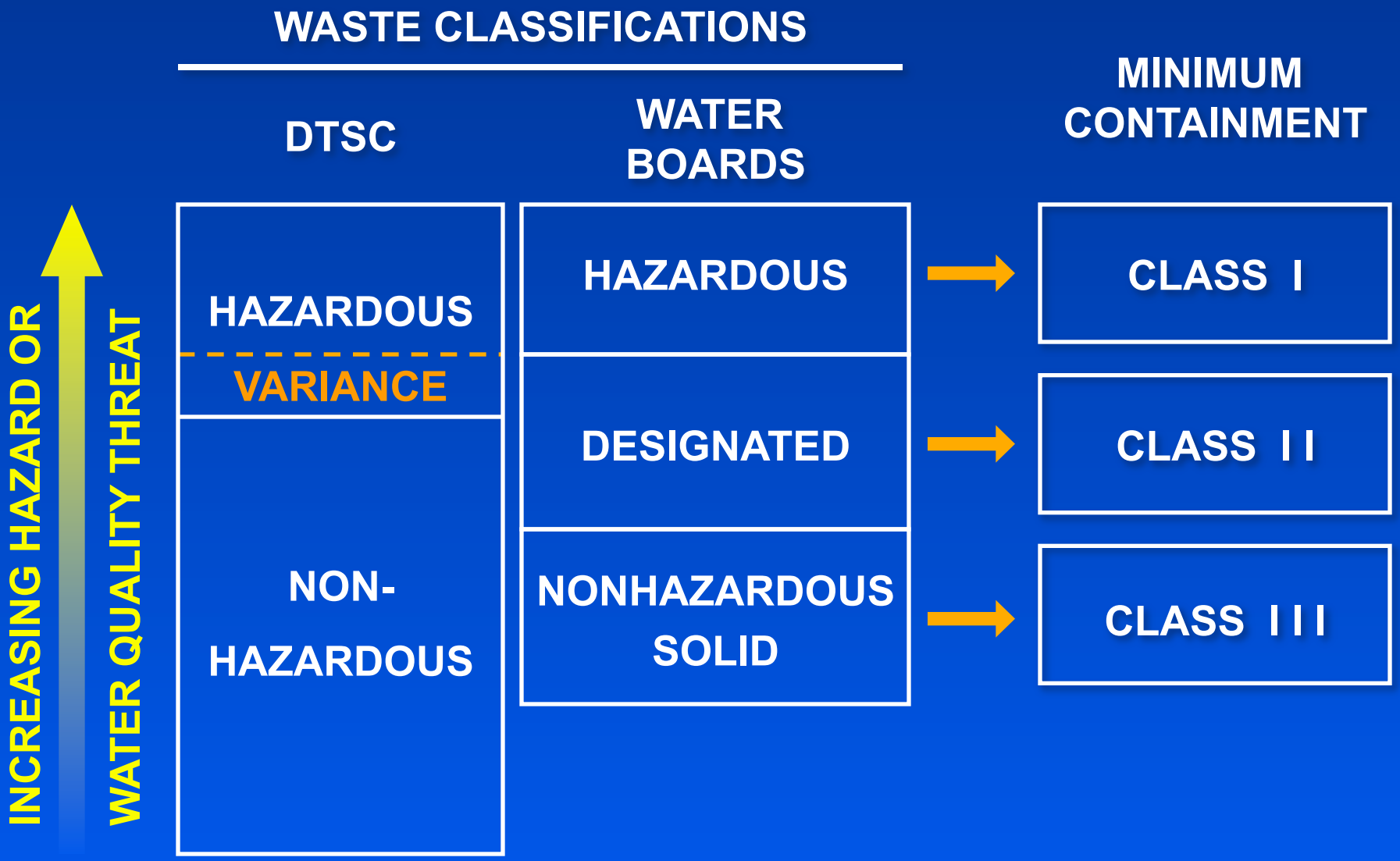

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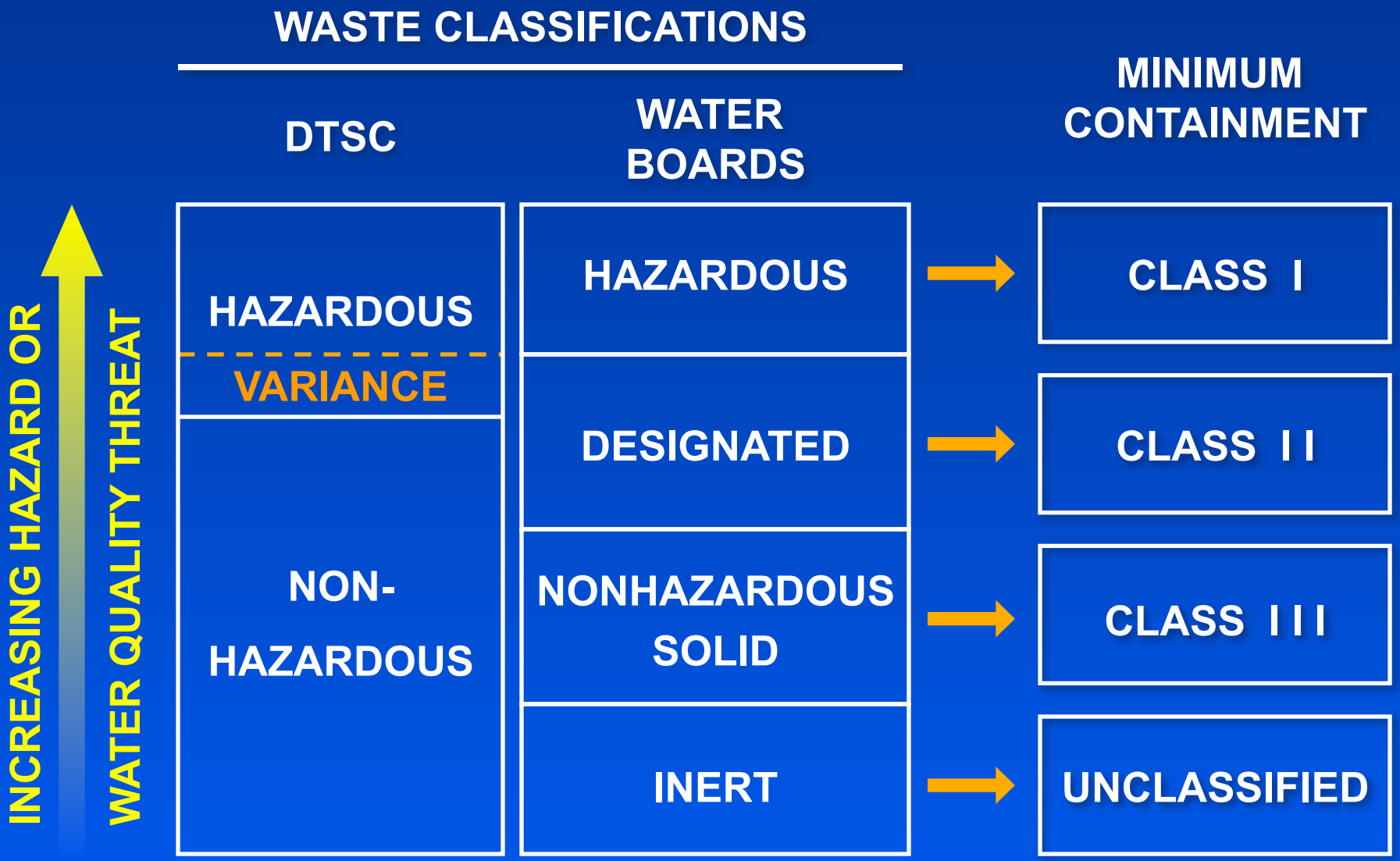
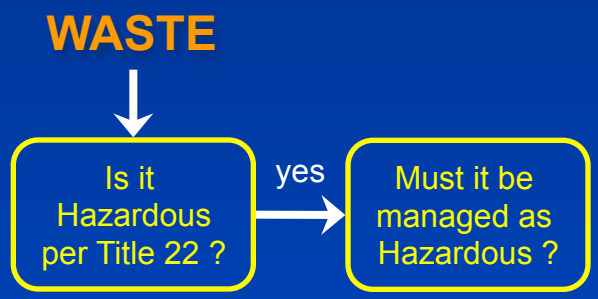


Waste Classifications and Disposal Options

DTSC Decisions

Water Board Decisions



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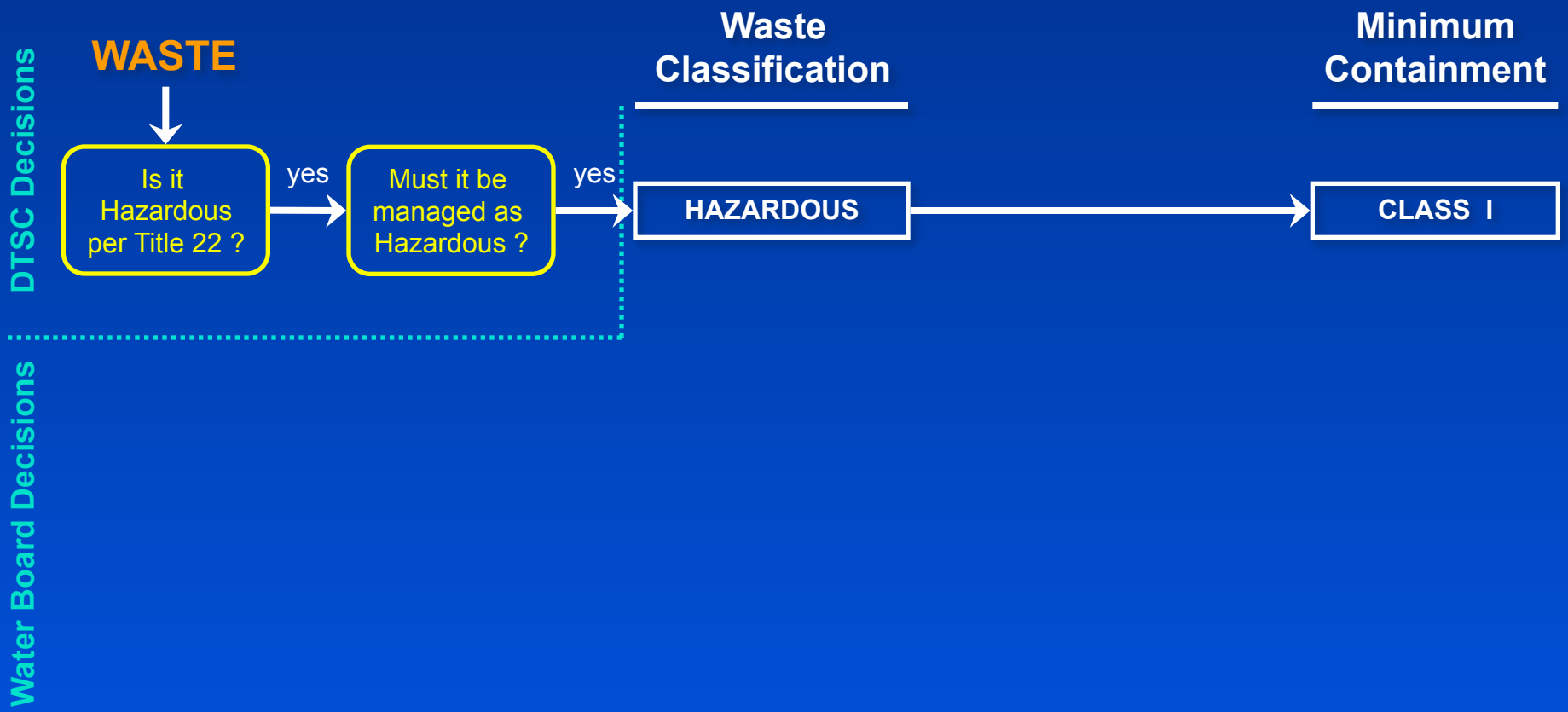

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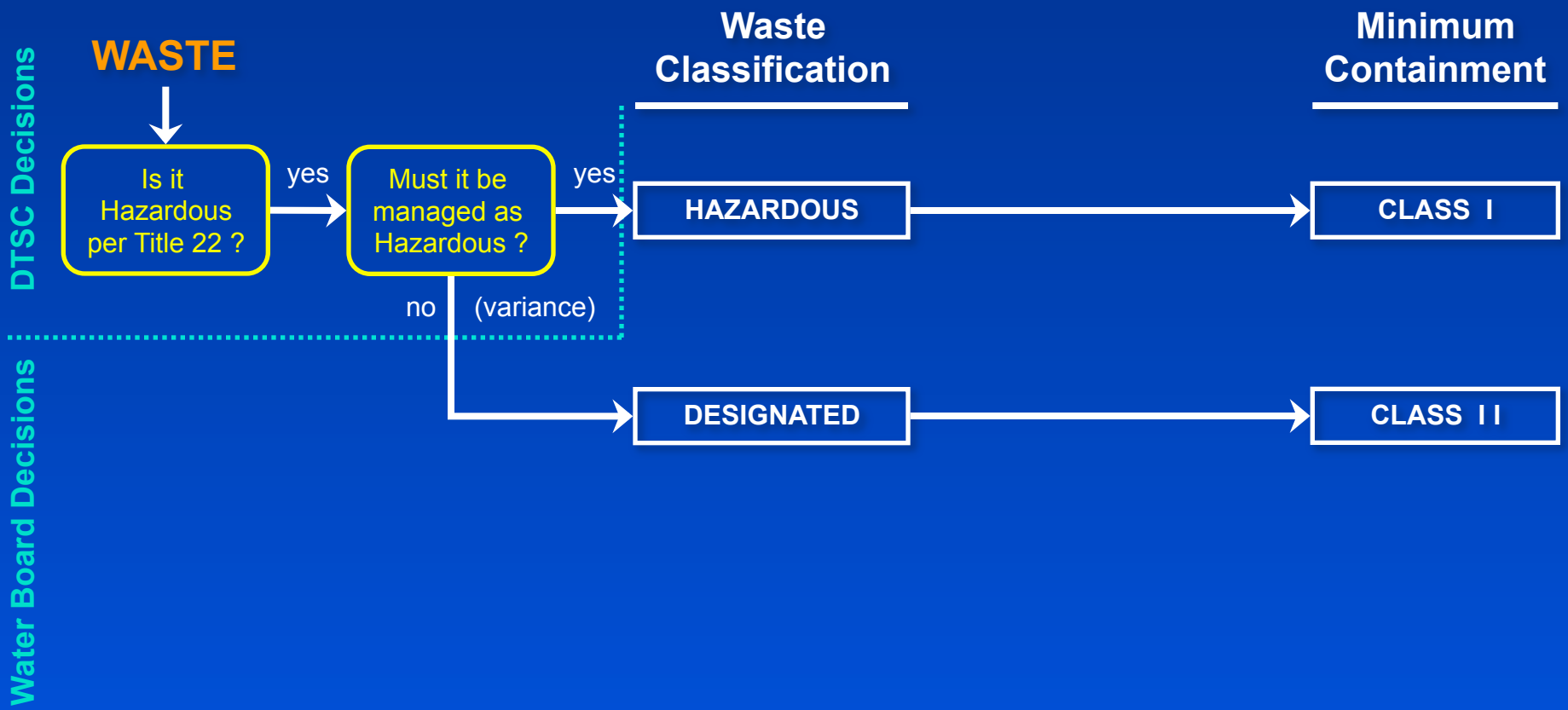

