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## QUALITY CONTROL/QUALITY ASSURANCE DOCUMENTATION

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## ACKOWLEDGEMENTS

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# TABLE OF CONTENTS

# 1.0 SCOPE AND APPLICABILITY

This document presents the North Dakota Department of Environmental Quality, Division of Water Quality's (DWQ) Standard Operating Procedure (SOP) for performing GPS Data Collection. This SOP applies to all DEQ field staff, non-DEQ cooperators, and citizen volunteers. The scope of this document is collection of coordinates for monitoring stations, observation points, sample locations, facility sites or other tracked or regulated feature using global positioning system (GPS) receivers. GPS receivers can be of any grade, recreational, mapping or survey. The accurate collection and recording of soil, water or air samples as well as facility locations is necessary to the regulatory and monitoring requirements of the North Dakota Department of Environmental Quality (NDDEQ) as described in ND Century Code Title 23.1 and Administrative Rule Title 33 and nay applicable Administrative Rule Supplements.

If location information is collected as presented in this Standard Operating Procedure and associated equipment specification procedures, the latitude and longitude data will meet the standards as set forth in the Latitude /Longitude Data Standard, Standard NO. EX000017.2 (January 6, 2006, by the Environmental Data Standards Council), as well as provide necessary accuracy statements needed to meet state Federal Geographic Data Committee metadata standards.

The best way to make data comparable for a monitoring project/program is to choose one procedure and have all data collectors use that procedure consistently. The procedure below was chosen by DEQ with a goal of reducing variability.

# 2.0 SUMMARY OF METHODS

GPS locations are collected from pre-determined locations depending on the type of facility and access to facility. GPS locations are also collected as part of air, water or soil sample collection. The Appendices contain specific methods for the GPS units that the NDDEQ maintains. No matter what GPS receiver is used, the type of facility visited, or sample collected, the following is a general summary of the method:

1. Users must read through and be familiar with the definitions and GPS background information as presented in this standard operating procedure and associated appendices relating to the specific GPS unit they will be using in the field.

2. Prior to leaving the office, the GPS receiver is checked to determine it is in good working condition, is fully charged and is fully operational prior to field work commencing.

3. Previous site information is examined to make sure there are no access contracts or potential hazards.

4. At the field site, care must be taken to ensure that the employee is in a safe environment, clear of overhead obstructions and off roadways or other transportation routes when taking GPS readings.

5. If applicable to the GPS-receiver, make sure Wide Area Augmentation System (WAAS) is enabled prior to collecting any location information. While at the site, GPS locations are recorded by the GPS receiver and saved to the device. Locations may also be transcribed to field notes or transmitted to laptop per program standard operating procedure.

6. GPS locations are recorded using the accuracy required for the project. Supplementary information about the GPS receiver is recorded, such as recording datum, type, make and model of GPS receiver as well as user name.

7. Time of data collection, weather conditions (temperature, precipitation, cloud cover) and other noteworthy conditions should be recorded on sample collection documentation.

# 3.0 BACKGROUND

## 3.1 History and Background

The Global Positioning System (GPS) is a space-based radio navigation system created, operated and maintained by the U.S. Department of Defense (DoD) to provide navigation, location, and timing information. The system was created primarily for military operations and first conceived by the DoD in the 1970's. The system is now a constellation of approximately 32 GPS satellites that orbit the earth and provide users with accurate information on position, velocity and time anywhere in the world and in all weather conditions. Since the 1990's the U.S. Coast Guard Navigation Center (NAVCEN) is the civilian interface for the public on GPS matters.

GPS is the U.S. implementation of Global Navigation Satellite System (GNSS), the international civil satellite navigation capability. GPS receivers have the capability to utilize signals from other GNSS such as the Russian GLONASS. NDDEQ Has no limitations on the use of signals from other GNSS if the GPS receiver can receive those signals.

The GPS consists of three basic elements: the space segment, control segment, and user segment. Background information is provided on the space and control segment to aid the user in understanding why specific procedures are followed in the user segment.

