

**Handy Conversion and Calculation Factors**

Length or Distance			
inch	x	2.54	= centimeter
foot	x	30.48	= centimeter
yard	x	0.914	= meter
mile	x	1.6093	= kilometer
Area			
inch <sup>2</sup>	x	6.45	= centimeter <sup>2</sup>
foot <sup>2</sup>	x	929	= centimeter <sup>2</sup>
yard <sup>2</sup>	x	8361.3	= centimeter <sup>2</sup>
yard <sup>2</sup>	x	0.835	= meter <sup>2</sup>
acre	x	4047	= foot <sup>2</sup>
acre	x	4840	= yard <sup>2</sup>
mile <sup>2</sup>	x	640	= acre
mile <sup>2</sup>	x	3097600	= yard <sup>2</sup>
mile <sup>2</sup>	x	2.59	= kilometer <sup>2</sup>
are	x	100	= meter <sup>2</sup>
hectare	x	10000	= meter <sup>2</sup>
Volume			
inch <sup>3</sup>	x	16.39	= centimeter <sup>3</sup>
fl. ounce (US)	x	1.805	= inch <sup>3</sup>
gallon (US)	x	231	= inch <sup>3</sup>
gallon (US)	x	8	= pint (US)
gallon (US)	x	3.785	= liter
foot <sup>3</sup>	x	7.481	= gallon (US)
yard <sup>3</sup>	x	0.7646	= meter <sup>3</sup>
barrel (oil)	x	42	= gallon (US)
Mass			
lb (avdp)	x	16	= ounce (avdp)
lb (avdp)	x	452.6	= gram
lb (avdp)	x	0.4526	= kilogram
ton (short)	x	2000	= lb (avdp)
tonne (metric)	x	2205	= lb (avdp)
ton (long)	x	2240	= lb (avdp)
slug	x	32.17	= lb (avdp)
carat	x	0.2	= grams
Density			
g/cm <sup>3</sup>	x	1	= kg/liter
g/cm <sup>3</sup>	x	1000	= kg/m <sup>3</sup>
lb/in <sup>3</sup>	x	27.68	= kg/liter
lb/ft <sup>3</sup>	x	16.019	= kg/m <sup>3</sup>
slug/ft <sup>3</sup>	x	515.378	= kg/m <sup>3</sup>
Viscosity (Dynamic)			
poise	x	1	= g/cm.s
poise	x	1	= dyne.s/cm <sup>2</sup>
poise	x	0.1	= Pa.s
poise	x	0.1	= N.s/m <sup>2</sup>
poise	x	100	= centipoise

**Fast Facts**

**Direct Push Technology**

Direct Push Technology (DPT) is an efficient method to install boreholes without bringing any undesired soil to the surface. DPT *pushes* rather than rotates drilling rods into soil, collecting soil samples with minimal site disruption. If necessary, the borehole can also be completed as a monitoring well using either a pre-packed screen and expanding foam bridge with bentonite quick seal sleeve or standard gravel pack with bentonite seal.

**DPT Benefits Help Reduce Costs**

- No cost for drill cuttings disposal
- No contaminant brought to the surface
- Smaller rig footprint than typical auger rigs
- Versatile and well suited for environmental sampling in tight spaces
- Maneuvers easily in rough areas
- Allows for angle drilling even in cramped areas
- Dual tube system allows continuous soil sampling over entire length of borehole

MSE operates a direct push Geoprobe® Model 66DT track-mounted unit and uses the latest sample collection technology.



MSE using the 66DT unit to probe radioactively contaminated SOILS (Department of Energy Hanford Site).

Geoprobe®  
 Direct Push Technology  
 Soil, Groundwater  
 & Geotechnical  
 Investigations

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Our drilling equipment and qualified personnel ensure your project is completed on time

Geoprobe®  
 Direct Push Technology  
 Soil, Groundwater  
 & Geotechnical  
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MSE offers soil and groundwater sampling and geotechnical drilling services using versatile Geoprobe® equipment operated by trained personnel

Our drilling equipment and qualified personnel ensure your project is completed on time

# Geoprobe® Services



## Providing Geoprobe® Services since 1999

MSE offers drilling services and qualified professionals and experts trained to assist you with specific field-work requirements.

## Services and Support

- Soil and groundwater characterizations
- Geotechnical investigations
- Work in radiation zones for High-level/Low-level radioactive waste investigations
- Drilling to depths of up to 100 feet (depending on subsurface formation)
- Discrete interval soil sampling
- Soil gas/vapor sampling
- Groundwater sampling and monitoring
- Setting monitoring wells up to 2-inch ID
- Setting pre-pack well screens and bentonite foam bridge quick seals
- Installing air sparging and soil vapor extraction (SVE) wells
- Grouting and remediation fluid injection