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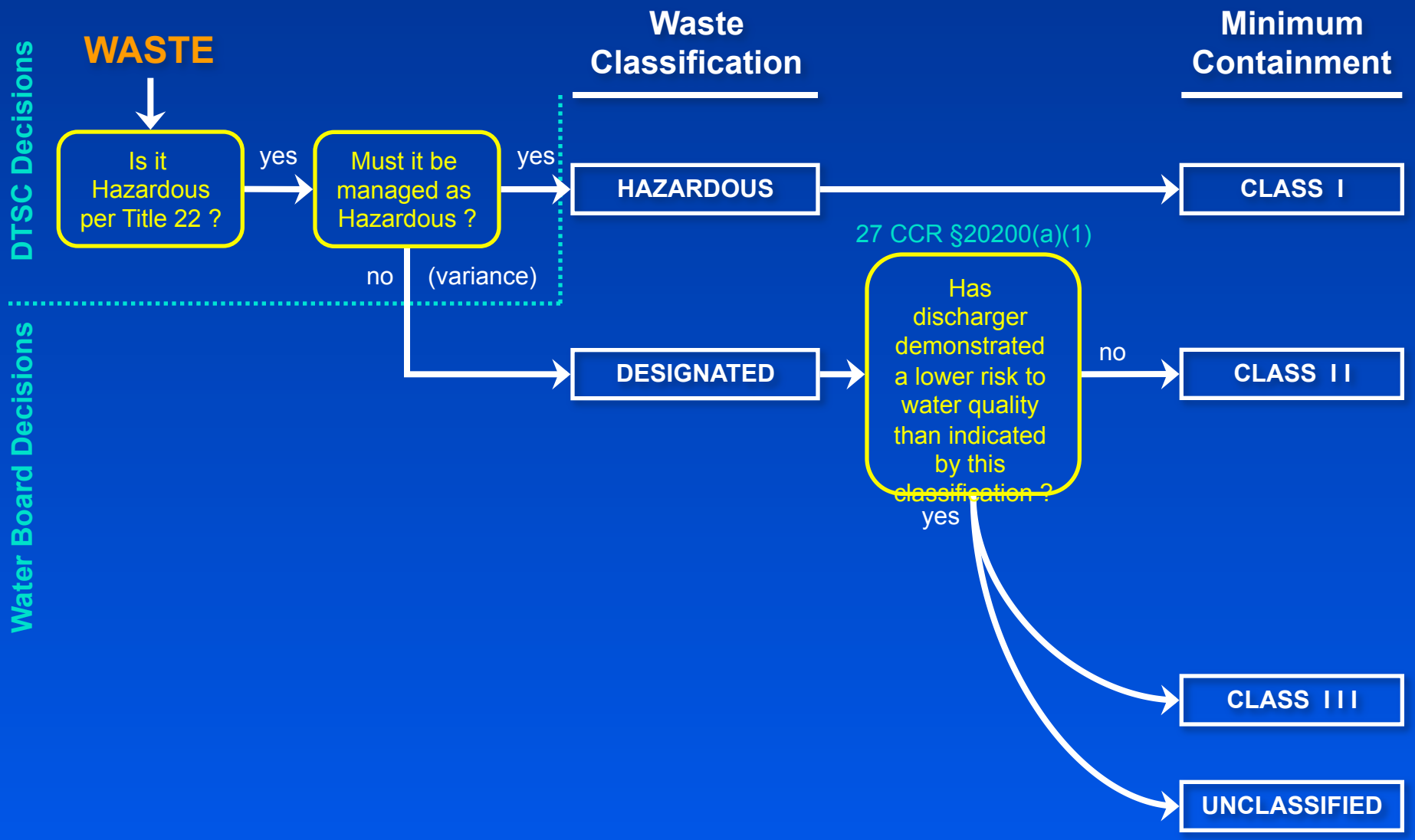

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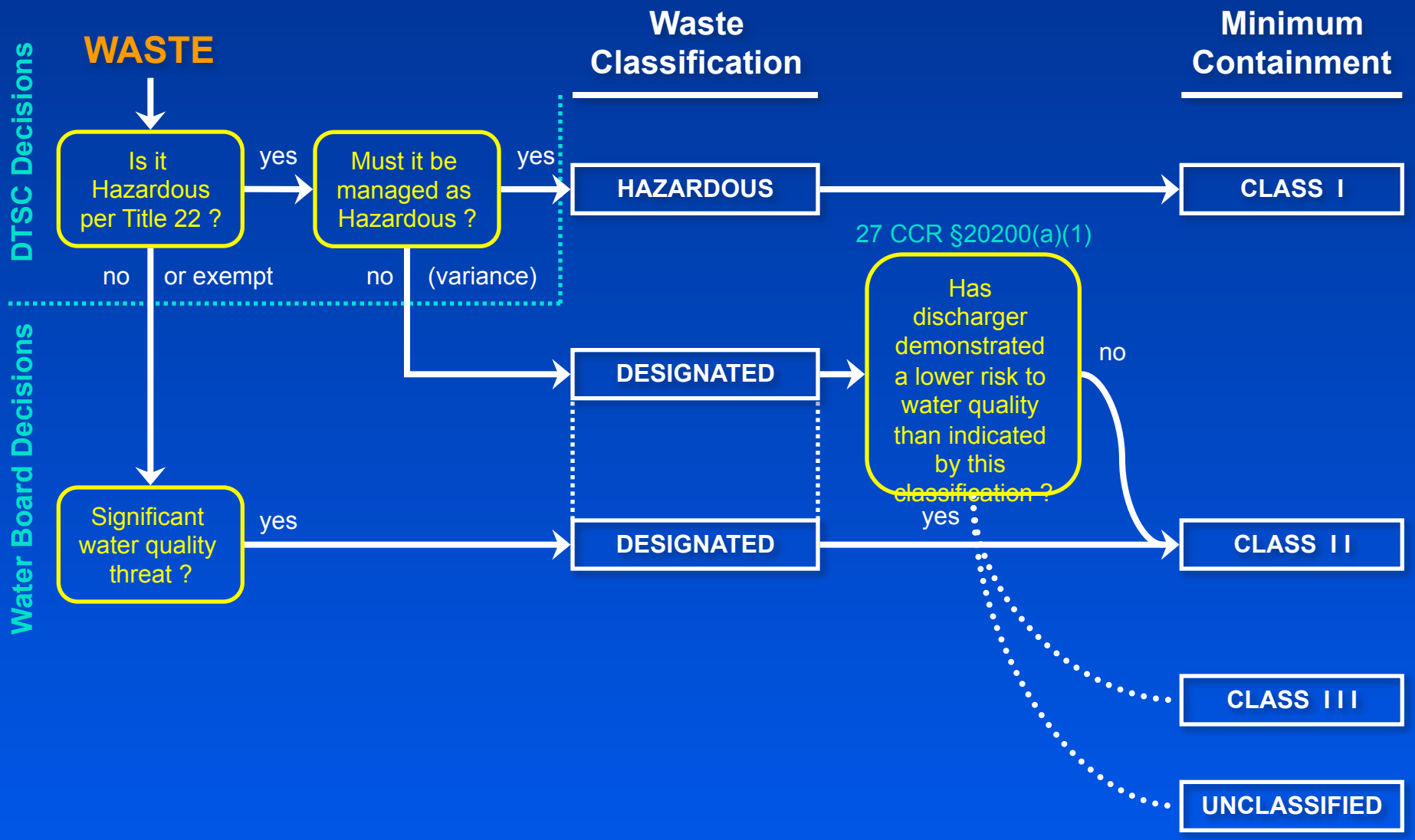

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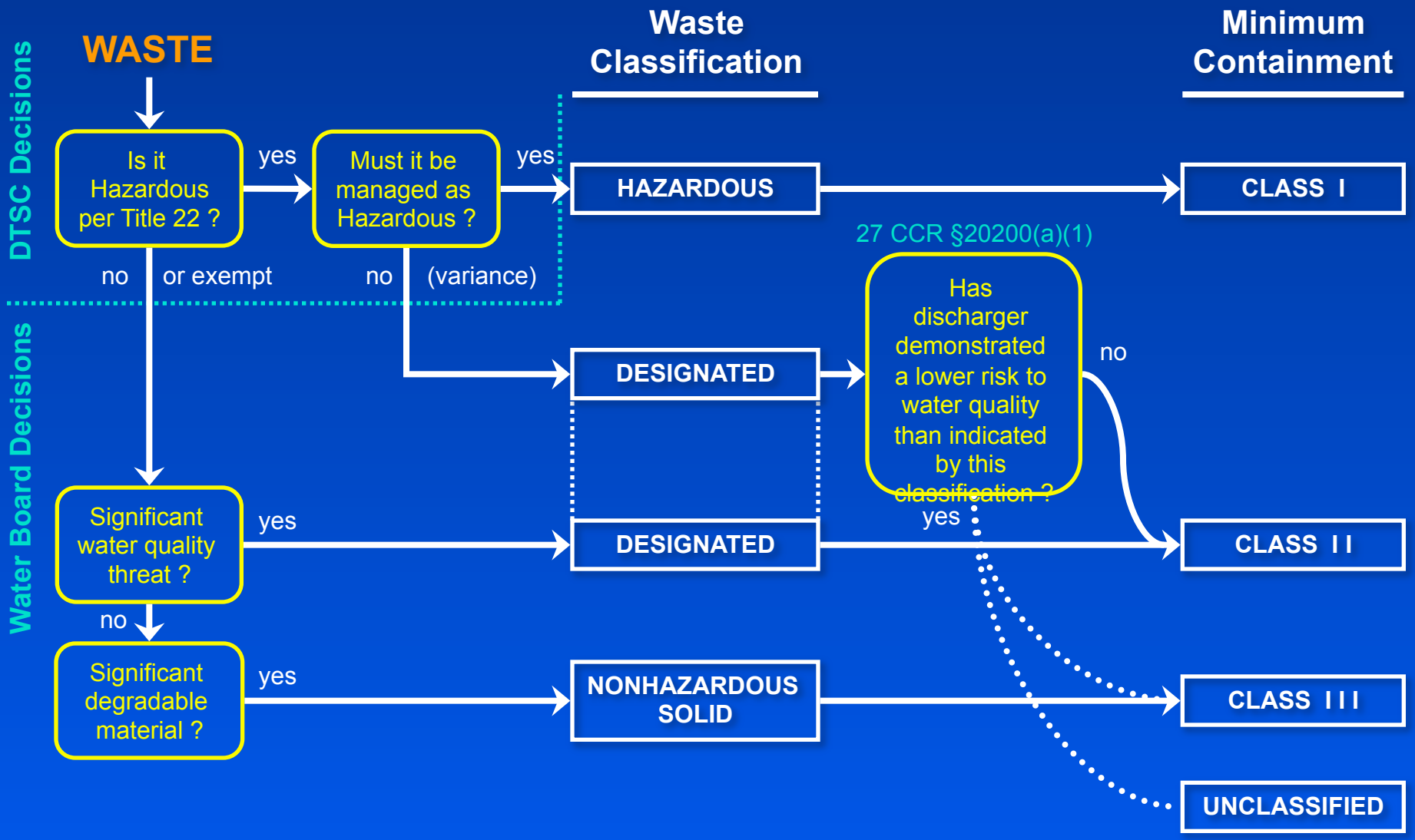