Space segment consists of the constellation of the approximate 32 satellites in six orbital tracks. Each satellite circles the earth twice per day and is in constant motion relative to a user on the ground. Each satellite consists of solar panels that provide power for the satellite throughout its life. Satellites have a variety of external antennas. Each satellite also has four atomic clocks and a radio transmitter. Each satellite transmits a unique code in the radio signal.

The control segment consists of a master control ground station and various monitoring stations and ground antennas across the earth that serve as uplinks to the satellites and adjust satellite orbits and clocks when necessary. The control segment uses measures collected by the monitor stations to predict the behavior of each satellite's orbit and clock. The prediction data is up linked, or transmitted, to the satellites for transmission back to the users. The control segment also ensures that the GPS satellite orbits and clocks remain within acceptable limits. A station can track up to 11 satellites at a time. This "check-up" is performed twice a day, by each station, as the satellites complete their journeys around the earth. Noted variations, such as those caused by the gravity of the moon, sun and the pressure of solar radiation, are passed along to the master control station.

The user segment consists of the GPS receivers that will typically consists of an antenna, multi-channel receiver, and processing unit used by people to receive the GPS signals. In the NDDEQ, the antenna is generally part of the GPS unit and not a stand-alone device. Survey-grad GPS receivers have a separate antenna and are generally not used in the NDDEQ.

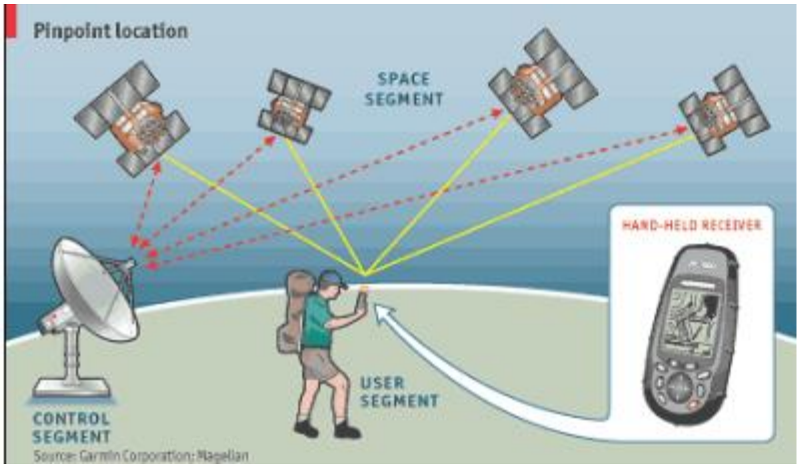


**Figure 1.** GPS consists of three segments, the space segment, control segment and the user segment.

In early GPS implementation, the DoD used selective availability (SA) to degrade the quality and subsequent accuracy of the GPS signals to non-DoD users. On May 1, 2000, President Clinton signed an executive order ending SA as part of an ongoing effort to make GPS more attractive to civil and commercial users worldwide. With SA enabled, accuracy of position fixes could be as poor as 300 meters without the use of differential correction techniques. The mention of SA is included here as some GPS measurements that are recorded in NDDEQ databases have records that may have been collected by GPS receivers prior to SA being turned off, but the records were differentially corrected, and correction information may be included in the databases.

## 3.2 Latitude and Longitude

GPS receivers collect XY coordinate pair information for a specific point on earth. Coordinate pairs are commonly reported as latitude and longitude values. Longitude is the X-coordinate value and Latitude is the Y-coordinate value (Figure 2).

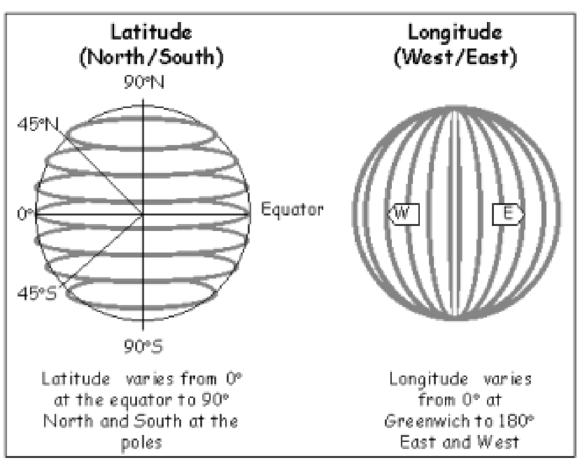


**Figure 2.** Latitude lines are parallel to the equator and longitude lines are perpendicular to the equator. Image source: https://en.wikipedia.org/wiki/Geographic_coordinate_system.

