

Oregon Department of Environmental Quality
HOW TO DETERMINE LATITUDE AND LONGITUDE FROM
TOPOGRAPHIC MAPS

Latitude is the distance north or south of the equator. Longitude is the distance east or west of the prime meridian (Greenwich, England). Latitude and longitude are measured in seconds, minutes, and degrees:

$$60'' \text{ (seconds)} = 1' \text{ (minute)}$$

$$60' \text{ (minutes)} = 1^\circ \text{ (degree)}$$

To determine the latitude and longitude of your facility, you will need a topographic map from United States Geological Survey (USGS).

How to Obtain USGS Maps:

USGS maps used for determining latitude and longitude may be obtained from the USGS distribution center. These maps are available in both the 7.5 minute and 15 minute series. For maps of the United States, including Alaska, Hawaii, American Samoa, Guam, Puerto Rico, and the US Virgin Islands, contact:

Earth Science Information Center
US Geological Survey
PO Box 25046, MS 504
Denver Federal Center
Denver, CO 80225

If you are not sure on which map your site is located, consult the index of topographic maps for your state, which USGS will provide free of charge. USGS maps cost about \$3.00 and are often available in local libraries and at commercial dealers such as surveyors or outdoor recreation equipment dealers. The index for your state lists these alternative sources for obtaining maps.

If you need help in determining your facility's latitude and longitude, the National Cartographic Information Center located in Denver, (303) 236-5829, can provide assistance.

For maps/indexes and additional assistance contact:

Publication Sales
Oregon Dept. of Geology
State Forestry Building
5375 Monument Dr.
Merlin, OR 97532
(541) 476-2496

The Nature of The NW
Information Center, State
Office Building, Suite 177
800 NE Oregon Street, #5
Portland, OR 97232
(503) 872-2750

Determining Your Facility's Latitude and Longitude: *(See diagram next page.)*

Once you have obtained the correct map for your facility:

1. Mark the location of the point(s) of discharge *and* the center of production on the map.

2. For each location, construct a small rectangle around the point with fine pencil lines connecting the nearest 2-1/2' or 5' graticules. Graticules are intersections of latitude and longitude lines that are marked on the map edge, and appear as black crosses at four points in the interior of the map.
3. Read and record the latitude and longitude for the southeast corner of the small quadrangle drawn in step two. The latitude and longitude are printed at the edges of the map.
4. To determine the increment of latitude above the latitude line recorded in step 3:

- Position the map so that you face its *west* edge;
- Place the ruler in approximately a north-south alignment, with the "0" on the latitude line recorded in step 3 and the edge intersecting the point.

Without moving the ruler, read and record:

- The measurement from the latitude line to the desired point (the point distance);
- The measurement from the latitude line to the north line of the small quadrangle (the total distance).

Determine the number of seconds to be added to the latitude recorded in step 3 by using the ratio:

$$\left[\frac{\text{Point distance}}{\text{Total distance between lines}} \right] \times 150'' = \text{Increment of latitude}$$

(NOTE: 150'' is the number of seconds of arc for the side of the small quadrangle on a 7.5' map. If you are using a 15' map, the multiplication factor is 300'' instead of 150'' since each graticule is 5' of latitude or longitude.)

For Example:

$$\text{Point distance} = 99.5$$

$$\text{Total distance} = 192.0$$

$$\frac{99.5}{192.0} \times 150'' = 77.7'' = 01' 17.7''$$

$$(60'' = 1'; 77.7'' - 60'' = 01' 17.7'')$$

Latitude in step 3: $32^{\circ} 17' 30.0''$
 Increment: $+ 01' 17.7''$
 Latitude of point: $32^{\circ} 18' 47.7''$
 to the nearest second = $32^{\circ} 18' 48''$

Determine the number of seconds to be added to the longitude recorded in step 3 by using the ratio:

$$\left(\frac{\text{Point distance}}{\text{Total distance between lines}} \right) \times 150'' = \text{Increment of longitude}$$

5. To determine the increment of longitude west of the longitude line you recorded in step 3:

- Position the map so that you face its *south* edge:
- Place the ruler in approximately an east-west alignment with the "0" on the longitude line recorded in step 3 and the edge intersecting the point.