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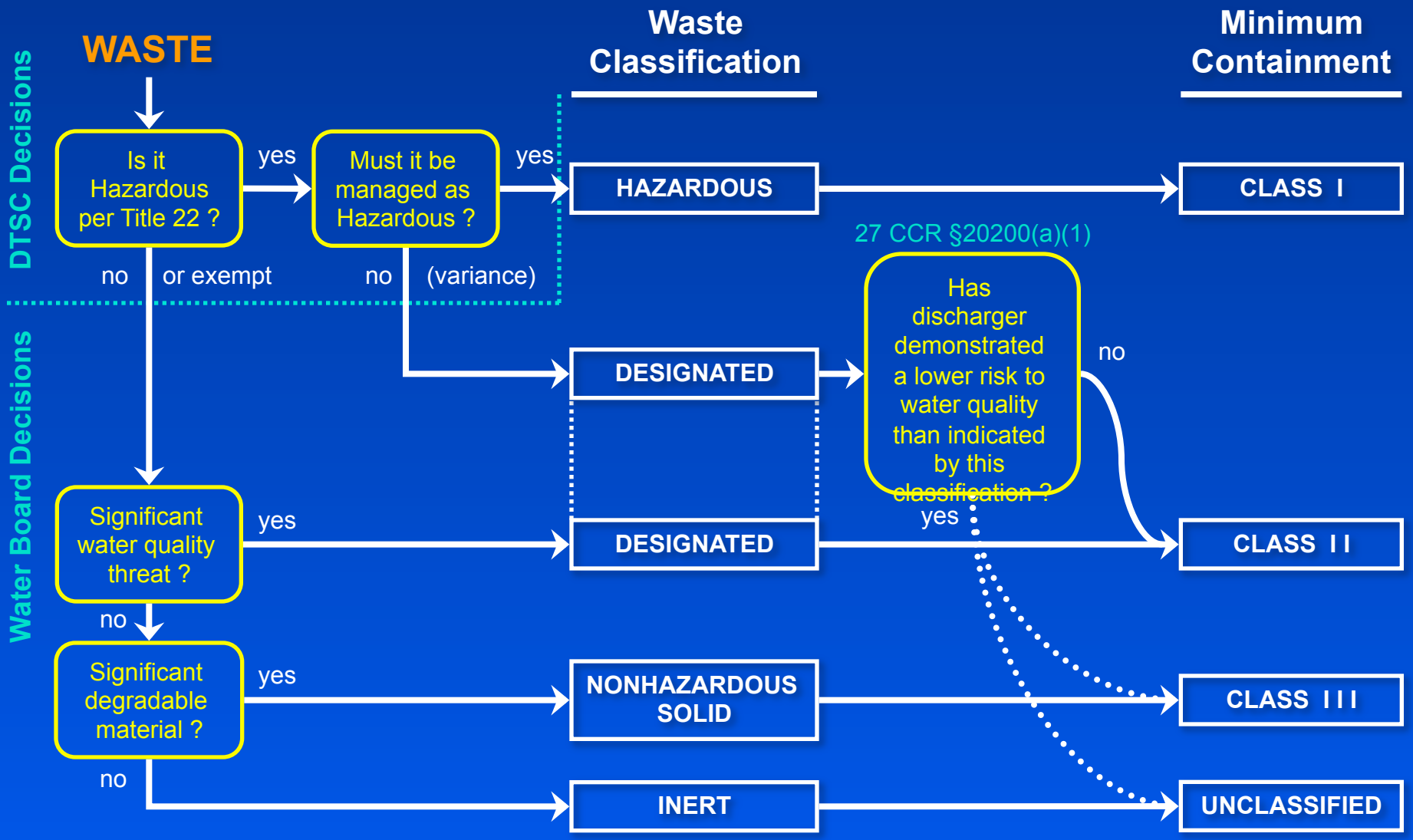


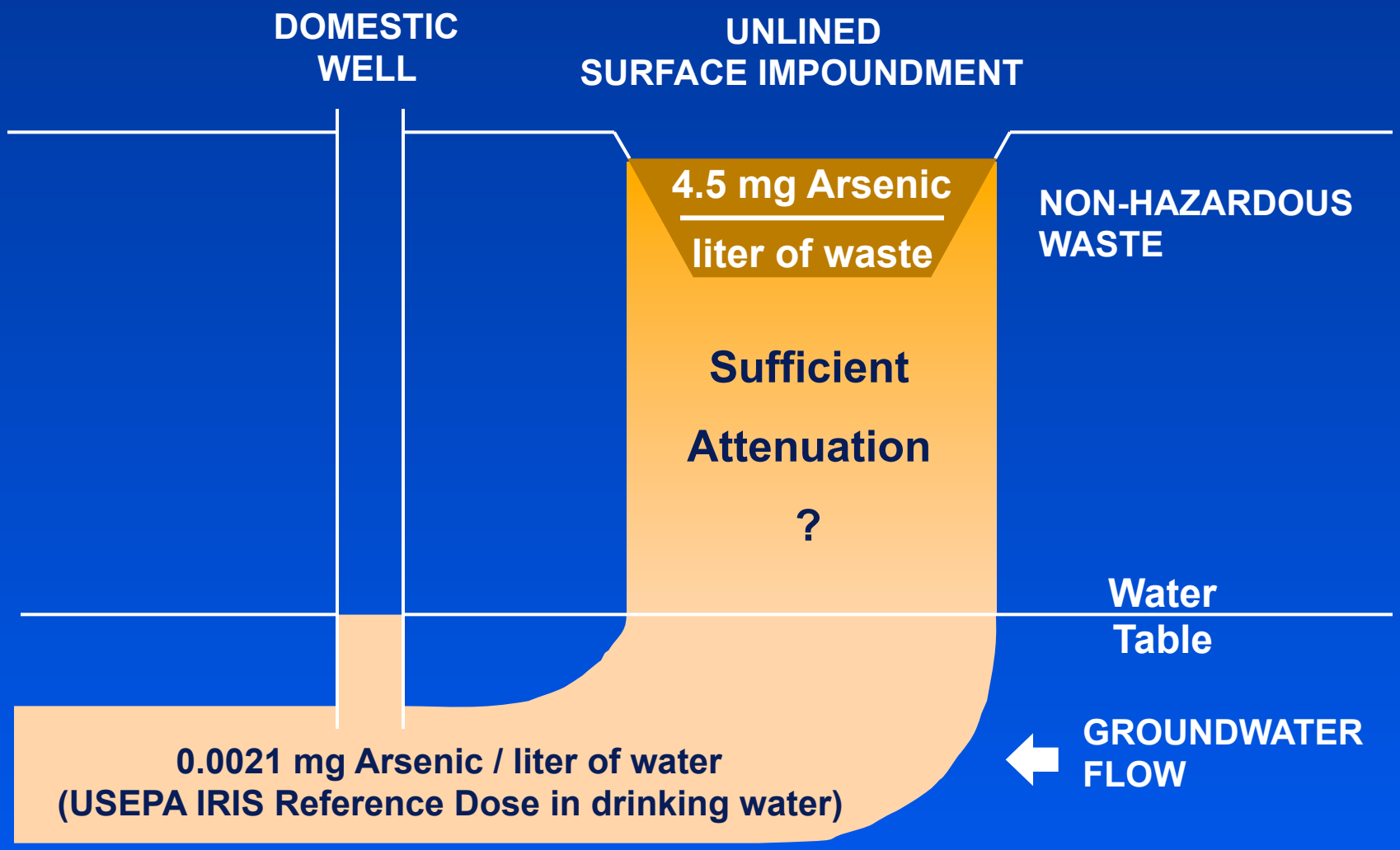
Hazardous Wastes

(Insert Corey Yep's slides here)

Designated Wastes

Wastes Which Threaten Water Quality

Hazardous Criteria Do Not Always Protect Water Quality



Definition of Designated Waste

California Water Code §13173

"Designated waste" means either of the following:

- Hazardous waste that has been granted a variance from hazardous waste management requirements . . .
- Nonhazardous waste that . . . under ambient environmental conditions at a waste management unit, could be released in concentrations exceeding applicable water quality objectives or that could reasonably be expected to affect beneficial uses of the waters of the state . . .

STAFF REPORT

THE

DESIGNATED LEVEL METHODOLOGY

FOR

WASTE CLASSIFICATION

AND

CLEANUP LEVEL DETERMINATION

October 1986

Updated – June 1989

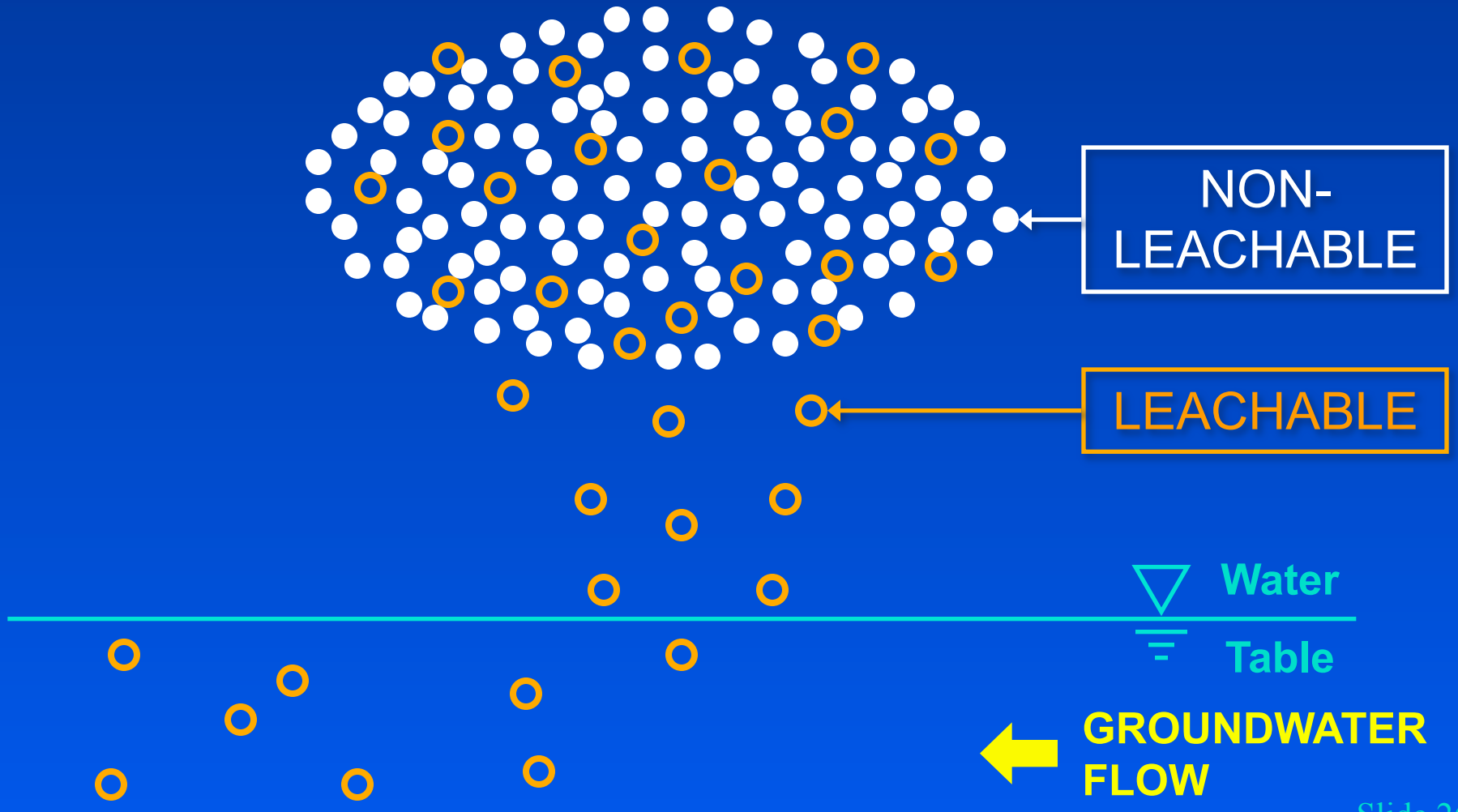
CALIFORNIA REGIONAL
WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

