



**US Army Corps
of Engineers**

Fact Sheet

Scientific Notation

U.S. Army Corps of Engineers

This is one in a series of fact sheets that provide information about regulatory, technical, and other issues considered in decision-making for programs addressing sites potentially contaminated with hazardous, toxic and/or radioactive materials. This fact sheet discusses the use of scientific notation in risk assessment.

Interpreting Cancer Risk Numbers Expressed in Scientific Notation

Carcinogenic risk is expressed in scientific notation, which is the use of numbers raised to a power, such as 10^4 or 10^{-6} . Writing numbers in scientific notation takes up less space, but this notation is not familiar to everybody.

If the number has an exponent, it is multiplied by itself the number of times indicated. (The exponent is the small number to the upper right.) For example, 10^2 (2 is the exponent) is 100, or 10×10 .

Negative exponents are different; a negative exponent indicates a fraction. So 10^{-4} is the same as $1/(10 \times 10 \times 10 \times 10)$ or 1 divided by $(10 \times 10 \times 10 \times 10)$. This is $1/(10,000)$, which equals 0.0001. Another way to think about 10^{-4} is to think that it is 10,000 times smaller than 1.

A cancer risk of 1×10^{-6} is the risk that one additional person in a population of one million (i.e., $10 \times 10 \times 10 \times 10 \times 10 \times 10$ or 1,000,000) exposed people will develop cancer over his/her lifetime. This is in addition to the risk that 1 in approximately 3 Americans will develop cancer over their lifetime, according to the American Cancer Society.

Here are the most common numbers, "translated" from scientific notation:

10^6	=	1,000,000	10^{-1}	=	0.1 (or 1/10)
10^5	=	100,000	10^{-2}	=	0.01 (or 1/100)
10^4	=	10,000	10^{-3}	=	0.001 (or 1/1,000)
10^3	=	1,000	10^{-4}	=	0.0001 (or 1/10,000)
10^2	=	100	10^{-5}	=	0.00001 (or 1/100,000)
10^1	=	10	10^{-6}	=	0.000001 (or 1/1,000,000)
10^0	=	1			

Other examples of scientific notation:

$$1.5 \times 10^1 = 15$$

$$7.3 \times 10^{-4} = 0.00073$$

$$4.18 \times 10^2 = 418$$

How Do I Get More Information?

To get more information about this topic or other related issues, contact:

**U. S. Army Corps of Engineers
FUSRAP Team
1776 Niagara Street
Buffalo, NY 14207**

(716) 879-4438

Or visit the USACE-Buffalo District webpage address: <http://www.lrb.usace.army.mil/fusrap>