Expressing Concentrations

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• The purpose of this presentation is to:
  
  • fulfill a 2015 Facilities Disposition and Site Remediation Work Plan topic
  
  • present information on some of the most common units of concentration used in CAB presentations
Acronyms:

- ppm – parts per million
- TCE – Trichloroethylene
- ppb – parts per billion
- mg – milligram
- kg – kilogram
- mL – milliliter
- L – Liter
- ug or µg – microgram
- dpm – disintegrations per minute
- Ci – Curie
- pCi – Picocurie
What is concentration?

- Concentration is the amount of something within something else.
CONTAINS ETHANOL
Maximum 10%
10 parts ethanol per 100 parts fuel

10 percent
concentration of ethanol in fuel

10 percent = 10 parts per hundred

\[
\frac{10}{100} = 0.1
\]
Concentrations of SRS contaminants are much less than 10 per cent,
and even much less than 1 per cent!
1 part per hundred $\frac{1}{100}$ 0.01

1 part per thousand $\frac{1}{1,000}$ 0.001

1 part per million $\frac{1}{1,000,000}$ 0.000001

1 part per billion $\frac{1}{1,000,000,000}$ 0.000000001
1 part per million (1 ppm)

one grain of salt.....

.....in 12 ounces of water
1 part per million (1 ppm)

one drop of dye.....

....in 12 gallons of water
1 part per million (1 ppm)

mg/kg one milligram of lead per kilogram of soil

mg/L one milligram of TCE per liter of water
1,000 ppm = 0.1%

10,000 ppm = 1%
1 part per billion (1 ppb)

one grain of salt.....

.....in 55 gallons of water
1 part per billion (1 ppb)

one drop of dye.....

.....in 240 55-gallon drums
1 part per billion (1 ppb)

ug/kg  one microgram of lead per kilogram of soil

ug/L  one microgram of TCE per liter of water
1 part per billion (1 ppb)

$\mu g/kg$ one microgram of lead per kilogram of soil

$\mu g/L$ one microgram of TCE per liter of water
are used for non-radioactive materials
MEASURING CONCENTRATIONS OF RADIOACTIVE MATERIAL
Each “click” of a Geiger Counter represents the disintegration of one atom.

The disintegration rate (disintegrations per minute) tells us how much radioactive material is present.
Disintegration rate is expressed in **Curies**

1 Curie (Ci) = about 2 trillion disintegrations per minute (dpm)

**Curies are used for High Level Waste**

Environmental samples have much less radioactivity, so a smaller unit is used for soil, water, & tissue.
1 picocurie (pCi) = one-trillionth of a Curie

1 pCi = about 2 disintegrations per minute

pCi/g picocuries per gram (soil, tissue)

pCi/L picocuries per liter (water)

pCi/mL picocuries per milliliter (water)
NATURAL RADIOACTIVITY

Radioactivity exists naturally everywhere

Uncontaminated soil: about 25 pCi/g
Uncontaminated groundwater: about 10-50 pCi/L
Please plan to attend
Education Sessions Parts 2 & 3:

Oct. 13 – Calculating Risk
Dec. 8 – Remedial Decisions
QUESTIONS??