Here is one interpretation

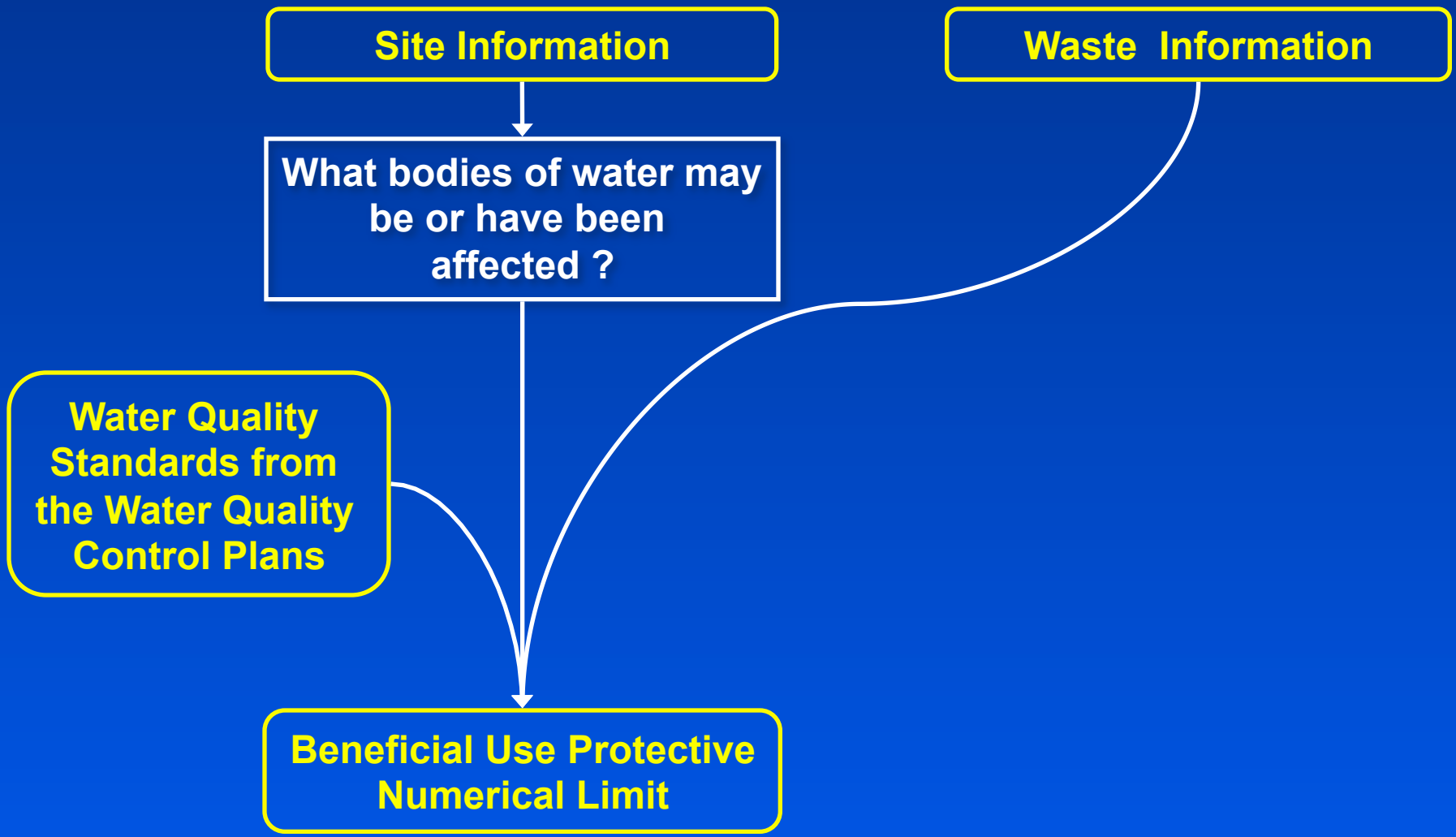
Available on the Internet at

http://www.swrcb.ca.gov/rwqcb5/available_documents/dlm.pdf

The Leachable / Mobile Fraction Threatens Groundwater



Calculating Designated Levels



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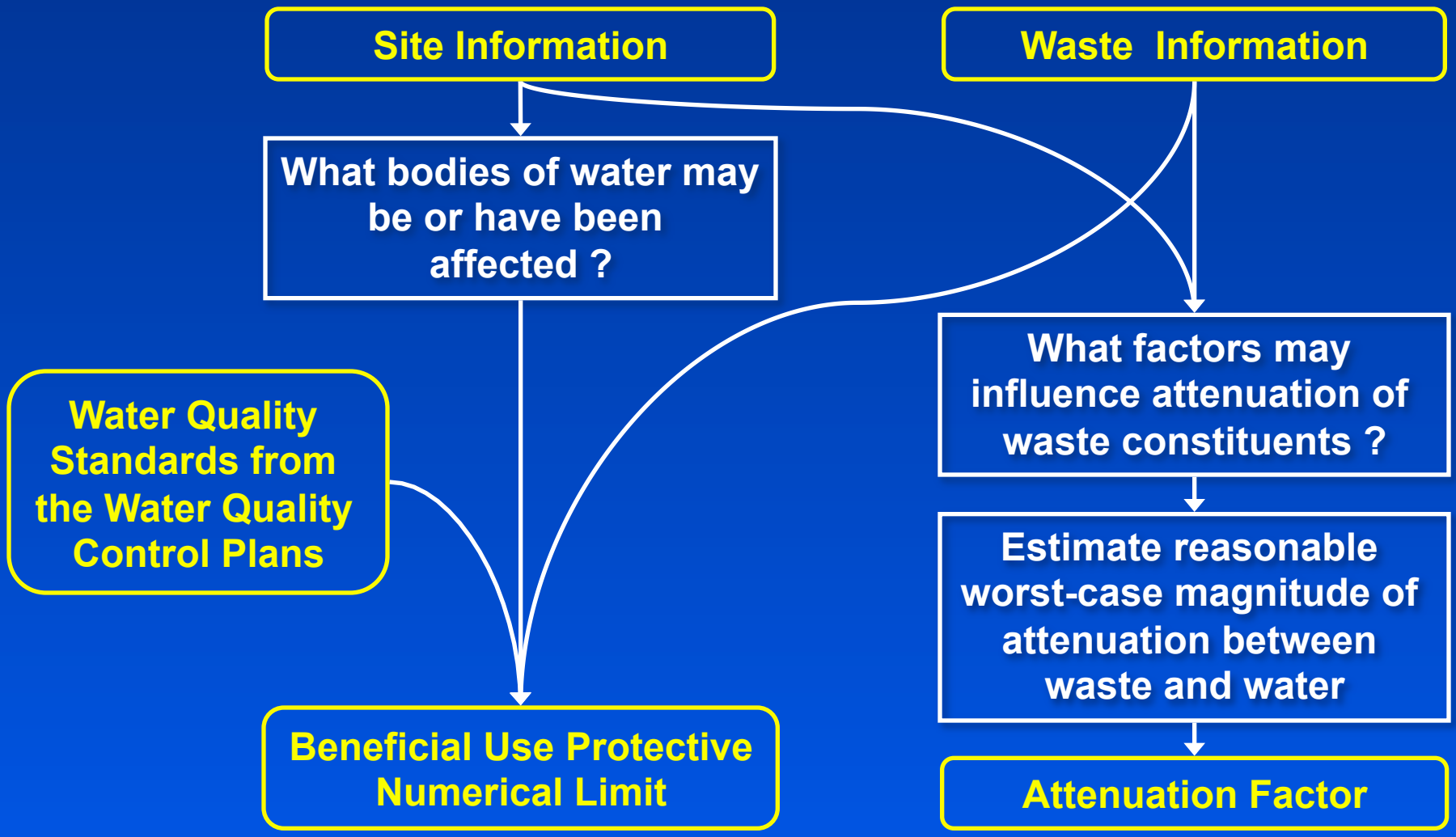

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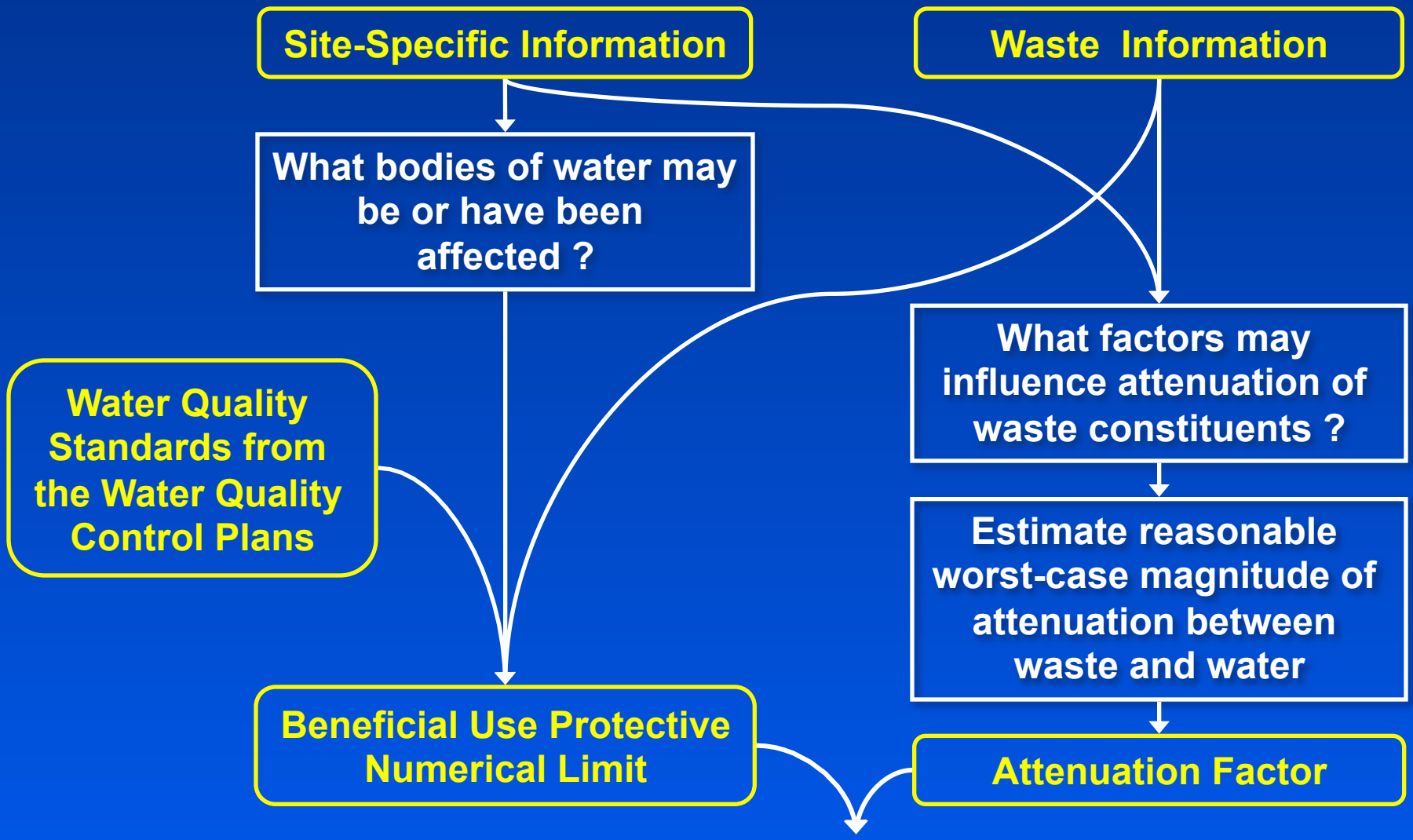


Water Quality Standards

Federal Clean Water Act—

"Water quality standards are provisions of state or federal law which consist of a **designated use** or uses for waters of the United States and **water quality criteria** for such waters based upon such uses."

[40 CFR 130.2(c) and 131.3(i)]

Water Quality Standards In California

- Found in the ***Water Quality Control Plans*** *(Basin Plans)*
- Adopted by the State and Regional Water Boards

Water Quality Standards In California

Water Quality Standards include

- **Beneficial Use designations** for each water body or portion thereof
- **Water Quality Objectives** (criteria) to protect uses
- **Implementation Programs** to achieve compliance with the objectives

Water Quality Standards In California

- "Waters of the state" include both surface waters **and groundwaters**
  - both have water quality standards
- Water Quality Standards apply **throughout the water body**

Beneficial Uses of Waters of the State

California Water Code § 13050(f)

" 'Beneficial uses' of the waters of the state that may be protected against water quality degradation include, but are not necessarily limited to,

- domestic, municipal, agricultural and industrial supply;
- power generation;
- recreation;
- esthetic enjoyment;
- navigation; and
- preservation and enhancement of fish, wildlife, and other aquatic resources or preserves."

Present and Potential Beneficial Uses of Waters of the State

From the Water Quality Control Plan Reports (Basin Plans)

- Municipal and Domestic Supply
- Agricultural Supply
- Industrial Supply
  - Service Supply
  - Process Supply
- Groundwater Recharge
- Freshwater Replenishment
- Navigation

Present and Potential Beneficial Uses of Waters of the State

- Hydropower Generation
- Recreation (both Water Contact & Non-Water Contact)
- Commercial & Sport Fishing
- Aquaculture
- Freshwater Habitat (both Warm & Cold)
- Estuarine Habitat

Present and Potential Beneficial Uses of Waters of the State

- Wildlife Habitat
- Preservation of Biological Habitats of Special Significance
- Preservation of Rare, Threatened, or Endangered Species
- Migration of Aquatic Organisms
- Spawning, Reproduction, and/or Early Development
- Shellfish Harvesting

State Water Resources Control Board

Resolution No. 88-63

Adoption of a Policy Entitled "Sources of Drinking Water"

"All surface and groundwaters of the State are considered to be suitable, or potentially suitable, for municipal or domestic water supply…"

Sources of Drinking Water Policy Exceptions

- Waters with total dissolved solids (TDS) > 3,000 mg/L
- Waters with contamination, unrelated to a specific pollution incident, that cannot reasonably be treated for domestic use using best management practices or best economically achievable treatment practices

Sources of Drinking Water Policy Exceptions

- Source cannot provide an average sustained yield of 200 gallons per day.
- Certain municipal, industrial, and agricultural wastewater conveyances and holding facilities
- Regulated geothermal groundwaters

Water Quality Objectives

Water Code §13050(h)

" 'Water quality objectives' means the **limits or levels of water quality** constituents or characteristics which are established for the **reasonable protection** of beneficial uses of water or the prevention of nuisance within a specific area."

Water Quality Objectives

Come in two forms

- Numerical
  - Specifies a concentration limit
- Narrative
  - Describes a requirement or a prohibition

Water Quality Objectives

From the Sacramento River and San Joaquin River Basin Plan and the Tulare Lake Basin Plan

- Chemical Constituents - General
  - Waters shall **not** contain chemical constituents in concentrations that **adversely affect beneficial uses**

Water Quality Objectives

From the Sacramento River and San Joaquin River Basin Plan and the Tulare Lake Basin Plan

- Chemical Constituents - MCLs
  - At a minimum, waters designated for use as domestic or municipal supply (MUN) shall not contain concentrations of chemical constituents in excess of California **drinking water Maximum Contaminant Levels** (MCLs)
  - To protect all beneficial uses, the Regional Water Board may apply limits **more stringent than MCLs**

Water Quality Objectives

From the Sacramento River and San Joaquin River Basin Plan and the Tulare Lake Basin Plan

- Toxicity
  - All waters shall be maintained **free of toxic substances** in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life
  - This objective applies regardless of whether the toxicity is caused by a single substance or the interactive effect of multiple substances

Water Quality Objectives

From the Sacramento River and San Joaquin River Basin Plan and the Tulare Lake Basin Plan

- Tastes & Odors
  - Water shall not contain taste- or odor-producing substances in concentrations that impart undesirable tastes or odors to domestic or municipal water supplies or to fish flesh or other edible products of aquatic origin, or that cause nuisance, or otherwise adversely affect beneficial uses.