### 3.3 Types of GPS receivers and How GPS Receivers Work

For the purposes of this document, the user segment GPS receivers may be loosely grouped into three groups: Recreational and Navigational receivers (henceforth referred to as General-Use receivers), Mapping Grade receivers and Survey Grade receivers.

- Most General-Use receivers are available on the retail market for a variety of applications including boating, hiking and automotive navigation. The accuracy of recreational-grade GPS receivers is adequate for many if not all the environmental applications of the NDDEQ. The devices display an instantaneous reading of position and are generally not optimized for continuous or large-scale automated data collection. Waypoints containing instantaneous position fixes can often be stored and downloaded.

- Mapping Grade receivers are used for applications such as resource management and geographic information system (GIS) feature collection. Mapping grade receivers are acceptable for many environmental applications of the NDDEQ. The receivers are capable of averaging multiple position fixes for greater accuracy and then data-logging the results with sufficient information to post-correct the positions as described below in 'Differential GPS.' The accuracy that can be achieved may be better than one meter.

- Survey Grade receivers can provide accuracy at the centimeter level by using long occupation times and special techniques for receiver use and data processing. Survey grade receivers are generally not used by the NDDEQ but are mentioned here because we may receive information from contractors that indicate 'survey grade' locations.

GPS receivers derive positions by simultaneously measuring the distance (range) to at least four satellites in precisely known orbits and using trilateration of the ranges to calculate a unique position for the receiver. The range to each satellite is determined by precisely measuring the transit time of radio signals broadcast from the satellites.

Accuracy can be improved on GPS receivers if WAAS is activated. WAAS stands for Wide Area Augmentation System, an air navigation aid developed by the Federal Aviation Administration to augment the GPS system. Many general-use GPS receivers have an option to activate WAAS which would increase accuracy to within three meters. WAAS is discussed in more detail later in this document.

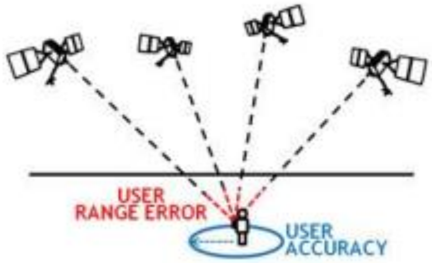


**Figure 3.** User range (URE) vs. User Accuracy. To calculate its position, a GPS receiver measures its distance from multiple GPS satellites. URE is the measure of ranging accuracy. User accuracy refers to how close the device's calculated position is from the truth, expressed as a radius.

## 3.4 GPS Accuracy Factors

The accuracy of the GPS system depends on a multitude of things. The satellites broadcast their signals with a certain amount of accuracy, but what the user receives can be affected by atmospheric delays, satellite clock and orbit errors, multipath signals, signal strength, satellite geometry relative to the user, as well as receiver features and quality. Selective Availability is set to zero, so that should not affect current measurements. GPS enabled smartphones are typically accurate to within a 16-foot radius (under a clear sky and with no obstructions).

As satellites move in their orbits and some signals are blocked by obstructions, the geometry of the available satellite signals relative to the user will constantly change. When the satellites with available signals are clustered closely together in the sky, small errors in range will result in large errors in reported position. Conversely, when the satellites are distributed more broadly across the sky, the resultant position errors will be at their minimum. The general measure of this phenomenon is Dilution of Precision (DOP), which may be represented as Position Dilution of Precision (PDOP), or more specifically for geographic coordinate collection, Horizontal Dilution of Precision (HDOP). If receivers collect PDOP and HDOP values, NDDEQ users are encouraged, but not required to collect these values. Mapping and Survey Grade receivers generally can calculate and display DOP and allow the user to limit logging to times when the higher potential accuracy conditions of low DOP prevail. General-Use receivers may display DOP and use DOP with other factors to estimate a general accuracy figure. DOP may range from approximately 2 to 50 meters, with high quality work usually requiring a HDOP of less than 4-6 meters.

