Evaluating the Potential Human-Health Relevance of VOCs in Samples from Domestic & Public Wells in the U.S.

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Why assess findings in a health context?

- Address stakeholders' requests to increase human-health relevancy of results
- Identify which compounds are important
  - Which have concentrations of potential human-health concern?
  - Which occur most and least often?
  - Which are important for future monitoring?

Ground water is used as a drinking-water supply for about 50% of the Nation's population

- 3,497 drinking-water supply wells sampled
  - 2,401 domestic wells
  - 1,096 public wells
- Samples collected prior to treatment or blending
- 1 sample collected per well
- 55 VOCs analyzed per sample

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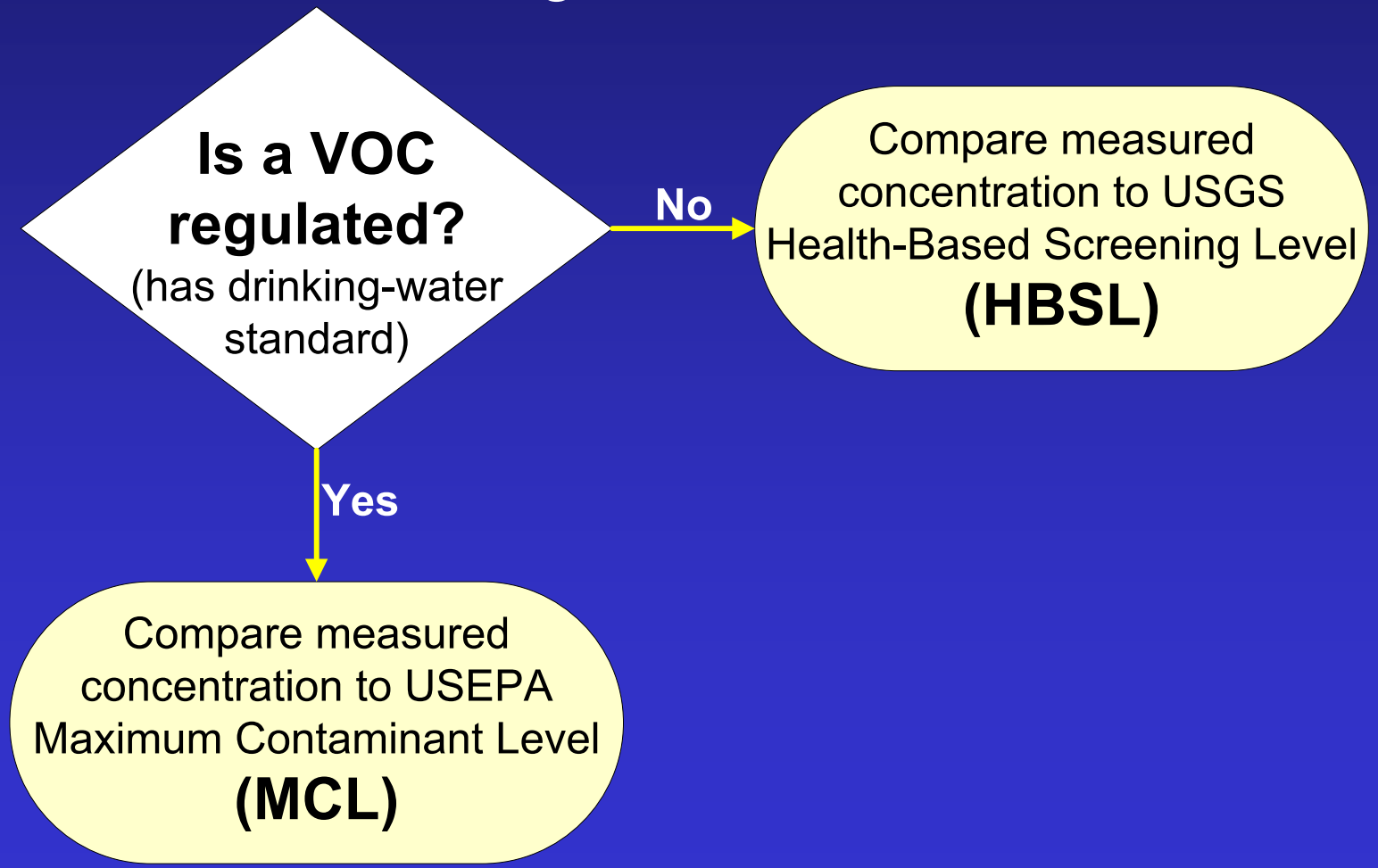
What process was used to assess findings in a human-health context?