Taste & Odor vs. Toxicity

	CA Primary MCL (Health)	Taste & Odor Threshold (Welfare)
Ethylbenzene	700 ug/l	29 ug/l
Toluene	150 ug/l	24 ug/l
Xylenes	1750 ug/l	17 ug/l
MTBE	13 ug/l	5 ug/l

Water Quality Objectives for Surface Waters

From the Sacramento River and San Joaquin River Basin Plan and the Tulare Lake Basin Plan

Other objectives exist for:

- Bacteria
- Biostimulatory Substances
- Color
- Dissolved Oxygen
- Floating Material
- Oil and Grease
- pH
- Pesticides
- Radioactivity
- Salinity
- Sediment
- Settleable Material
- Suspended Material
- Temperature
- Turbidity

Water Quality Objectives for Groundwater

From the Sacramento River and San Joaquin River Basin Plan and the Tulare Lake Basin Plan

Other objectives exist for:

- Bacteria
- Radioactivity

California Toxics Rule

- Federal Clean Water Act
  - All States required to have enforceable numerical water quality criteria for priority toxic pollutants in surface waters
- Statewide Water Quality Control Plans
  - Inland Surface Waters Plan (1991)
  - Enclosed Bays & Estuaries Plan (1991)
- National Toxics Rule, USEPA
  - Promulgated in 1992 (amended in 1995 & 1999)
  - Criteria for CA filled gaps in Statewide Plans

California Toxics Rule

- Statewide Plans rescinded in 1994
  - Court order from discharger lawsuit
  - Adoption did not sufficiently consider economics
- California out of compliance with CWA
- California Toxics Rule, USEPA
  - Promulgated 18 May 2000
  - NTR criteria still in effect
  - CTR criteria fills gaps in CWA compliance

California Toxics Rule

- CTR and NTR Criteria
  + Basin Plan Beneficial Use Designations
  = enforceable Water Quality Standards

- State-adopted Site-specific Objectives
  - If approved by EPA, supercede NTR & CTR
  - If under EPA review, more stringent applies

Region 5 Policy for Application of Water Quality Objectives

From the Implementation Chapter of the Region 5 Basin Plans

- Numerical receiving water limitations will be established in Board orders for constituents and parameters which will, at a minimum, meet all applicable water quality objectives
- The Board will impose more stringent numerical limitations or prohibitions to maintain the existing water quality unless some degradation is allowed pursuant to Resolution No. 68-16

Region 5 Policy for Application of Water Quality Objectives

From the Implementation Chapter of the Region 5 Basin Plans

- Narrative Objectives
  - Implement with numerical limits in orders
  - Evaluate compliance by considering
    - Direct evidence of beneficial use impacts
    - All material and relevant information submitted by the discharger and other interested parties
    - Relevant numerical criteria and guidelines from other agencies and organizations (see *A Compilation of Water Quality Goals*)

Region 5 Policy for Application of Water Quality Objectives

From the Implementation Chapter of the Region 5 Basin Plans

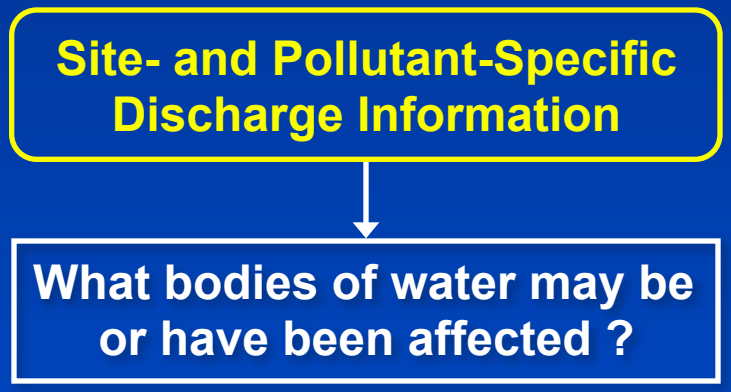
- Minimum & Maximum Levels
  - **Water Quality Objectives** define the least stringent limits which will be imposed on ambient water quality
  - **Background** defines the most stringent limits which will be imposed on ambient water quality
    - — Water Quality Impacts from Waste Discharges
    - — Controllable Factors

Region 5 Policy for Application of Water Quality Objectives

From the Implementation Chapter of the Region 5 Basin Plans

- Water quality objectives do not require improvement over natural background concentrations
  - If Background > Water Quality Objective Controllable Water Quality Factors are not allowed to cause further degradation
- Interaction of multiple toxic pollutants
  - Additivity assumption

Selecting Beneficial Use Protective Numerical Limits in Water



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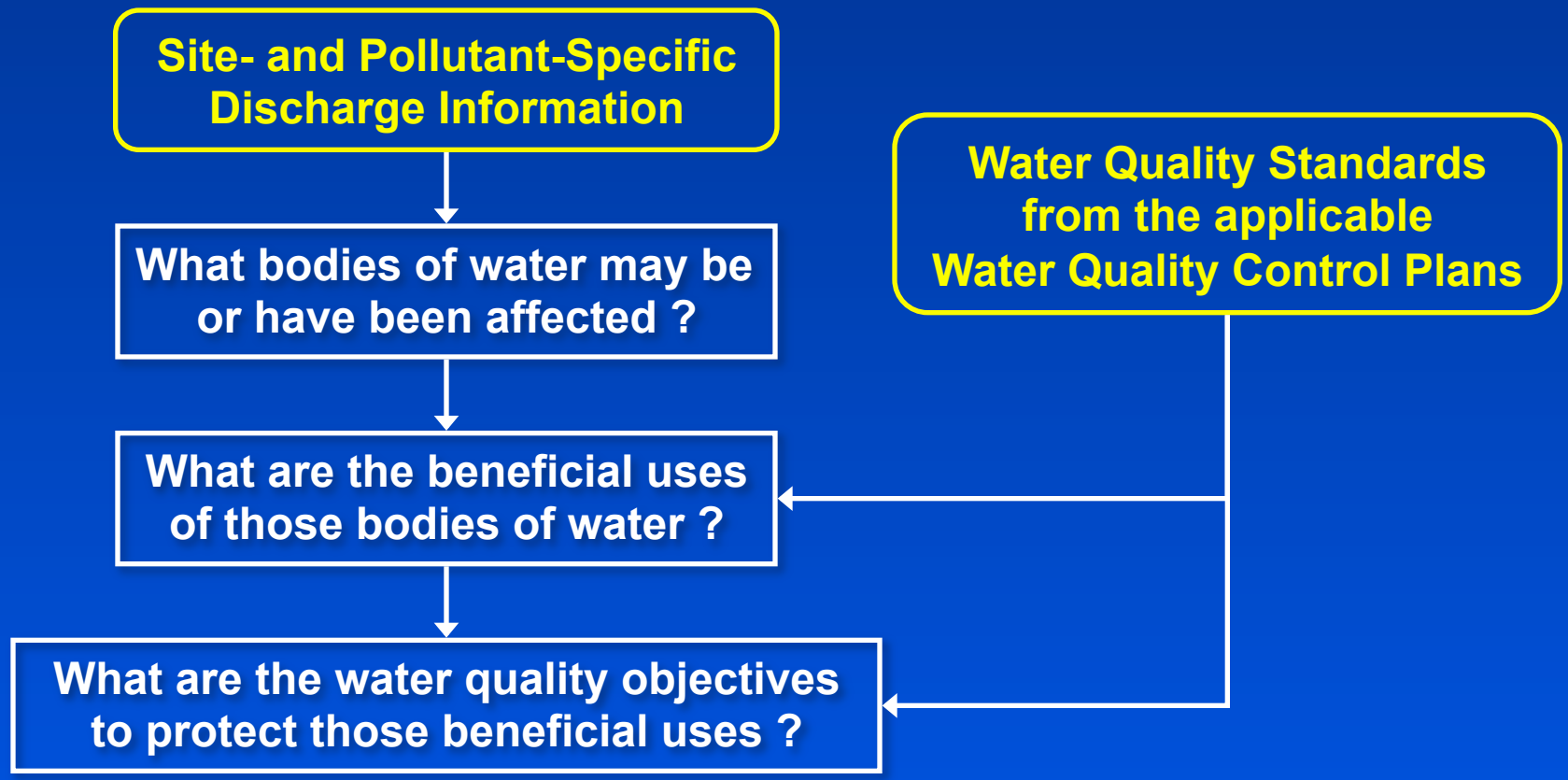

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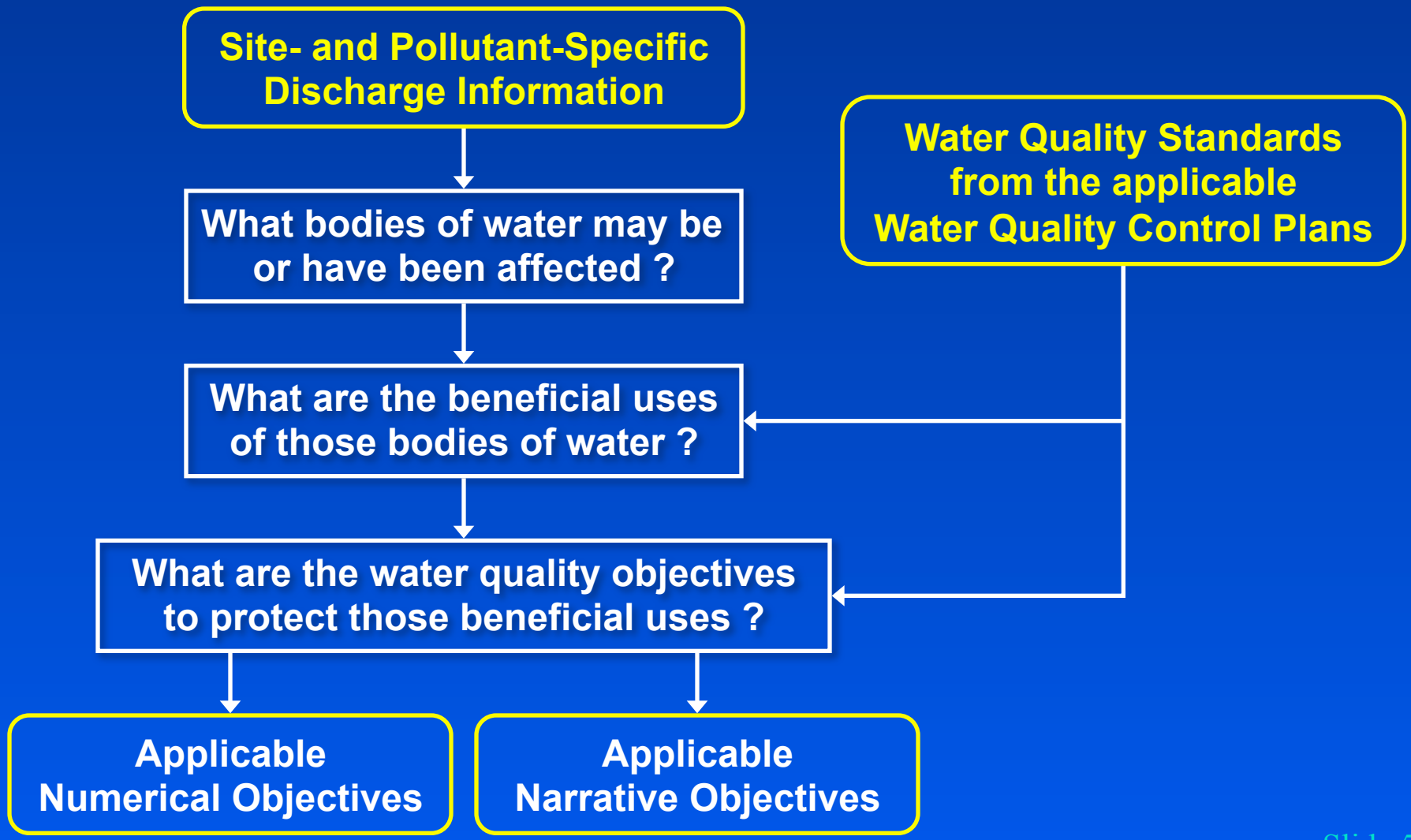

Selecting Beneficial Use Protective Numerical Limits in Water

Applicable Numerical Objectives

Applicable Narrative Objectives

Selecting Beneficial Use Protective Numerical Limits in Water

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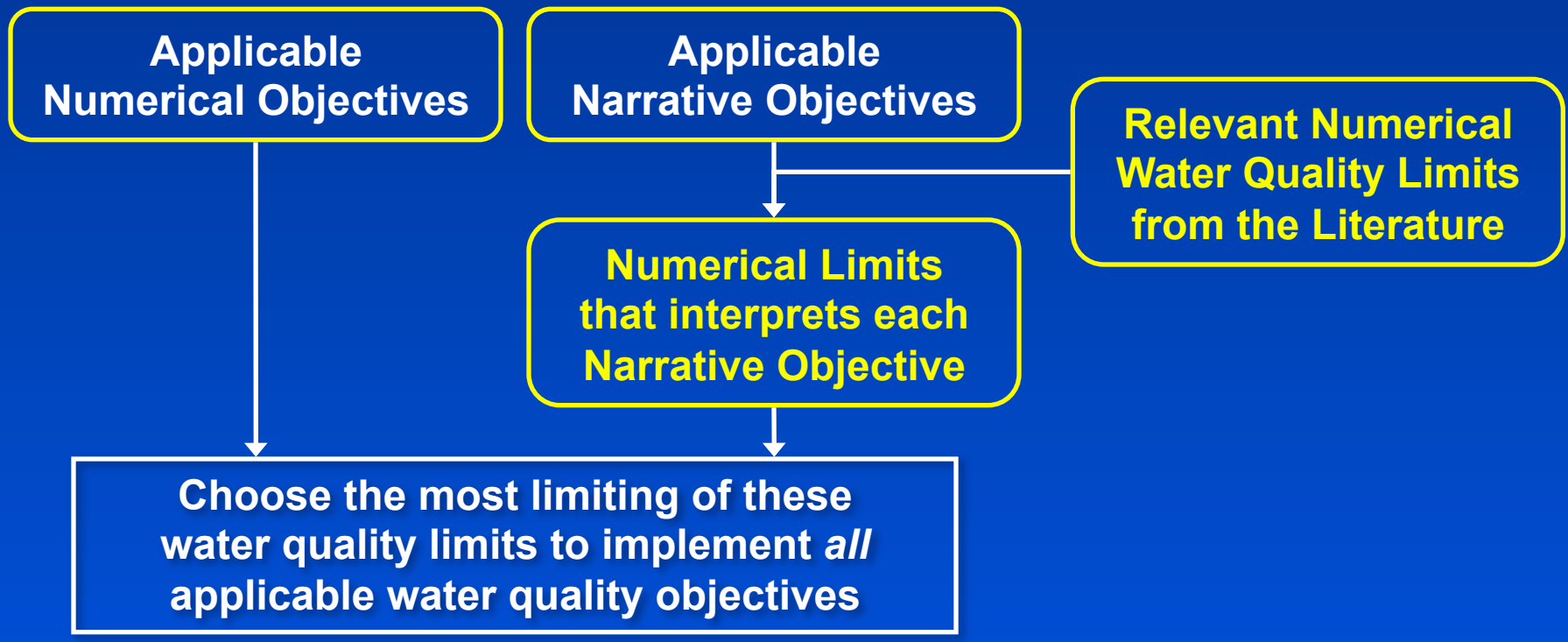