Signal strength and multipath signals relate to the strength and quality of the signal reaching the receiver antenna. Signal attenuation by the atmosphere, buildings, and tree cover limit the accuracy of the ranges obtained. The measure of signal strength is Signal to Noise Ratio (SNR), generally measured in decibels (db). Most receivers of any grade will display the SNR of the satellite signals in a bar graph or table. Mapping Grade Receivers generally allow the user to specify a minimum signal strength for the use of a satellite signal (commonly 2-15db). Poor signal strength can be resolved by waiting for satellite locations to change or moving the receiver location. Multipath signals result from portions of the satellite signal bouncing off terrain, structures, or atmospheric disturbances, resulting in a degraded total signal. Higher quality Mapping Grade receivers may be capable of rejecting the stray multipath signals.

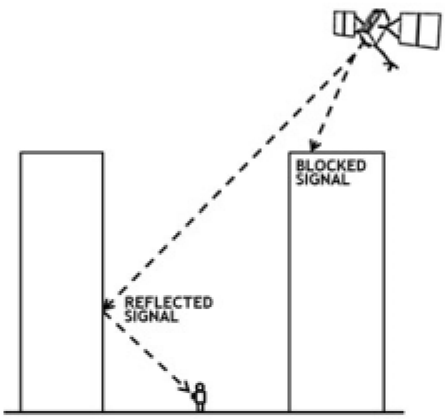


**Figure 4.** How GPS accuracy can be affected by obstructions. While this figure shows buildings as obstructions, in North Dakota, trees or buttes could be an obstruction as well. (Source: https://www.gps.gov/systems/gps/performance/accuracy/)

### 3.5 WAAS Enabled GPS Receivers

Wide Area Augmentation System (WAAS), developed by the Federal Aviation Administration to meet the additional demands on GPS for aircraft navigation, can be utilized to improve receiver positional accuracy. The WAAS network of base stations collect information on satellite clock errors, orbital errors, and atmospheric conditions as well as integrity information about each GPS satellite. The error information is transferred to satellites in geo-synchronous orbits and subsequently broadcast to WAAS equipped GPS receivers. While the beacon-based DGPS passes specific satellite range corrections to the receivers, WAAS communicates a model for the errors which is usable over large areas. Modern General-Use receivers are generally equipped with WAAS differential correction capability that improves positional accuracy by up to five times better than without WAAS. For example, on the Garmin eTrex Legend recreational grade receiver, if WAAS is activated the user can increase the positional accuracy to within three meters. Without WAAS activated, the positional accuracy is to within 20 feet. If it is available, be sure to check that WAAS is enabled on the GPS receiver that you are using.

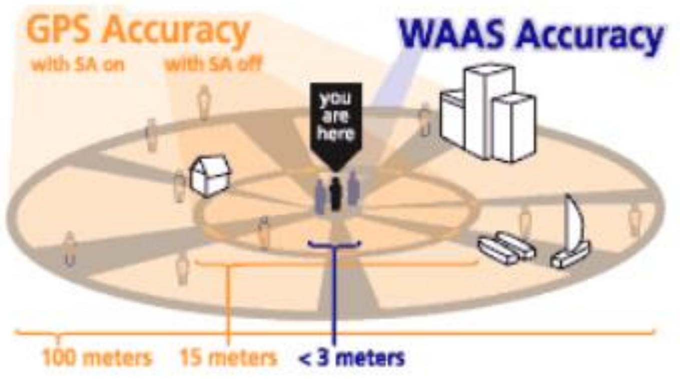


**Figure 5.** Typical GPS receiver accuracy with and without WAAS activated. SA is Selective Availability. (Source: Garmin)

# 4.0 GPS RECEIVERS AND VERTICAL ACCURACY

Various factors limit GPS accuracy in the vertical plane to approximately half of that obtainable in the horizontal plane. For example, if a location fix is accurate to 3 m in the horizontal plane, it may only be accurate to 6 m in the vertical plane. Since relatively high accuracy is usually required for the uses of elevation data, recreational grade GPS is rarely used to obtain and report elevations. It is recommended that if highly accurate elevation measurements are required that a Survey-grade GPS receiver is used to obtain elevation measurements.

