Units of Measure

The principal units of measurement used in the HSW EIS are SI units, an abbreviation for the International System of Units, a metric system accepted by the International Organization of Standardization as the legal standard at a meeting in Elsinore, Denmark, in 1966. In this system, most units are made up of combinations of six basic units, of which length in meters, mass in kilograms, and time in seconds are of most importance in the EIS. An exception is radiological units that use the common system (e.g., rem, millirem).

Numerical (Scientific or Exponential) Notation

Numbers that are very small or very large are often expressed in scientific or exponential notation as a matter of convenience. For example, the number 0.000034 may be expressed as 3.4×10^{-5} or 3.4E-05 and 65,000 may be expressed as 6.5×10^{4} or 6.5E+04. In the EIS, numerical values less than 0.001 or greater than 9999 are generally expressed in exponential notation, or 1.0E-03 and 9.9E+03, respectively.

Multiples or sub-multiples of the basic units are also used. A partial list of prefixes that denote multiples and sub-multiples follows, with the equivalent multiplier values expressed in scientific and exponential notation:

Name	Symbol	Value Multiplied by:		
atto	a	0.000000000000000001	or 1×10^{-18}	or 1E-18
femto	f	0.000000000000001	or 1×10^{-15}	or 1E-15
pico	p	0.000000000001	or 1×10^{-12}	or 1E-12
nano	n	0.000000001	or 1×10^{-9}	or 1E-09
micro	µ	0.000001	or 1×10^{-6}	or 1E-06
milli	m	0.001	or 1×10^{-3}	or 1E-03
centi	c	0.01	or 1×10^{-2}	or 1E-02
kilo	k	1,000	or 1×10^{3}	or 1E+03
mega	M	1,000,000	or 1×10^{6}	or 1E+06
giga	G	1,000,000,000	or 1×10^{9}	or 1E+09
tera	T	1,000,000,000,000	or 1×10^{12}	or 1E+12

The following symbols are occasionally used in conjunction with numerical expressions: < less than; ≤ less than or equal to; > greater than; ≥ greater than or equal to.

In some cases, numerical values in this document have been rounded to an appropriate number of significant figures to reflect the accuracy of data being presented. For example, the numbers 0.021, 21, 2100, and 2,100,000 all contain 2 significant figures. In some cases, where several values are summed to obtain a total, the rounded total may not exactly equal the sum of its rounded component values.

Basic Units and Conversion Table

Unit of Measure	English Unit	Symbol	Metric Unit	Symbol
Length	inches	in	centimeters	cm
	feet	ft	meters	m
	yards	yd	kilometers	km
	miles	mi		
Area	square feet	ft^2	square meters	m^2
	acres	ac	hectares	ha
	square miles	mi^2	square kilometers	km^2
Volume (dry)	cubic feet	ft^3	cubic meters	m^3
	cubic yards	yd^3		
Volume (liquid)	gallons	gal	liters	L
Mass	ounces	oz	grams	g
	pounds	lb	kilograms	kg
Concentration	parts per million	ppm	grams per liter	g/L
Radioactivity	curies	Ci	becquerels	Bq
Radiation Absorbed Dose	rad	rad	Gray	Gy
Radiation Effective Dose Equivalent	rem	rem	Sievert	Sv
Temperature	degrees Fahrenheit	°F	degrees Centigrade	°C

Base Unit	Multiply By	To Obtain	Base Unit	Multiply By	To Obtain
in	2.54	cm	cm	0.394	in
ft	0.305	m	m	3.28	ft
yd	0.914	m	m	1.09	yd
mi	1.61	km	km	0.621	mi
ft^2	0.093	m^2	m^2	10.76	ft^2
ac	0.405	ha	ha	2.47	ac
mi^2	2.59	km^2	km^2	0.386	mi^2
ft^3	0.028	m^3	m^3	35.3	ft^3
yd^3	0.765	m^3	m^3	1.31	yd^3
gal	3.77	L	L	0.265	gal
oz	28.349	g	g	0.035	oz
lb	0.454	kg	kg	2.205	lb
ppm	0.001	g/L	g/L	1000	ppm
Ci	3.7×10^{10}	Bq	Bq	2.7×10^{-11}	Ci
rad	0.01	Gy	Gy	100	rad
rem	0.01	Sv	Sv	100	rem
°F	(°F - 32) x 5/9	°C	°C	(°C x 9/5) + 32	°F