## Equipment

- to support subsurface investigation projects:
- Track-Mounted Geoprobe® Model 66DT Unit
  - Automatic drop hammer for SPT blow count
  - 3.25-inch diameter probe rods
  - 2.25-inch diameter probe rods
  - Auxiliary GA 3000 auger head
  - 4.25-inch diameter hollow stem augers
  - Macro-Core MC5 sampling system
  - Dual-Tube soil sampling (DT 22 & DT 325 systems)
  - Grout pumps with in-line mixing system
  - Specialized injection rods
  - Photo-Ionization Detector (PID)
  - Support trailer for field operations
  - Safety equipment
  - Decontamination equipment

## Capabilities

- Can install and probe
  - ✓ Vertical pushes
  - ✓ Slanted pushes
  - ✓ Horizontal pushes
- Can operate unit
  - ✓ Over rough terrain
  - ✓ In relatively low load-bearing surfaces
  - ✓ At location with limited accessibility
  - ✓ Inside buildings with ceilings as low as 13'
  - ✓ Inside buildings with entries as small as 7'-2" high and 4' -1 inch wide

## Geoprobe® Model 66DT Specifications

Stroke	66 in	1676 mm
Weight	4,900 lbs	2,225 Kg
Width	48 in	1219 mm
Length (folded)	94 in	2388 mm
Height (folded)	85 in	2159 mm
Height (unfolded)	153 in	3886 mm
Lateral Movement (side to side)	39 in	991 mm
Foot Travel	39 in	991 mm
Extension	15 in	381 mm
Oscillation (both directions)	6 degrees from vertical	
Down Force	34,000 lbs	151 kN
Retraction Force	46,000 lbs	205 kN
Hydraulic Pressure (max)	3,000 psi	207 bar
Hydraulic Flow Rate (system)	30 gpm	114 Lpm
Hammer System	GH60	GH60
Percussion Rate	32 Hz	32 Hz
Torque (hammer rate)	560 ft. lb	759 Nm
Rotation Rate (bi-directional)	240 rpm	
Auger head torque (max)	3,000 ft. lb	4,067 Nm
Rotation rate	0 – 150 rpm	

## Versatility and Flexibility

MSE's equipment goes where you need it to go and our experienced operators make sure samples are collected safely and efficiently.



We can maneuver the Geoprobe® track-mounted machine over rough terrain where trucks cannot venture easily.



We can probe slant holes allowing us to take samples under buildings or other features.



MSE personnel have experience drilling with the Geoprobe® in hazardous areas.



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Geoprobe Services

## Handy Conversion and Calculation Factors

### Viscosity (Kinematic)

stoke	x	1	=	cm <sup>2</sup> /s
stoke	x	0.0001	=	m <sup>2</sup> /s
stoke	x	100	=	centistokes
stoke	x	3.875	=	ft <sup>2</sup> /h

### Viscosity (Kinematic to Dynamic)

stoke	x	Density in g/cm <sup>3</sup>	=	poise
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### Pressure

atm	x	29.92	=	inch Hg
atm	x	760	=	mm Hg
atm	x	14.7	=	PSI
atm	x	101325	=	Pa
atm	x	101.325	=	kPa
atm	x	1.01325	=	bar
atm	x	10.332	=	meter H <sub>2</sub> O
atm	x	33.899	=	foot H <sub>2</sub> O
PSI	x	2.307	=	foot H <sub>2</sub> O
PSI	x	2.036	=	inch Hg
PSI	x	51.7	=	mm Hg

### Radioactivity

becquerel	x	1	=	disintegration/s
curie	x	3.7x10 <sup>10</sup>	=	becquerel
curie	x	1x10 <sup>12</sup>	=	picocurie

### Temperature

Celsius	(C°x1.8) +32	=	Fahrenheit
Fahrenheit	(F°-32)/1.8	=	Celsius

### SI Prefix

P (peta)	=	1x10 <sup>15</sup>
T (tera)	=	1x10 <sup>12</sup>
G (giga)	=	1x10 <sup>9</sup>
M (mega)	=	1x10 <sup>6</sup>
k (kilo)	=	1x10 <sup>3</sup>
h (hecto)	=	1x10 <sup>2</sup>
da (deka)	=	1x10 <sup>1</sup>
base unit	=	1
d (deci)	=	1x10 <sup>-1</sup>
c (centi)	=	1x10 <sup>-2</sup>
m (mili)	=	1x10 <sup>-3</sup>
µ (micro)	=	1x10 <sup>-6</sup>
n (nano)	=	1x10 <sup>-9</sup>
p (pico)	=	1x10 <sup>-12</sup>
f (femto)	=	1x10 <sup>-15</sup>

Cut along line for handy conversion factors

## Selected Clients >

- GeoLOGIC Inc.
- Dowl HKM
- Montana Bureau of Mining Geology (MBMG)

- United States Geological Survey (USGS)
- Montana Dept. of Environmental Quality
- United States Department of Energy

- Pioneer Technical Services
- University of Montana
- SLR International Corporation

- ARCO/British Petroleum
- DoD Malmstrom Air Force Base
- Robert Peccia & Associates

- CH2MHIL Hanford
- URS Corporation
- Washington Closure Hanford

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