# 5.0 REQUIREMENTS FOR LOCATIONAL INFORMATION

## 5.1 Consideration of Data Uses

Locational information can serve many purposes in an environmental investigation, a few of which are listed below:

1. Providing an unambiguous means to identify facilities or sampling plots.
2. Providing location information to key analytical data in a GIS-based data archiving system to the original sampling locations.
3. Differentiating watersheds.
4. Providing information to calculate extents and volumes of contamination.
5. Providing a means to relocate the media represented by samples for removal or treatment.
6. Providing information to prepare presentation graphics of sampling locations.

Depending on the specific uses for the data and the type of work being performed, there will be different needs for the accuracy of the locational data. Studies where a sample represents a large area of relatively homogeneous material would not require the same accuracy as the location of a permanent monitoring well. Table 1 are broad guidelines for the accuracy that might be required for different applications that may be present in the NDDEQ

**Table 1.** Desired accuracy and example applications for GPS work. (Source: Region 4 U.S. Environmental Protection Agency (EPA), Science and Ecosystem Support Division, Global Positioning System Operating Procedure, Number SESDROC-110-R4, page 11.)

| Desired Accuracy | Application Examples |
|---|---|
| 100 m | Open water work on a large body of water (e.g., Lake Sakakawea) where sample is presumed to be representative of a large area. |
| 20 m | Open water work on a lake where sample is presumed to be representative of a large area. |
| 10 m | Stream or river work where samples are presumed to be broadly representative of a reach. |
| 3 – 5 m | Stream or river work where samples are representative of a narrowly defined section. |
| 10 m | Air monitoring stations. |
| 3 – 10 m | Microscale air monitoring. |
| 3 m | Permanent monitoring wells. |
| 1 m | Location of “hot spots” for removal of limited extent. |
| 1 – 3 m | Locations of temporary groundwater monitoring wells in plumes requiring narrow delineation. |
| 3 m | Locations of temporary ground water monitoring wells in broad plumes. |
| 3 m | Locations of environmental samples with sample spacing > 20 m. |
| 5 m | Locations of environmental samples with sample spacing > 60 m. |
| 20 – 200 | Coordinates describing a facility where mobile waste units are stored. |
| 3 – 30 | Location of industrial process areas or NDPDES permitted facilities where the sample locations are described in field notes relative to process or site features. |

Specific demands of a study may drive increased or decreased requirements for accuracy. The preferred means of location data collection for most studies will be handheld GPS receivers, although alternate means are permissible if they meet accuracy requirements (i.e. cell phone GPS apps). Table 2 shows the accuracy that may be expected from various means of establishing coordinates.

**Table 2.** Accuracy that can be expected from various methods of obtaining location information. (Source: region 4 US EPA, Science and Ecosystem Support Division, Global Positioning System Operating Procedure, Number SESDPROC-110-R4, page 12).

| Accuracy | Description |
|---|---|
| 50 – 200 m | Map derived, coarse work |
| 20 – 40 m | Map derived, fine work or suing GIS with digital imagery (3 m pixels) |
| 15 m | General use, recreational-use grade GPS without WAAS |
| 10 m | Mapping grade GPS with no corrections; averaged readings |
| 5 m | General use grade GPS with WAAS or beacon corrections |
| 3 m | Mapping Grade GPS with differential correction, averaged readings |
| 1 m | Mapping grade GPS with differential correction, controlled dilution of precision (DOP) and signal-to-noise ratio (SNR), averaged readings |
| < 10 cm | Survey grade GPS or optical survey (depending on baseline length) |

Accuracy is a term used to describe the degree of conformity of a measurement. In GPS, accuracy is usually specified as an estimate of the radius from the measured coordinates that is likely to include the actual coordinates. The estimate will be based on a percentage likelihood or a certain number of standard deviations that the accuracy estimate is met. As such, it is recognized that some measurements will fall outside of the specified accuracy. For the purposes of NDDEQ GPS work, the nominal accuracy figures derived from manufacturer’s literature for specific operating conditions, displayed by the receiver at the time of feature collection, or output from processing software will be taken at face value.