Radionuclide Nomenclature[a,b]

Symbol	Radionuclide	Half-Life	Symbol	Radionuclide	Half-Life
Ac-227*	actinium-227	22 yr	Pu-240	plutonium-240	6537 yr
Ag-110m	silver-110m	250 d	Pu-241	plutonium-241	14 yr
Am-241	americium-241	432 yr	Pu-242	plutonium-242	3.7×10^5 yr
Ba-137m	barium-137m	2.6 min	Pu-244	plutonium-244	8.1×10^7 yr
Be-7*	beryllium-7	53 d	Ra-224*	radium-224	3.7 d
Bi-212*	bismuth-212	61 min	Ra-226*	radium-226	1600 yr
Bi-214*	bismuth-214	20 min	Ra-228*	radium-228	5.8 yr
C-14*	carbon-14	5730 yr	Rb-87*	rubidium-87	4.8×10^{10} yr
Cd-113m*	cadmium-113m	15 yr	Rh-106	rhodium-106	30 sec
Ce-144	cerium-144	285 d	Ru-106	ruthenium-106	374 d
Cl-36	chlorine-36	3.0×10^5 yr	Sb-125	antimony-125	2.8 yr
Cm-244	curium-244	18 yr	Sb-126m	antimony-126m	11 sec
Co-60	cobalt-60	5.3 yr	Se-75	selenium-75	120 d
Cs-137	cesium-137	30 yr	Se-79	selenium-79	6.5×10^5 yr
Eu-152	europium-152	14 yr	Sm-147*	samarium-147	1.1×10^{11} yr
Eu-154	europium-154	8.6 yr	Sm-151	samarium-151	90 yr
Eu-155	europium-155	4.8 yr	Sn-126	tin-126	1.0×10^5 yr
Fe-55	iron-55	2.7 yr	Sr-90	strontium-90	29 yr
H-3*	tritium	12 yr	Tc-99	technetium-99	2.1×10^5 yr
I -125	iodine-125	59 d	Th-228*	thorium-228	1.9 yr
I -129	iodine-129	1.6×10^7 yr	Th-229	thorium-229	7880 yr
K-40*	potassium-40	1.3×10^9 yr	Th-230*	thorium-230	7.5×10^4 yr
Mn-54	manganese-54	312 d	Th-232*	thorium-232	1.4×10^{10} yr
Mo-93	molybdenum-93	4000 yr	Th-234*	thorium-234	24 d
Nb-94	niobium-94	2.0×10^4 yr	U-232	uranium-232	69 yr
Ni-59	nickel-59	7.6×10^4 yr	U-233	uranium-233	1.6×10^5 yr
Ni-63	nickel-63	100 yr	U-234*	uranium-234	2.5×10^5 yr
Np-237	neptunium-237	2.1×10^6 yr	U-235*	uranium-235	7.0×10^8 yr
Pa-231*	protactinium-231	3.3×10^4 yr	U-236	uranium-236	2.3×10^7 yr
Pb-210*	lead-210	22 yr	U-238*	uranium-238	4.5×10^9 yr
Pb-212*	lead-212	11 hr	W-185	tungsten-185	75 d
Pd-107	palladium-107	6.5×10^6 yr	Y-90	yttrium-90	2.7 d
Pr-144	praseodymium-144	17 m	Zn-65	zinc-65	244 d
Pu-238	plutonium-238	88 yr	Zr-93	zirconium-93	1.5×10^6 yr
Pu-239	plutonium-239	2.4×10^4 yr	Zr-95	zirconium-95	64 d

(a) From *CRC Handbook of Chemistry and Physics*. 74th edition. ed. David R. Lide, CRC Press, Boca Raton, Florida 1993.
(b) Listing includes radionuclides evaluated in this document. Metastable isomers are indicated by the addition of an *m*. Short-lived decay products are not shown.
* Indicates naturally occurring radionuclides.