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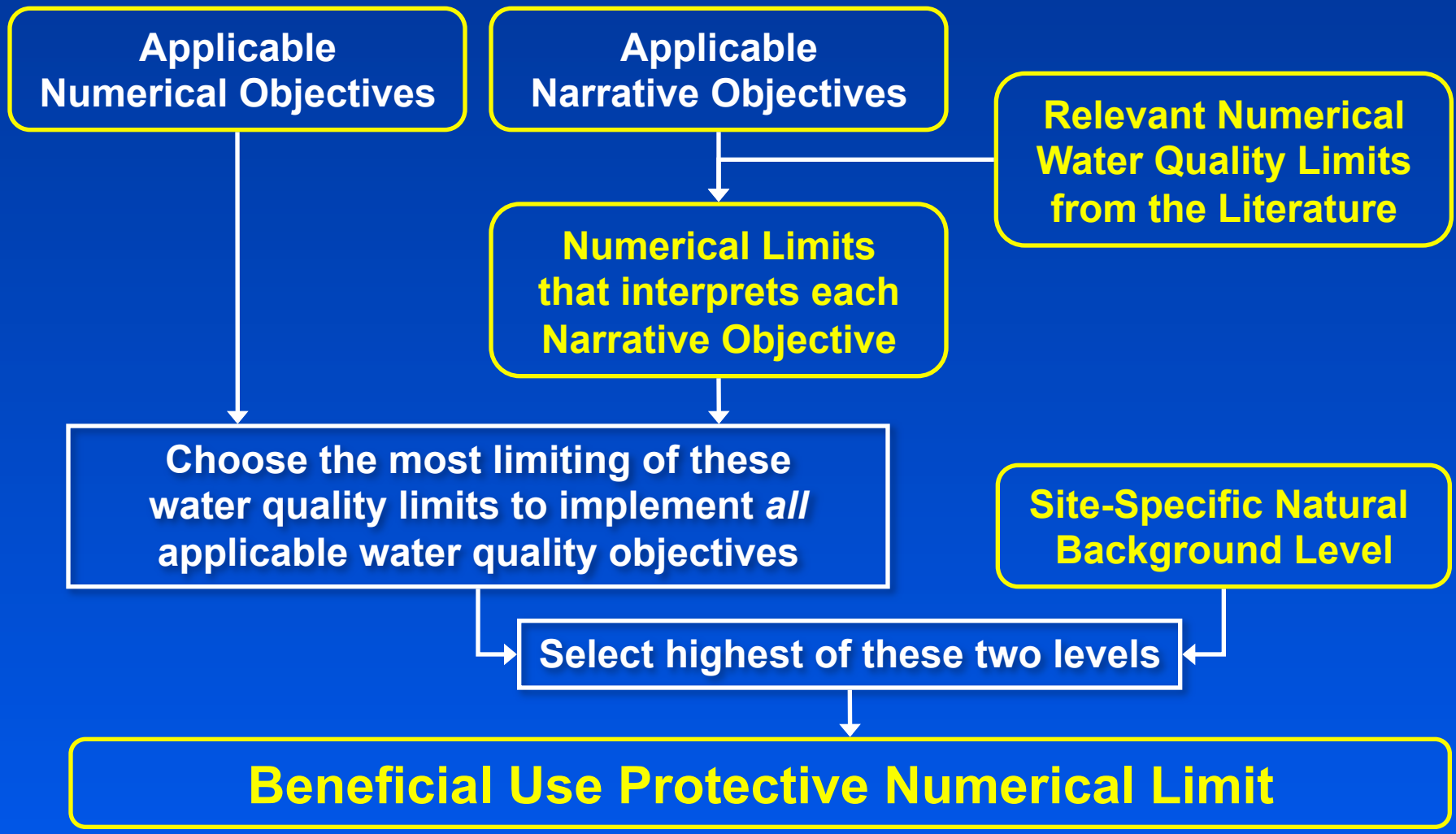


Sources of Water Quality Limits

Used to Interpret Narrative Objectives

Chemical Constituents objective

- California Drinking Water MCLs — DHS
  - Primary MCLs based on human health
  - Secondary MCLs based on human welfare
  - Technology & Economics of water at the tap
- Federal Drinking Water MCLs — USEPA
  - Only if lower than California MCLs
- *Water Quality for Agriculture* — FAO-UN
- *Water Quality Criteria* (McKee & Wolf) — SWRCB
  - e.g., industrial use criteria

MCLs Are Not Always Sufficient
to Implement the Narrative Toxicity Objective

- Primary MCLs **may not prevent** "detrimental physiological responses" in humans
- MCLs derived for Water Distribution Systems
- Balancing of Health and Technology/Economics **may not be relevant** to Drinking Water Sources or Future Beneficial Use Protection
  - Total Trihalomethane MCL and Chloroform
    - Cancer Risk vs. Pathogens
  - MCLs for Chlorinated Solvent Carcinogens
    - Outdated Analytical Quantitation Limits
  - Public Health Goals predict Future MCLs

Sources of Water Quality Limits

Used to Interpret Narrative Objectives

Toxicity objective

- California Public Health Goals — OEHHA
- Federal MCL Goals — USEPA
  - non-"zero" limits only
- California State Action Levels — DHS
- Integrated Risk Information System — USEPA
  - Reference Doses for non-cancer effects
  - Cancer Risk Estimates
- Cancer Risk Estimates — OEHHA, NAS
  - at 1-in-a-million (10^{-6}) risk level

10^{-6} Cancer Risk Level

Should be Used to Interpret Toxicity Objective

- DHS Primary MCLs and Action Levels
  - *de minimis* cancer risk for involuntary exposures
- OEHHA Public Health Goals for drinking water
  - level considered negligible or *de minimis*
- California Toxics Rule and National Toxics Rule
  - human health criteria shall be applied at the State-adopted 10^{-6} risk level
- DTSC Prelim. Endangerment Assessments
  - > 10^{-6} indicates presence of contamination which may pose a significant threat to human health
- Region 5 Board Support - Mather AFB

Sources of Water Quality Limits

Used to Interpret Narrative Objectives

Toxicity objective (continued)

- Drinking Water Health Advisories — USEPA & NAS
- Proposition 65 Regulatory Levels — OEHHA
  - Carcinogens at 1-in-100,000 (10^{-5}) risk level
  - Reproductive Toxins at 1/1000 of NOAEL
  - Intent of statute
    - Public Notice prior to exposure
    - Prohibition of Discharge to drinking water
    - **Not** establishment of levels considered “safe”

Sources of Water Quality Limits

Used to Interpret Narrative Objectives

Toxicity objective (continued)

- National Recommended Ambient Water Quality Criteria — USEPA
  - Human Health protection – **surface waters only**
    - Water + Fish & Shellfish Consumption
    - Fish & Shellfish Consumption only
  - Aquatic Life protection
- Aquatic Life and Wildlife Protective Limits — CDFG
  - Hazard Assessments & Water Quality Criteria

Sources of Water Quality Limits

Used to Interpret Narrative Objectives

Taste and Odor objective

- Secondary MCLs — DHS & USEPA
- National Recommended (Ambient) Water Quality Criteria — USEPA
- California State Action Levels — DHS
- Drinking Water Health Advisories — USEPA & NAS
- Taste and Odor Thresholds — USEPA & others

CALIFORNIA ENVIORNMENTAL PROTECTION AGENCY
REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

A Compilation of
WATER QUALITY GOALS

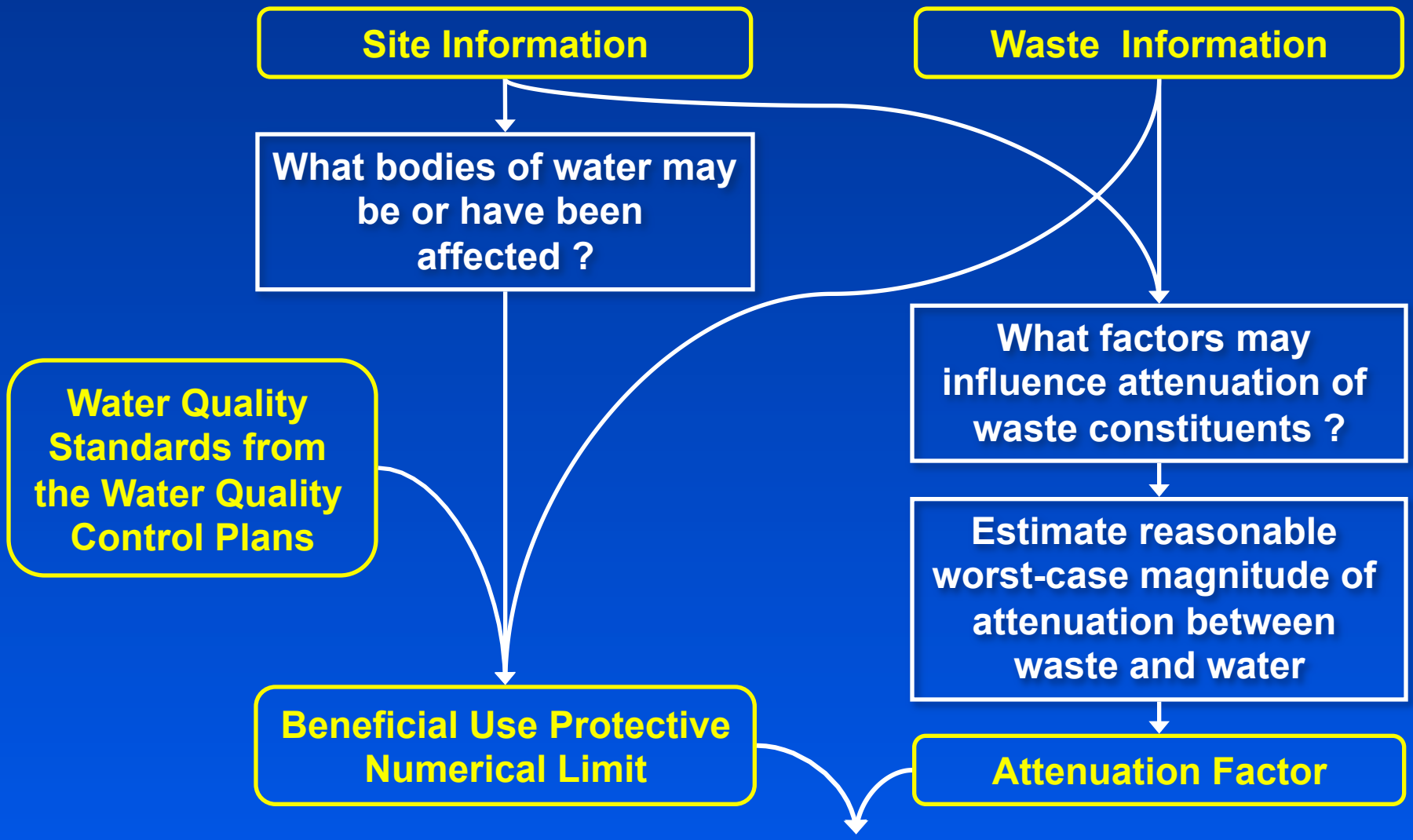
August 2000

A Source for Numerical Water Quality Limits

Available on the Internet at

http://www.swrcb.ca.gov/rwqcb5/available_documents/wq_goals

Calculating Designated Levels



Examples of Environmental Fate Characteristics Which Influence the Selection of Attenuation Factors

For the Protection of Groundwater

- Depth to Highest Groundwater
  - including capillary fringe
- Net Recharge
  - [rainfall] – [evaporation]
- Characteristics of the Vadose Zone:
  - Permeability and Porosity
  - Clay Content
  - Organic Matter Content
  - Ion Exchange Capacity and pH

Environmental Fate Characteristics

For the Protection of Groundwater

- Pollutant Characteristics:
  - Polarity
  - Ionic Strength
  - Volatility (vapor-phase transport)
  - Viscosity
  - Degradability or Biologic Activity
  - Octanol / Water Partition Coefficient (K_{OW})
- Other Constituents that Could Increase Mobility
- Topography (runoff vs. infiltration)
- Total Pollutant Load (mass loading)
- **Uncertainty of the Data and Assumptions**

Environmental Fate Characteristics

For the Protection of Surface Waters

- Distance from Drainage Courses
- Topography (runoff vs. infiltration)
- Pollutant Characteristics:
  - Polarity
  - Volatility (loss to atmosphere)
  - Reactivity or Degradability
  - Octanol / Water Partition Coefficient (K_{OW})

Environmental Fate Characteristics

For the Protection of Surface Waters

- Other Constituents that Could Increase Mobility
- Initial Dilution Upon Reaching Surface Waters
- Interconnection of Ground and Surface Waters
- Total Pollutant Load (mass loading)
- **Uncertainty of the Data and Assumptions**

Environmental Fate Characteristics

Note:

- Liners and other Engineered Containment Systems are **not** considered in evaluating protectiveness of site in waste classification
  - Wastes are classified based on Potential Threat to Water Quality if discharged to site
    - Informs public of potential for water quality impacts
  - Resulting Classification determines Appropriate Containment for the waste