## 6.0 DATUM CONSIDERATIONS

For GPS purposes, a datum is the model of the earth that is used in the mapping of the coordinate pairs. It is a reference from which other measurements are taken. In the development of surveying systems by different civil entities (for example, different states or countries), different datums were used as base references that can result in differing coordinates for the same location. A GPS receiver will display coordinates in the user-selected datum; in many GPS receivers the user can select the datum to display coordinates. Unless there are specific requirements on a project, all NDDEQ work should be conducted using the WGS84 datum. Alternatively, the NAD83 datum may be used if WGS84 is unavailable as a receiver option. If an alternate coordinate system is used where coordinates are obtained and recorded in field logbooks, the use of the alternate coordinate system should also be noted in the field documentation.

Some NDDEQ databases require that coordinates for sample locations be entered in decimal degree format using the WGS84 datum. Unless specific project requirements dictate otherwise, all coordinates explicitly stated in reports will be in WGS84 format. In every case the datum should be specified so users of the data know if there are deviations from the WGS84 datum.

## 7.0 DATA REPORTING AND ACCURACY

There is no NDDEQ policy on significant digits for GPS information and accuracy should not be implied from the presence of significant digits in reported coordinates. However, good scientific practice should be followed in the presentation of locational information in order that useful information not truncated, or a greater degree of accuracy is implied. Table 3 shows the incremental distance in latitude represented by the least significant digit for various coordinate formats:

**Table 3.** Average distance implied by number of significant digits in latitude and longitude coordinates. Distances will vary in latitude and longitude measurements separately.

| Significant Digits | Average Distance |
|---|---|
| dd.dddddd° | Approximately 4 inches or 10 cm |
| dd.ddddd° | Approximately 44 inches or 1.1 m |
| dd.dddd° | Approximately 36 feet or 11 m |
| | |
| dd°mm’ ss” | Approximately 100 feet or 30 m |
| dd°mm’ ss.x” | Approximately 10 feet or 3 m |
| dd°mm’ ss.xx” | Approximately 1 feet or 30 cm |
| | |
| dd°mm.xxxx’ | Approximately 7 inches or 18 cm |
| dd°mm.xxx°’ | Approximately 6 feet or 1.8 m |
| dd°mm.xx’ | Approximately 60 feet or 18 m |

## 8.0 QUALITY CONTROL PROCEDURES

By nature of its military origins and application to aircraft navigation, the GPS is designed for high reliability. GPS failures resulting in an incorrect receiver reading beyond the bounds of known errors are rare enough that the possibility can be ignored for most studies. If a study requires the verification of receiver function, this can be accomplished by verifying that a receiver displays the correct position while occupying a known benchmark.

Finally, at minimum, users should ensure that the recorded GPS coordinate pairs fall within the boundaries of expected coordinate values for North Dakota. Figure 4 shows the longitude and latitude values that a user would expect when collecting GPS points in North Dakota and surrounding area.