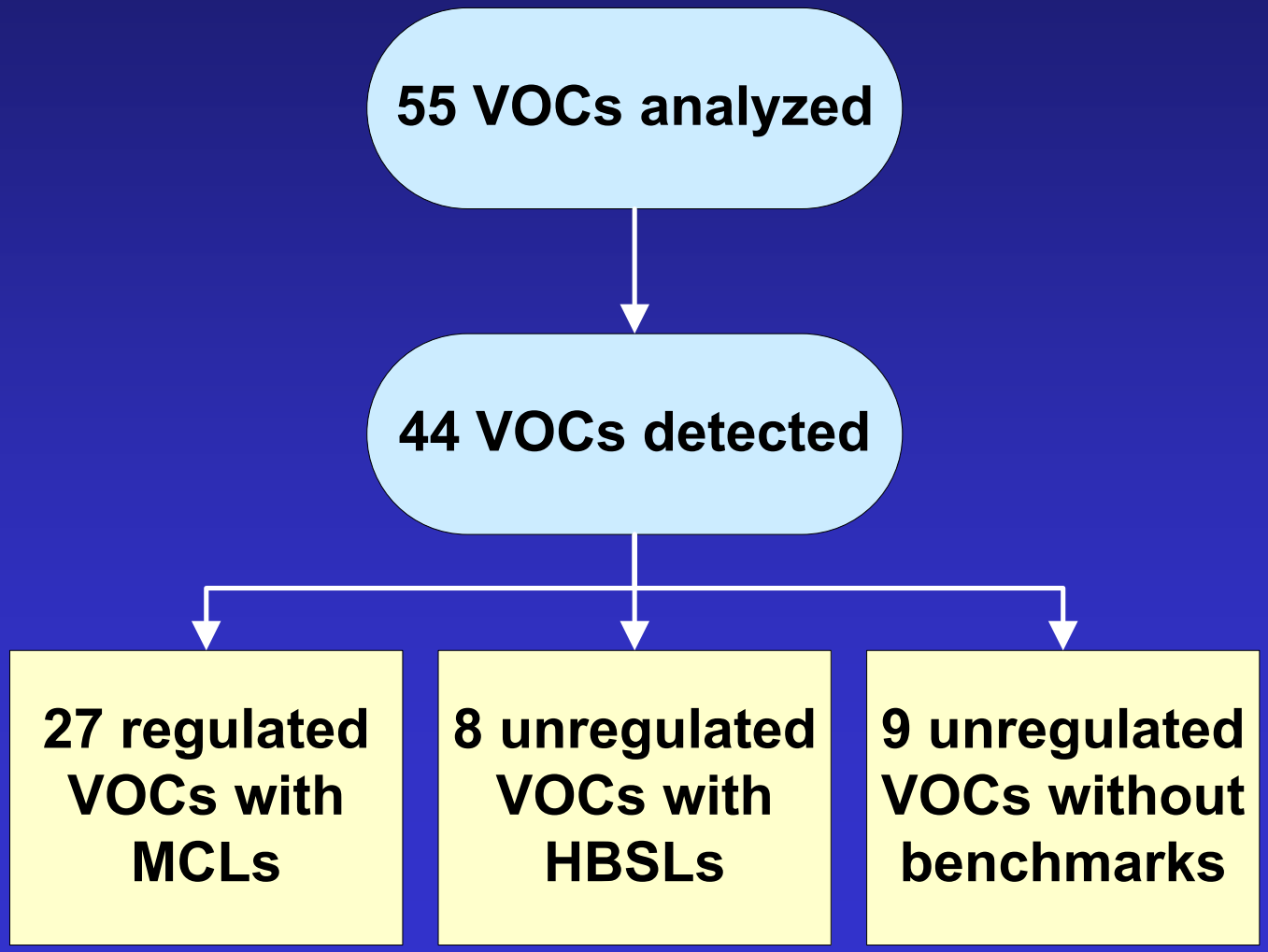
Screening-level assessment



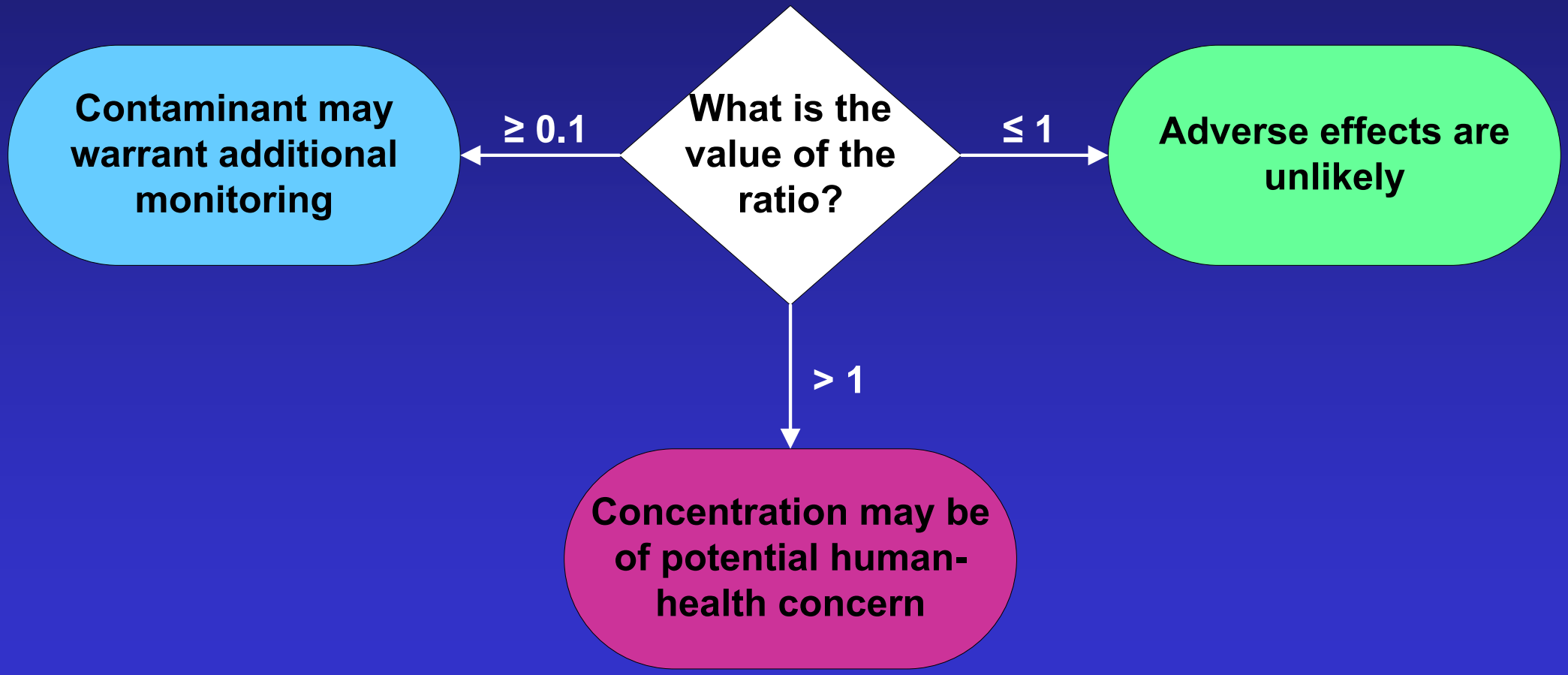
HBSLs are benchmark concentrations of contaminants in water

- Below which adverse human-health effects are not expected to occur