Without moving the ruler, read and record:

- The measurement from the longitude line to the desired point (the point distance);
- The measurement from the longitude line to the west line of the small quadrangle (the total distance).

For Example:

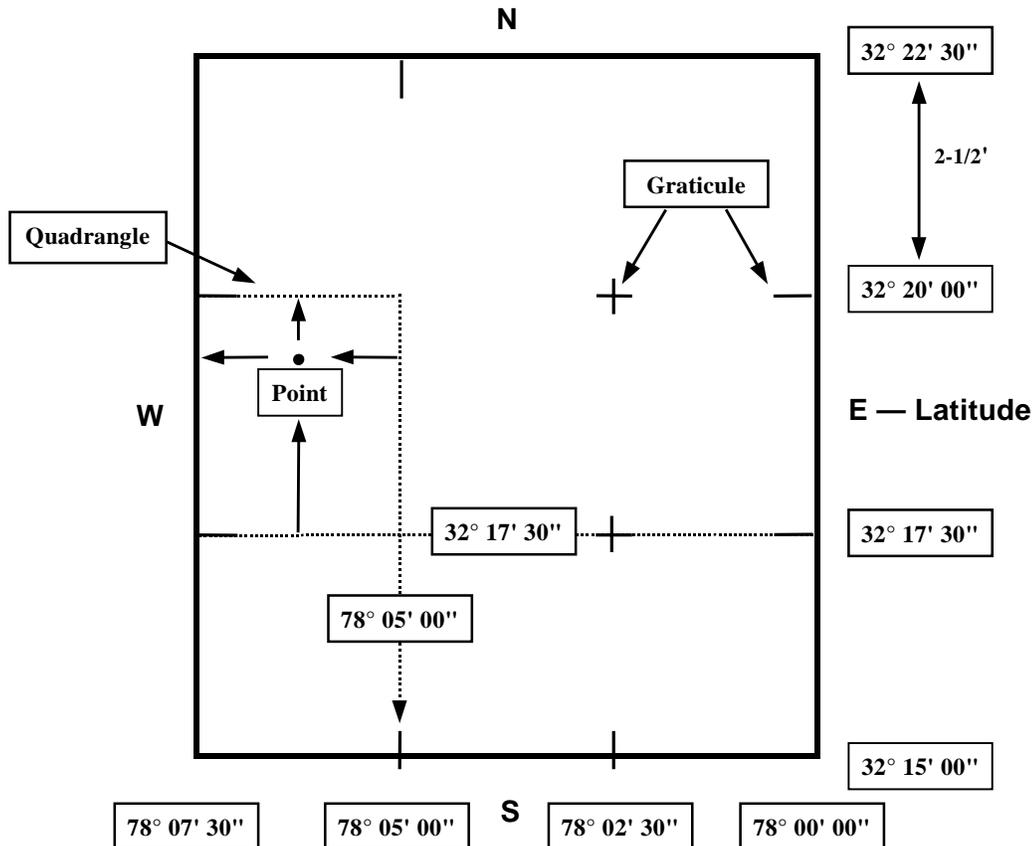
Point distance = 65.0
 Total distance = 149.9

$$\frac{65.0}{149.9} \times 150'' = 66.4'' = 01' 06.4''$$

($60'' = 1'$; $66.4'' - 60'' = 01' 06.4''$)

Latitude in step 3: $78^{\circ} 05' 00.0''$
 Increment: $+ 01' 06.4''$
 Latitude of point: $78^{\circ} 06' 06.4''$
 to the nearest second = $78^{\circ} 06' 06''$

Latitude/Longitude Diagram



Point:
 Latitude - $78^{\circ} 06' 06''$ (North)
 Longitude - $78^{\circ} 06' 06''$ (West)

NOTE: This diagram based on a USGS 7.5 Minute Series Topographic Map. Not drawn to scale.