

FT 1000 – FT 2200 Audit Checklists

To use this field audit checklist effectively, the auditor must be familiar with FT 1000 to FT 2200 (Field Testing and Measurement) in “DEP Standard Operating Procedures for Field Activities”, (DEP-SOP-001/01)

General Requirements for Calibration Activities (FT 1000)

All field-testing equipment and instruments brought to the field appeared to function properly.

All sample measurements were chronologically bracketed between acceptable calibration verifications.

All sample measurements were quantitatively bracketed with an appropriate choice of calibration standards for calibrations or verifications.

Historical, instrument-specific data justified calibration verification intervals of greater than 24-hours.

Instruments failing to meet calibration verification acceptance criteria were recalibrated or removed from service.

Sample measurements were qualified as estimated (“J” data qualifier code) when the instrument calibration could not be verified.

An explanatory narrative was provided in the field record for all sample “J” values.

The time interval between calibration verifications did not exceed one month, or, if less, the life of the sampling project (except for temperature measurements).

pH (FT 1100)

The pH meter and electrode system met DEP SOP specifications for accuracy, reproducibility and design.

All measurements were corrected for temperature (manual or automatic).

The temperature sensor calibration was verified according to FT 1400.

A pH 7 buffer was used as the first calibration standard for the initial calibration.

All sample measurements were chronologically bracketed with acceptable calibration verifications.

All sample measurements were quantitatively bracketed with an appropriate choice of at least two calibration buffers for calibrations or verifications.

All calibration verifications met the acceptance criteria of + 0.2 standard pH units.

The meter system was checked on a weekly basis to ensure a >90% theoretical electrode slope (if applicable to instrument type).

The pH electrode was rinsed with deionized or distilled water between buffer solutions and between sample measurements.

The instrument pH readings stabilized before pH values were recorded.

Conductivity (FT 1200)

The specific conductance meter and electrode system met DEP SOP specifications for accuracy, reproducibility and design.

All sample measurements were quantitatively bracketed with an appropriate choice of calibration standards for calibrations or verifications.

All continuing calibration verifications were performed using standards within the range of sample measurements.

All calibration verifications met the acceptance criteria of + 5% of the verification standard value.

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All measurements were corrected for temperature (manual or automatic).

The temperature sensor calibration was verified according to FT 1400.

The conductivity electrode was rinsed with deionized or distilled water between standard solutions and between sample measurements.

The instrument conductivity readings stabilized before measurement values were recorded.

Temperature (FT 1400)

The temperature measurement device met DEP SOP specifications for design and measurement resolution.

All sample measurements were quantitatively bracketed with calibration verifications of the temperature measurement device at a minimum of two temperatures using the NIST-traceable thermometer.

All sample measurements were chronologically bracketed with acceptable calibration verifications.

Historical, device-specific data justified calibration verification intervals of greater than one month (extended chronological calibration bracket).

The temperature device readings stabilized before measurement values were recorded.

Groundwater samples were measured in situ (downhole) or by using a flow-through container.

Dissolved Oxygen (FT 1500)

The dissolved oxygen meter and electrode system met DEP SOP specifications for accuracy, reproducibility and design.

All sample measurements were chronologically bracketed with acceptable calibration verifications.

All calibration verifications met the acceptance criteria of + 0.3 mg/L dissolved oxygen when compared to the table of theoretical values for water-saturated air.

All measurements were corrected for temperature (manual or automatic).

The temperature sensor calibration was verified according to FT 1400.

All measurements were corrected for salinity, where applicable (manual or automatic).

The salinity (conductivity) sensor calibration was verified according to FT 1200 or FT 1300.

The dissolved oxygen electrode was rinsed with deionized or distilled water between sample measurements.

The dissolved oxygen electrode was stored in a water-saturated air environment when not in use.

The instrument dissolved oxygen readings stabilized before measurement values were recorded.

Turbidity (FT 1600)

The turbidimeter met DEP SOP design specifications.

Alternative design turbidimeters used for groundwater stabilization measurements met DEP performance criteria.

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All sample measurements were chronologically bracketed with acceptable calibration verifications.

All sample measurements were quantitatively bracketed with an appropriate choice of calibration standards for calibrations and verifications.

Initial calibration of the turbidimeter was performed using formazin or styrene divinylbenzene primary standards, whichever was required by the manufacturer of the instrument.

All calibration verifications met the DEP SOP acceptance criteria applicable to the NTU ranges associated with the verification standard values. FT 1600 section 3.2

The sample cells (optical cuvettes) were inspected for scratches and discarded or coated with a silicone oil mask, as necessary.

The sample cells (optical cuvettes) were optically matched for calibrations and sample measurements.

The sample cells (optical cuvettes) were cleaned with detergent and deionized or distilled water between standard solutions and between sample measurements, as applicable.

The sample cells (optical cuvettes) were rinsed with deionized or distilled water between standard solutions and between sample measurements, as applicable.

The sample cells (optical cuvettes) were rinsed with sample prior to filling with sample for measurement.

The exterior of the sample cell (optical cuvette) was kept free of fingerprints and dried with a lint-free wipe prior to insertion in the turbidimeter.