- Non-enforceable guidelines to compare against measured contaminant concentrations
- Developed in collaboration with USEPA & others
  - USEPA methodologies and toxicity data

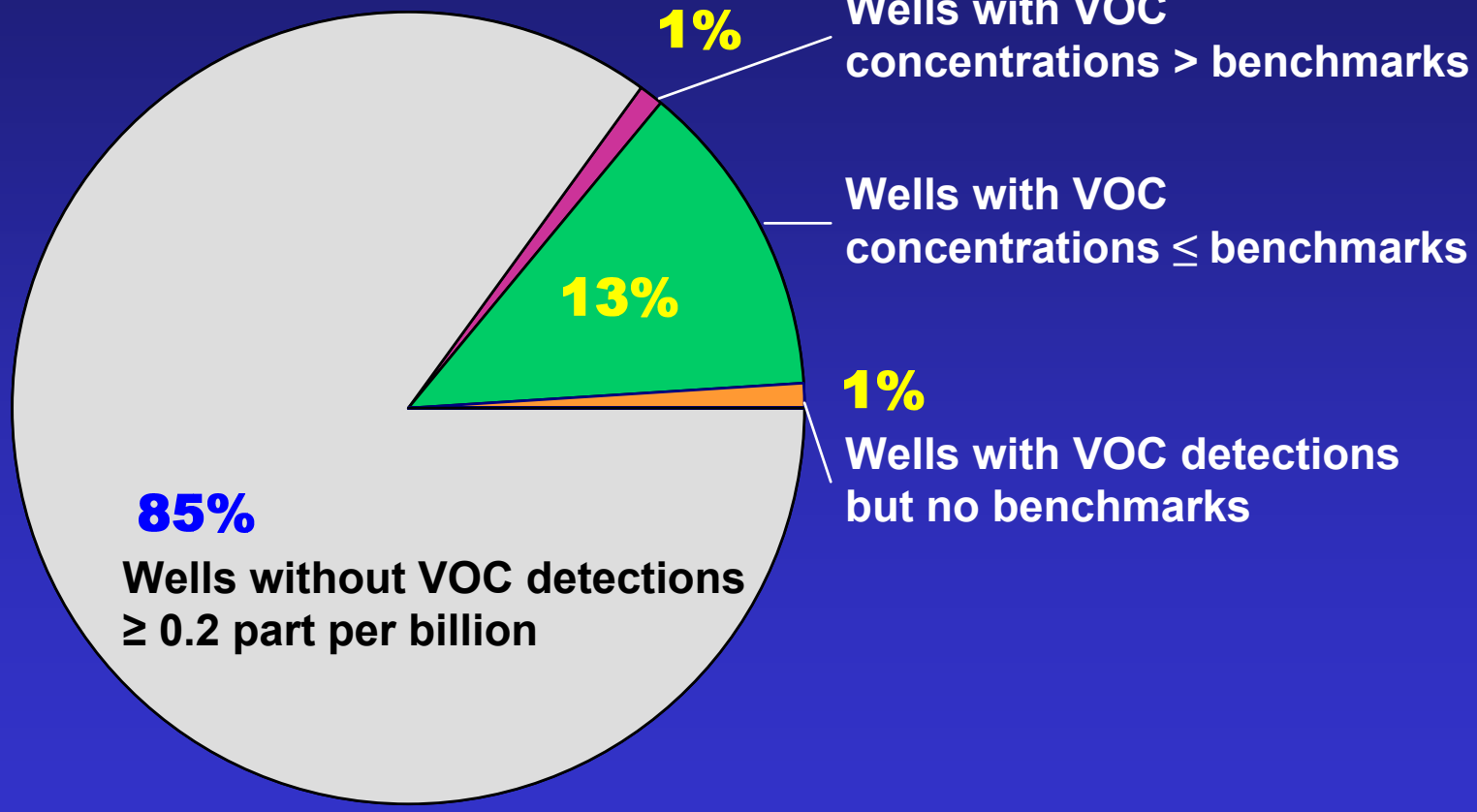
35 VOCs with MCLs or HBSLs were detected