Environmental Fate Characteristics

- We rarely have detailed information
- There are many unknowns

Generic Attenuation Factors

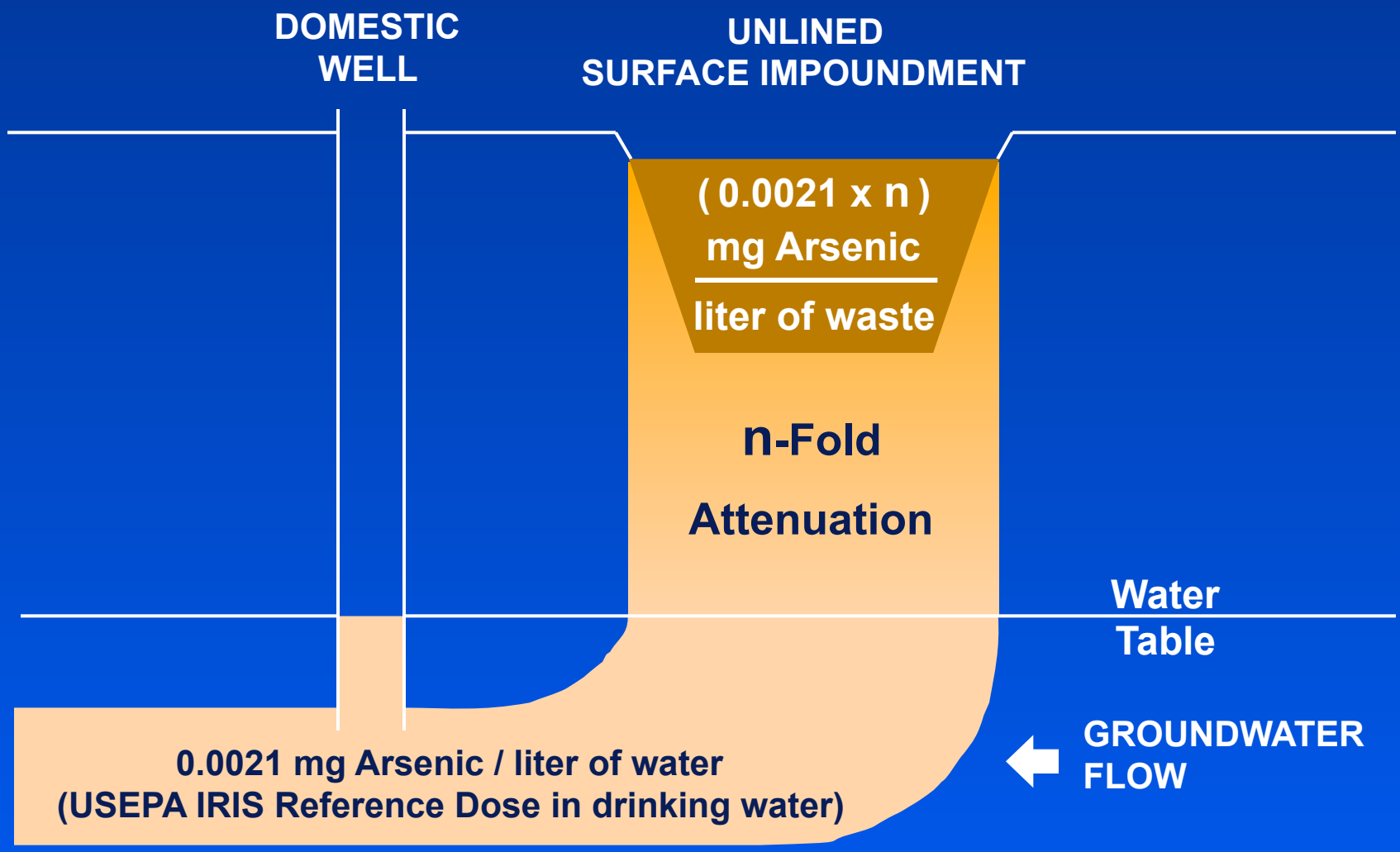
Generic Attenuation Factors

- For initial screening or where a detailed assessment of attenuation is not performed:
- Factor of **100** assumed for most pollutants at sites which meet these minimum criteria
  - at least 30 feet of alluvial materials with
  - a significant clay content between the lowest level of contamination and the highest level of underlying groundwater.
- Factor of **10** assumed for sites which do not meet the minimum criteria.

Generic Attenuation Factors

- 10-fold higher attenuation factors assumed for highly attenuated pollutants, such as
  - Copper, Lead, and Zinc
  - Polynuclear Aromatic Hydrocarbons (PAHs or PNAs)
  - DDT and related pesticides
  - Polychlorinated Biphenyls (PCBs)

Soluble Designated Level for a Constituent of a Liquid Waste



Calculating Soluble Designated Levels for Liquid Wastes

SOLUBLE DESIGNATED LEVEL in mg/L =

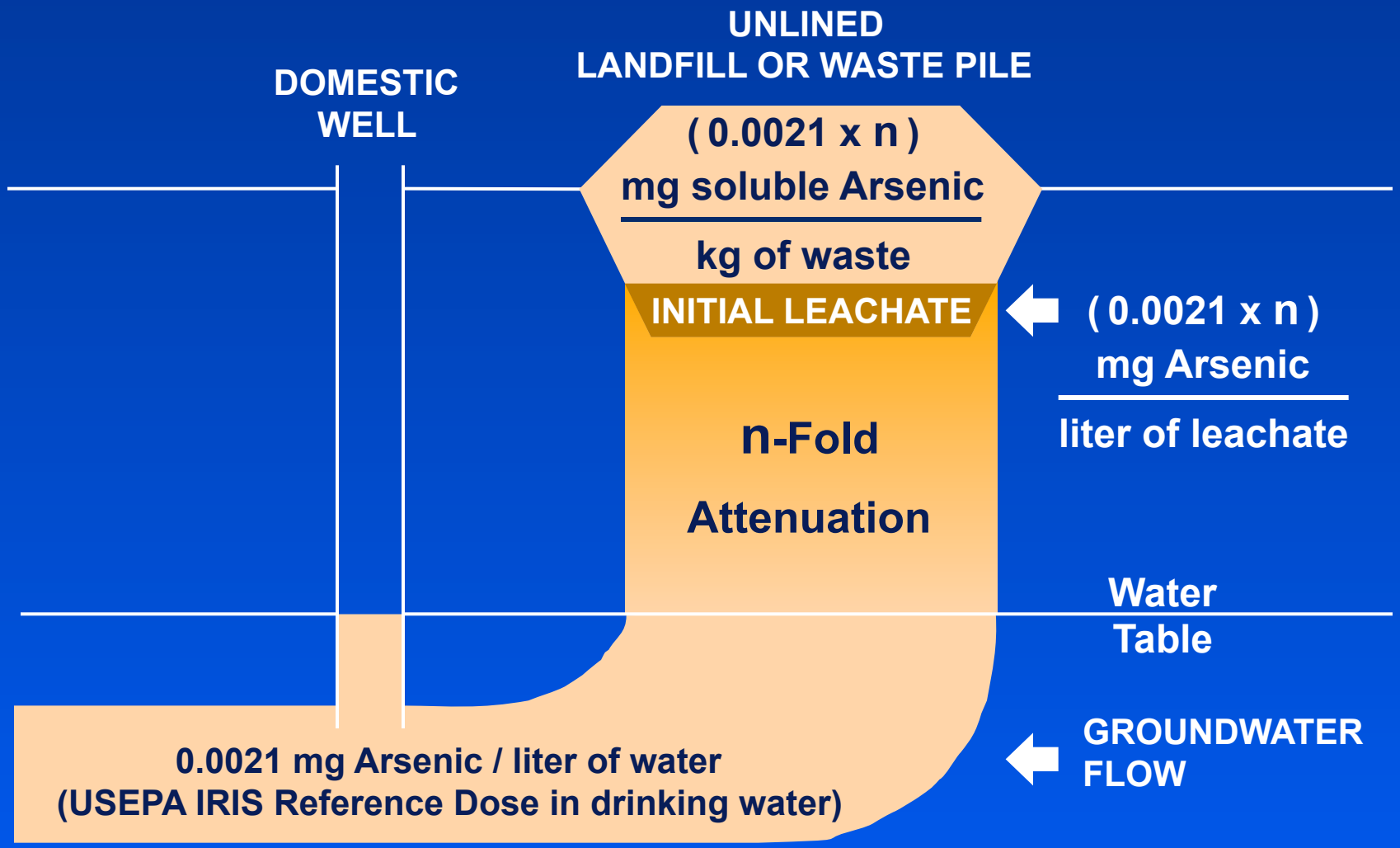
$$\left(\begin{array}{c}\text{WATER}\\ \text{QUALITY}\\ \text{LIMIT}\end{array}\right) \times \left(\begin{array}{c}\text{ATTENUATION}\\ \text{FACTOR}\end{array}\right)$$

Is It a Designated Waste?

- **YES** if

measured concentration (mg/L) in filtered liquid waste	≥	Soluble Designated Level

Soluble Designated Level for a Constituent of a Solid Waste



Calculating Soluble Designated Levels for Solid Wastes

$$\left(\begin{array}{c}\text{SOLUBLE}\\ \text{DESIGNATED}\\ \text{LEVEL in}\\ \text{mg/L leachate}\end{array}\right) = \left(\begin{array}{c}\text{WATER}\\ \text{QUALITY}\\ \text{LIMIT}\end{array}\right) \times \left(\begin{array}{c}\text{ATTENUATION}\\ \text{FACTOR}\end{array}\right)$$

Assume:

$$\left(\begin{array}{c}\text{Concentration of}\\ \text{Mobile/Leachable}\\ \text{Constituent in}\\ \text{Solid Waste (mg/kg)}\\ \text{prior to leaching}\end{array}\right) \approx \left(\begin{array}{c}\text{Concentration of}\\ \text{Mobile/Leachable}\\ \text{Constituent in}\\ \text{Initial Leachate (mg/L)}\\ \text{formed}\end{array}\right)$$

Calculating Soluble Designated Levels for Solid Wastes

SOLUBLE DESIGNATED LEVEL of Mobile/ Leachable Constituent in mg/kg waste

$$= \left(\begin{array}{c} \text{WATER} \\ \text{QUALITY} \\ \text{LIMIT} \end{array} \right) \times \left(\begin{array}{c} \text{ATTENUATION} \\ \text{FACTOR} \end{array} \right)$$

But Concentrations of Mobile/Leachable Constituents are measured in **extract** from waste

Calculating Soluble Designated Levels for Solid Wastes

SOLUBLE DESIGNATED LEVEL in mg/L extract =

$$\left(\begin{array}{c}\text{WATER}\\ \text{QUALITY}\\ \text{LIMIT}\end{array}\right) \times \left(\begin{array}{c}\text{ATTENUATION}\\ \text{FACTOR}\end{array}\right) \div \left(\begin{array}{c}\text{DILUTION}\\ \text{FACTOR OF}\\ \text{EXTRACTION}\\ \text{TEST USED *}\end{array}\right)$$

* 10 for the Waste Extraction Test (WET)
20 for the Toxicity Characteristic Leaching Procedure (TCLP)

Is It a Designated Waste?

- **YES** if

measured concentration (mg/L) in extract of solid waste	≥	Soluble Designated Level

Handout:
Inorganic Class III Limits

Determining Extractable Concentrations of Constituents in Solid Waste

- Selecting the Extraction Procedure:
  - For metals, other inorganics, and low volatility organics (e.g., lead, pesticides, TPH-diesel)
    - Use Waste Extraction Test (WET)
    - For oily wastes, use centrifuge instead of filtration
  - Extraction tests don't work for volatile constituents
    - Loss to atmosphere during the test
    - Ignores vapor-phase migration

Determining Extractable Concentrations of Constituents in Solid Waste

- Selecting the Extractant:
  - For metals and ionizable organics (phenolics)
    1) Is the waste in an acidic environment ?
    2) Is the waste capable of generating acid ?
       - Low pH
       - High sulfide content (see Mining Waste)
       - Low Neutralization Potential/Acid Generation Potential
       - Significant putrescible matter content

    — If the answer to either (1) or (2) is “yes”, **extract with the standard Citric Acid Buffer**

    — If both answers are “no” **extract with Deionized Water**

Determining Extractable Concentrations of Constituents in Solid Waste

- Selecting the Extractant:
  - For other low volatility constituents (salts and base/neutral organics)
    - **Extract with Deionized Water**
      - Extractability not affected by acid conditions
      - Remove analytical interferences from citrate

Determining Extractable Concentrations of Constituents in Solid Waste

- Selecting the Extraction Procedure:
  - For volatile organic constituents (e.g., TCE, PCE, benzene, TPH-gasoline)
    - Analyze for Total Concentrations (mg/kg)
    - Calculate Total Designated Levels in mg/kg
    - Assume Leachability Factor = 100% (1.0)
      - Can move in both vapor and aqueous phases

Calculating Total Designated Levels for Solid Wastes

TOTAL DESIGNATED LEVEL in mg/kg =

$$\left(\begin{array}{c}\textbf{WATER}\\ \textbf{QUALITY}\\ \textbf{LIMIT}\end{array}\right) \times \left(\begin{array}{c}\textbf{ATTENUATION}\\ \textbf{FACTOR}\end{array}\right) \times \left(\begin{array}{c}\textbf{LEACHABILITY}\\ \textbf{FACTOR *}\end{array}\right)$$

$$\text{* LEACHABILITY FACTOR} = \frac{\text{TOTAL CONCENTRATION}}{\text{MOBILE CONCENTRATION}}$$

both expressed in mg constituent per kg waste

Is It a Designated Waste?