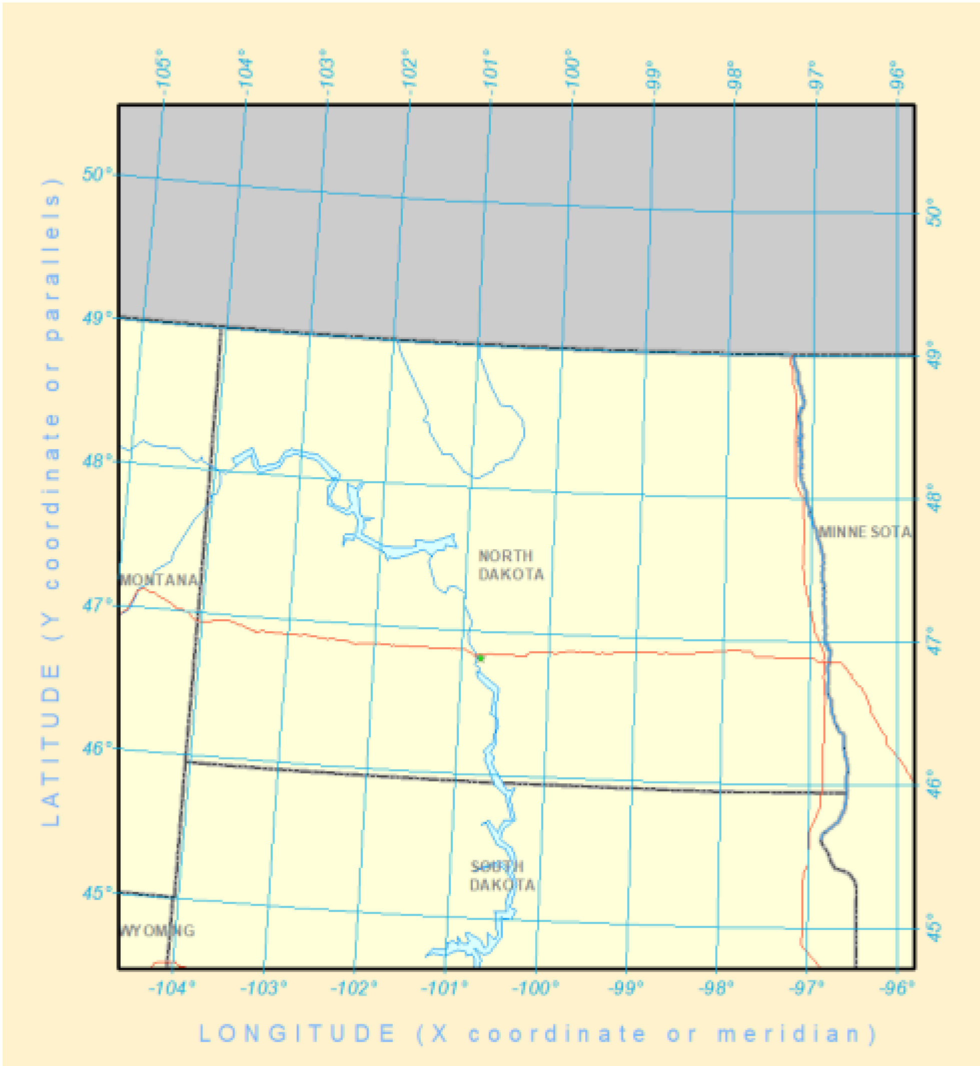


**Figure 6.** Longitude and latitude values for North Dakota and surrounding areas. Longitude is the X-coordinate or meridians, and latitude is the Y-coordinate or parallels.

## 9.0 HEALTH AND SAFETY WARNING

Field personnel should adhere to site-specific safety protocols and be aware that hazardous conditions potentially exist at all locations. If unfavorable conditions are present at the time of sampling, the sample visit should be rescheduled. If hazardous weather conditions arise during sampling, such as lightning or high winds, personnel should cease sampling and move to a safe location. Samplers should be aware of ice conditions when sampling during winter months. If ice is dangerous, samples should be taken at a different time.

Field personnel should also be aware of wildlife, insects, and plants that could be harmful as well as heat stroke and hypothermia. A first aid kit should be accessible for any potential cuts, stings, bites, or contact with poisonous plants. Also ensure there is access to water, sunscreen, insect repellant, and extra clothing. Ensure adequate communication tools are available in case of emergencies.

# 9.0 INTERFERENCES

Note all factors that may affect GPS accuracy.

# 10.0 PERSONNEL QUALIFICATIONS/RESPONSIBILITIES

All personnel using a GPS must read this SOP annually and acknowledge they have done so via a signature page (see Appendix A). New field personnel must also demonstrate successful performance of the method. The signature page will be signed by both trainee and trainer to confirm that training was successfully completed and that the new monitor is competent in carrying out this SOP. The signature page will be kept on-file with the WMP staff, along with the official hard copy of this SOP.

# 11.0 EQUIPMENT AND SUPPLIES

_____ Copy of this SOP
_____ Spare Batteries
_____ Charging Cable
_____ GPS unit of choice

# 12.0 PROCEDURE

**Pre-Fieldwork Preparation**

1. Verify that the GPS device is fully charged and in good working condition.
2. Ensure the device's settings are configured correctly:
    - **Datum:** Set to WGS84 or NAD83 or proper unless specified otherwise. North Dakota is currently covered by UTM zones 14T in the east and 13T in the west.
    - **Units:** Use decimal degrees or degrees, minutes, and seconds as required by the study protocol.
    - **Coordinate System:** Confirm it matches project requirements.
3. Load or verify any pre-programmed waypoints, if applicable.
4. Perform a test to ensure the device is acquiring satellite signals correctly (Connect to 4 or more satellites for better accuracy).
5. Pack spare batteries or a portable power bank.