Ratios of concentrations to MCLs or HBSLs provide perspective on findings



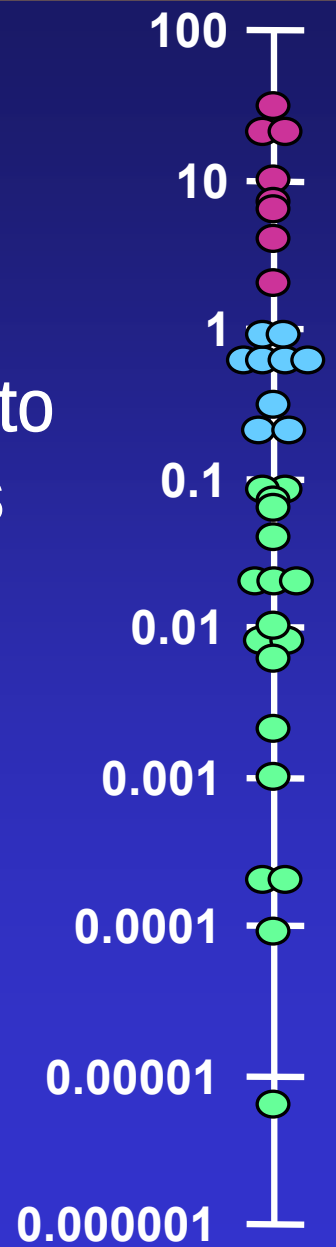
VOCs were not detected in the majority of samples



n = 3,497 well samples

Ratios were less than 1 for most detected VOCs

Ratios of maximum concentrations to MCLs or HBSLs



- 8 VOCs with ratios > 1
- 9 VOCs with ratios between 0.1 and 1
- 18 VOCs with ratios < 0.1

Increased risk of cancer & liver problems are potential effects for 8 VOCs with ratios greater than 1

Compound	Max ratio	# Samples with concentrations > MCLs	Potential health effects		
			Cancer	Liver problems	Other
Trichloroethene (TCE)	30	15	X	X	
Ethylene dibromide (EDB)	20	3	X	X	X
Methylene chloride	20	2	X	X	
Dibromochloropropane (DBCP)	10	14	X		X
Perchloroethene (PCE)	7	14	X	X	
1,1-Dichloroethene	6	3		X	
1,2-Dichloropropane	4	3	X		
Vinyl chloride	2	2	X		

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Take-home messages

- Screening-level assessments:
  - Provide human-health perspective for VOC occurrence
  - Prioritize needs for possible further investigations
- VOCs were not detected in the majority of well samples
- VOC concentrations were seldom greater than human-health benchmarks

More information

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USGS Fact Sheet: What Findings May Mean to Human Health

http://pubs.usgs.gov/fs/2006/3043/

http://water.usgs.gov/nawqa/HBSL/