- **YES** if

measured concentration (mg/kg) in solid waste	≥	Total Designated Level

Total vs. Soluble Designated Levels

- Soluble Designated Levels
  - Directly measure Leachability with Extraction Test
  - Attenuation is the only assumed factor
- Total Designated Levels
  - Requires assumptions about Leachability as well as Attenuation
  - Use where Leachability cannot be measured
    - Volatile waste constituents

Other Wastes Classes

Nonhazardous Solid

Inert

Definition of Nonhazardous Solid Waste

Title 27, Division 2, Subdivision 1 §20220(a)

Nonhazardous solid waste means all putrescible and nonputrescible solid, semi-solid, and liquid wastes, including garbage, trash, refuse, paper, rubbish, ashes, industrial wastes, demolition and construction wastes, abandoned vehicles and parts thereof, discarded home and industrial appliances, manure, vegetable or animal solid and semi-solid wastes and other discarded waste (whether of solid or semi-solid consistency); provided that such wastes do no contain wastes which must be managed as hazardous wastes, or wastes which contain soluble pollutants in concentrations which exceed applicable water quality objectives, or could cause degradation of waters of the state (i.e., designated waste).

Nonhazardous Solid Waste Examples

- **Municipal and Industrial Origin**
  - Garbage from handling, preparation, processing or serving of food or food products (excluding grease trap pumpings and cannery wastes)
  - Rubbish such as paper, cardboard, tin cans (provided they are empty, opened, dry, and five gallons or less in volume), cloth (provided it is not oil or solvent soaked industrial cleanup rags), and glass
  - Construction and demolition materials such as paper, cardboard, wood, scrap metal (provided it is not friable, finely divided, or powdered), glass, rubber products, roofing paper and shingles (provided they contain less than 1% friable asbestos) and wallpaper

Nonhazardous Solid Waste Examples

- **Municipal and Industrial Origin**
  - Street refuse such as sweepings, dirt (not from a roadside chemical spill or in any way contaminated), leaves, catch basin cleanings, litter, yard clippings, glass, paper, wood, and scrap metals
  - Dead animals and portions thereof
  - Abandoned vehicles
  - Ashes from household burning (not from industrial or large municipal incinerators)

Nonhazardous Solid Waste Examples

- **Municipal and Industrial Origin**
  - Infectious materials and hospital or laboratory wastes authorized for disposal to land by official agencies charged with control of plant, animal, or human disease provided the local Environmental Health Officer has approved and disposal is above the 100-year flood plain
    - —Infectious wastes are actually classified as hazardous under CCR Title 22
    - —Discharge of these wastes to Class III landfills must be approved by the local Environmental Health officer and must implement the applicable statutes and regulations

Nonhazardous Solid Waste Examples

- **Agricultural Origin**
  - Plant residues from the production of crops including, but not limited to stalks, vines, green drops, culls, stubble, hulls, lint, untreated seed, roots, stumps, prunings, and trimmings
  - Dried manures
  - Dead animals and portions thereof

Nonhazardous Solid Waste Examples

- **Agricultural Origin**
  - Adequately cleansed pesticide containers that meet the following criteria
    - —Metal, plastic, and glass containers processed by
      - At least triple rinsing with thorough draining
      - Puncturing of the containers
      - Rinse waters placed in the spray tank or disposed of in accordance with requirements of the Regional Board
    - —County Agricultural Commissioner must certify that such a processing program exists and is utilized by pesticide users in the county
    - —Paper or plastic sacks and bags used for pesticide dusts and wettable powders ***are not permitted***

Definition of Inert Waste

Title 27, Division 2, Subdivision 1 §20230(a)

- Inert waste is that subset of solid waste that does not contain
  - hazardous waste or
  - soluble pollutants at concentrations in excess of applicable water quality objectives

  and does not contain
  - significant quantities of decomposable waste

Inert Waste Examples

- **Consist entirely of non-water soluble, non-decomposable inert solids**
  - Construction and demolition wastes such as earth, rock (not from a chemical spill, leaking underground tank or similar excavation/cleanup), concrete rubble, and asphalt paving fragments (pavement had been in place for at least two rainy seasons; not fresh asphalt)
  - Vehicle tires
  - Industrial wastes such as clay products from brick and pipe manufacturing, glass, and inert slags (wastes are blemishes, seconds or rejects of similar product manufacturing and were never used or came in contact with chemical processing), inert tailings, inert rubber scrap, and inert plastics

Moisture Limitations

Liquid and
Semi-Solid Wastes

Disposal of Liquids and Semi-Solid Wastes

- Concept:
  - Liquids belong in Surface Impoundments
  - Wet Wastes belong in Surface Impoundments or Land Treatment Units
- Requirements:
  - No Discharge of Liquid or Semi-Solid Wastes to Landfills or Waste Piles

Percent Solids Requirements

SOLIDS CONTENT	DISPOSAL
More than 50%	May be discharged to any Class III Landfill
Primary Sewage Sludge between 20 and 50% or Secondary Sewage Sludge, Mixture of Primary and Secondary Sludge, or Water Treatment Sludge between 15 and 50%	May be discharged to a Class III Landfill only if: 1) Landfill has Leachate Collection & Removal System and 2) Minimum 5:1 Solids to Liquids Ratio by weight is maintained
All Other	No Landfill Discharge

Waste Management Units

Classes and Types

Waste Management Unit Classification

- Classification of a Waste Management Unit is Determined by
  - Site Characteristics
    - Suitability to Contain the Waste
  - Not the classes of waste that were discharged in the past

Types of Classified Waste Management Units

- Class I and Class II
  - Landfill
    - Permanent disposal of solid waste
  - Waste Pile
    - Temporary storage of solid waste
  - Surface Impoundment
    - Storage or treatment of liquid waste
  - Land Treatment Unit
    - Treatment of solid and liquid wastes

Types of Classified Waste Management Units

- Class III
  - Landfill only

Mining Wastes

Different Names for
the Same Things

Mining Waste Regulations

Differences from Regulation of Other Units

- Additional flexibility given the Regional Water Boards
  - Mining wastes normally cannot be moved far from place of generation

Mining Waste Regulations

Differences from Regulation of Other Units

- Specific exemptions may be granted by the Regional Water Board on a case-by-case basis for:
  - Leachate Collection Systems
    - —Discharger demonstrates that leachate will not form or escape from unit
  - Liners and Leachate Collection Systems
    - —Only very minor amounts of groundwater underlie unit and
    - —Natural barriers to migration of waste and leachate shown to exist

Mining Waste Regulations

Differences from Regulation of Other Units

- Mining Waste Classifications
  - Group A — highest threat to water quality
  - Group B — significant threat to water quality
  - Group C — insignificant threat to water quality
- Acid-Generating Potential of mining waste used in determining its classification
  - pH effects on water quality
  - Acid mobilizes metals

Acid Generation Processes

- Sulfide Minerals Can Oxidize
  - Upon Exposure to Oxygen in Air + Water
  - Forms Sulfurous Acid → Sulfuric Acid
- Carbonates and Other Minerals
  - Can neutralize acid
- Remaining Acid Mobilizes Metals
- Salts Also Mobilized
  - Even if acid is all neutralized

Acid-Base Account Testing

- Method in Appendix II of Designated Level Methodology on the web at http://www.swrcb.ca.gov/rwqcb5/dlm.pdf

- Acid Generation Potential (AGP)
  - Sulfide minerals
  - Titratable sources of acid + sulfuric acid equivalent from total sulfur
  - Units = $\frac{\text{Tons } CaCO_3 \text{ needed to neutralize acid}}{\text{1000 tons of mining waste}}$

Acid-Base Account Testing

- Neutralization Potential (NP)
  - Alkaline carbonates, exchangeable bases, weatherable silicates and other minerals capable of neutralizing strong acids
  - Measured by titration
  - Units = $\frac{\text{Tons } CaCO_3 \text{ equivalents}}{\text{1000 tons of mining waste}}$

Acid-Base Account Testing

- Waste is Potentially Acid Generating if

$$\frac{\text{Neutralization Potential}}{\text{Acid Generation Potential}} < 3.0$$

  - Neutralizing Minerals more easily weathered than Acid Generating Minerals
  - Excess Neutralizing Capacity needed to prevent future acid generation
  - Protect Wastes from Weathering

Definition of Group A Mining Waste

27 CCR §22480(b)(1)

- Wastes that must be managed as hazardous waste pursuant to Chapter 11 of Division 4.5 of Title 22 of this code
- Provided the RWQCB finds that such mining wastes pose a significant threat to water quality

Definition of Group B Mining Waste

27 CCR §22480(b)(2)(A)

- Consist of or contain hazardous wastes, that qualify for a variance under Chapter 11 of Division 4.5 of Title 22 of this code
- Provided that the RWQCB finds that such mining wastes pose a low risk to water quality

or

Definition of Group B Mining Waste

27 CCR §22480(b)(2)(B)

- Consist of or contain nonhazardous soluble pollutants of concentrations which exceed water quality objectives for, or could cause, degradation of waters of the state

Definition of Group C Mining Waste

27 CCR §22480(b)(3)

- Wastes from which any discharge would be in compliance with the applicable water quality control plan, including water quality objectives other than turbidity

Mining Waste Classification Considerations

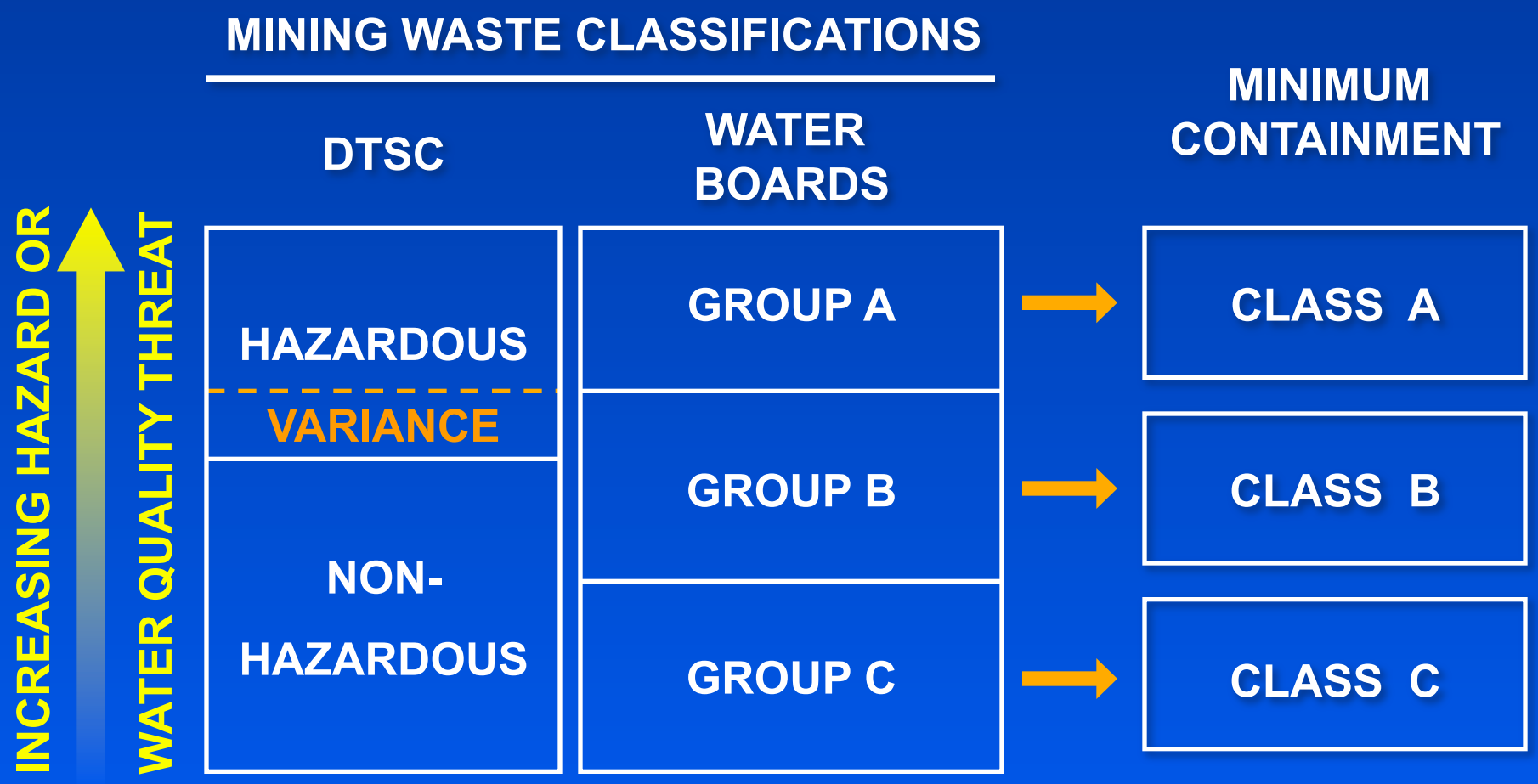
27 CCR §22480(c)

- In reaching decisions regarding classification as Group B or Group C, the RWQCB can consider
  - Whether the waste contains hazardous constituents only at low concentrations
  - Whether the waste has no or low acid-generating potential
  - Whether, because of intrinsic properties, the waste is readily containable by less stringent measures.

Comparison of Waste Classes for Mining and Other Wastes

Mining Waste		Other Wastes
Group A	≈	Hazardous
Group B	≈	Designated
Group C	≈	Inert

Mining Waste and Unit Classifications in California



Analyzing for Soluble Metals in Mining Waste

- Run Acid-Base Account
- If Potentially Acid Generating
  - Use Citrate WET for Metals Analysis
- If Not Potentially Acid Generating
  - Use Deionized Water WET for Metals
- Calculate Soluble Designated Levels

Is It a Group B Mining Waste?

- **YES** if

measured concentration (mg/L) in extract of solid waste	≥	Soluble Designated Level

Mining Waste Regulations

Differences from Regulation of Other Units

- Mining Waste Management Units
  - Waste Piles
    - for solid mining wastes
  - Surface Impoundments
    - for liquid mining wastes
  - Tailings Ponds
    - for mining waste slurries

Mining Waste Regulations

Similarities to Regulation of Other Units

- Containment systems are similar

Mining Waste		Other Wastes
Waste Piles	≈	Landfills
Surface Impoundments	≈	Surface Impoundments
Tailings Ponds	≈	Surface Impoundments