## Field Data Collection

1. Turn on the GPS device in an open area to allow it to acquire satellite signals. Wait for a stable signal (accuracy typically displayed on the device).
2. Verify accuracy before recording data:
    - Ensure a minimum accuracy of ≤10 meters for most environmental studies.
    - Avoid areas with dense canopy cover, tall buildings, or other obstructions that may reduce signal quality.
3. Navigate to the site using the GPS device if required.
4. At each sample site:
    - Record the waypoint (latitude and longitude) and name it based on the study protocol (e.g., Site001).
    - Note additional environmental factors (e.g., weather, site condition) in the field notebook.
5. Take multiple readings if the signal is weak, averaging the values if necessary.
6. Ensure that timestamps are synchronized with field observations, especially if data will be merged with other datasets.

## Post-Fieldwork Tasks

1. Transfer GPS data to a computer or central database as soon as possible.
    - Use software or apps compatible with the GPS device to export data in the required format (e.g., .GPX, .KML, .CSV).
2. Check the data for accuracy and completeness.
3. Back up raw GPS data to a secure location.
4. Review notes for any discrepancies or anomalies and flag them for further review.

## Quality Assurance and Quality Control (QA/QC):

1. Conduct periodic calibration of GPS devices per manufacturer guidelines.
2. Perform regular checks of recorded coordinates against known benchmarks.
3. Train personnel on GPS device usage and troubleshooting annually.
4. Document any deviations from the SOP and their potential impact on data quality.

## 7. Safety Considerations:

1. Be aware of surroundings while using GPS devices to avoid accidents (e.g., tripping, wildlife encounters).
2. Ensure adequate communication tools are available in case of emergencies.

3. Adhere to site-specific safety protocols.

For procedures specific to the use of individual handheld GPS units, reference each GPS unit's user manual.

## 11.0 REFERENCES

Garmin Products: http://www8.garmin.com/aboutGPS/

National Geodetic Survey: https://www.ngs.noaa.gov/

Continuously Operating Reference Station (CORS) reference: https://www.ngs.noaa.gov/CORS/

U.S. Environmental Protection Agency, Geospatial Policies and Standards: https://www.epa.gov/geospatial/geospatial-policies-and-standards

Federal Aviation Administration – Satellite Navigation – Global Position System (GPS), https://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/techops/navservices/g nss/gps/

Harkness, Russell E., Datum Issues in the Red River of the North Basin, Scoping Document, May 1999, U.S. Geological Survey, Water Resource Division, http://www.ijc.org/rel/pdf/datum.pdf

National Geodetic Survey, Frequently Asked Questions, https://www.ngs.noaa.gov/faq.shtml

Guidance for Geospatial Data Quality Assurance Project Plans, EPA QA/G-5G, EPA/240/R-03/003, March 2003, https://www.epa.gov/sites/production/files/documents/guidance_geospatial_data_qapp.pdf

# APPENDIX A
SOP Acknowledgement and Training Form

# SOP Acknowledgement and Training Form

This SOP must be read and this form signed annually. This form must be kept with the latest version of the SOP.

| | |
|---|---|
| **Document Title:** | |
| **Document Revision Number:** | |
| **Document Revision Date:** | |

Please sign below in accordance with the following statement:
"I have read and understand the above referenced document. I agree to perform the procedures described in this SOP in accordance with the document until such time that it is superseded by a more recent approved revision."

| Printed Name | Signature | Date |
|---|---|---|
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## SOP Acknowledgement and Training Form (con't)

Trainee: Sign below to acknowledge that training on this SOP was received, understood, and all questions/concerns were addressed by the trainer.

Trainer: Sign below to acknowledge that training on this SOP was completed for the individual listed and that training is competent to perform the procedures described within.

| Date of Training | Trainee Printed Name | Trainee Signature | Trainer Printed Name | Trainer Signature |
|---|---|---|---|---|
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