Fort Stewart/Hunter Army Airfield
Stormwater Management Program
Municipal Separate Storm Sewer System

Illicit Discharge Detection and Elimination Plan
Complaint Response Standard Operating Procedures

Georgia General NPDES Stormwater Permit GAG480000 for Discharges Associated with Small Municipal Separate Storm Sewer Systems (MS4) At Military Facilities

July 2024 Version

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment for knowing violations."

JAMES L. HEIDLE
Director, Public Works

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1. Purpose

To enhance and support the Fort Stewart and Hunter Army Airfield (FSGA/HAAF) Stormwater Management Program (SWMP) and ensure compliance with the Municipal Separate Storm Sewer System (MS4) permitting and the Illicit Discharge Detection & Elimination (IDDE) Plan by providing employees with specific step-by-step instructions for receipt, investigation, and tracking of illicit discharge complaints.

2. Applicability

The IDDE Complaint Response Standard Operating Procedures (SOP) are applicable to both FSGA/HAAF.

3. General

Properly responding to reports and/or complaints of potential illicit discharges is needed for the detection and elimination of illicit discharges, prevention of pollution, and protection of state water bodies.

4. Illicit Discharge Detection and Elimination Complaint Response Step-By-Step Guidance

4.1 Call Receipt and Documentation. When a call is received regarding a potential illicit discharge, document the call on the IDDE Complaint Log as shown in Appendix A. Annotate the time the call was received, who reported the discharge (e.g. 911 operator, Soldier, Civilian, resident, etc.), the location of the discharge with a referenced building number, and the facility point of contact when applicable/known (which may not be the person reporting the discharge).

4.2 Site Assessment & Source Tracking. A visual inspection of the area will be conducted within 24 hours of notification.

a. Drainage Area. Upon identification of an illicit discharge, review the storm sewer mapping and determine the upstream flow path of the respective storm sewer for possible sources within the drainage area.

b. Visual Observation Inspections and Dye Testing. Perform visual observation inspections of the possible sources to confirm the origin of the illicit discharge. Continuous discharges may be detected using biodegradable dye approved for use in waterways.

4.3 Source of Discharge Immediately Discernable. When a potential illicit discharge is reported and visual observation inspections can determine a source for the discharge, the following action will be taken.

a. Upon completion of the visual inspection and confirmation of an illicit discharge, spill response/corrective actions will be implemented immediately to contain the petroleum, oil, and lubricant (POL) or sanitary spills. All POL or sanitary spills discharged into

"Waters of the State" will be properly reported to the State in accordance with the applicable notification procedure requirements. Spill response and corrective actions will be performed in accordance with respective Resource Conservation & Recovery Act and Clean Water Act response plans. Reports will be obtained for documentation purposes and final closeout of the complaint.

b. Coordination with construction project management will be made within 24 hours of confirmation of turbid discharges. An erosion and sedimentation (E&S) compliance inspection will be initiated using the FSGA/HAAF Stormwater E&S Construction Inspection form as shown in Appendix B. As needed, the E&S Pollution Control Plan (ESPCP) will be redlined and the contractor will implement corrective action measures in accordance with the redlined ESPCP and General Permit for Discharge of Stormwater from Construction Sites. Reports will be retained for documentation purposes and final closeout of the complaint.

c. Efforts will be made to mitigate the impact of other discharges such as those associated with a leaking water line pending acquisition of resources for pinpointing and repairing the leak.

4.4 Source of Discharge Not Immediately Discernable. When an illicit discharge is reported and visual observation inspection cannot determine a source for the discharge, a Dry Weather Screening Outfall Inspection will be initiated using the checklist as shown in Appendix C and the following procedures will be performed to assist with determination of the type of discharge and potential source(s).

a. Source Tracking. Source tracking will be methodical, focusing at first on large drainage areas upstream of the site to narrow down the investigation area. Upstream sampling should continue until the source is determined, or efforts result in no detectible discharge.

b. Field Screening/Sampling Procedures. If flow is observed, source tracking and visual, chemical, bacteriological, and turbidity monitoring will be initiated in order to assist with the determination of what source may be causing the illicit discharge.

1) Chemical Monitoring. Measure the discharge for the following parameters utilizing a probe(s): pH, temperature, and conductivity. Sample the discharge with a colorimeter or test kit for surfactants and total fluoride.

2) Extended Chemical Monitoring. Collect additional samples for other parameters if more information is required to identify potential pollutants. The additional parameters sampled may include, but are not limited to: ammonia, metals, volatile organic compounds, semi-volatile organic compounds, pesticides, herbicides, or any other water priority pollutants.

3) Bacteriological Monitoring. Collect grab samples for fecal coliform analysis if conductivity or surfactants are high, or if visible signs such as smells, milky white or gray color, and/or floatables are present, or if other applicable evidence exists for potential sanitary wastewater discharge.

c. Standards. If field sampling detects limits of the above mentioned parameters that exceed the benchmark values described below, an illicit discharge is likely and an attempt to trace the source of the discharge must be performed. The following parameters were chosen to address potential industrial, sanitary, construction, and residential contaminates most likely to be found.

1) Chemical Monitoring.

- pH. Rainwater tends to have an average pH range of 6.0 – 7.0. pH detected between 5.5 – 6.0 is likely due to influence of ground water. Low pH could possibly be caused by industrial activities including metal plating, metal finishing/fabrication, fertilizer/pesticide application runoff, or industrial wastewater spills. High pH could possibly be caused by industrial activities including aircraft repainting, metal plating, concrete wastewater, and industrial wastewater spills.

- Specific Conductance. Benchmark value is 2000 uS/cm which would be an indicator of the presence of contaminating ions from industrial wastewater spills.

- Temperature. Recreational waters in Georgia have temperatures greater than ambient (>75.3 – 96.9°F). Temperatures should not exceed 90°F. If so, the likely sources are industrial wastewater, cooling tower discharges, steam condensate, or other industrial process waters.

- Surfactants. Benchmark value is 0.25 ppm. Levels greater than this should be investigated for surfactants.

- Fluoride. The mineral fluoride occurs naturally on Earth and is released from rocks into the soil, water, and air. All water contains some fluoride. Some groundwater and natural springs can have naturally high levels of fluoride. Raw water samples of FSGA/HAAF have shown fluoride present in groundwater. However, a detection of fluoride and chlorine, as is found in treated drinking water, may be an indicator of a water line break.

- Turbidity. FSGA/HAAF waters are designated warm water fisheries. Consequently, turbidity readings greater than 50 NTUs during non-rain events, or 75 NTUs during rain events, should be investigated. Soil erosion typically is the cause of turbid waters exceeding these acceptable levels, per the Georgia Soil and

Water Conservation Commission. The source may be a construction site or washout at a facility.

2) Bacteriological Monitoring. Fecal coliform benchmark values are seasonal as follows:
May – Oct (Summer): 200 CFU/100mL
Nov – Apr (Winter): 1000 CFU/100ml

Note: Fecal coliform in excess of sanitary sewage standards does not necessarily indicate sanitary sewage discharge. This could potentially be due to indigenous wildlife or domestic animals.

d. Quality Assurance/Quality Control.
1) Confirmation. To confirm positive results, field testing must be performed twice if a benchmark level is exceeded.

2) Sampling. If in-flow sampling is required, but is not possible, then a clean/uncontaminated container or bucket should be used to collect a sample to take the needed readings. The bucket should be rinsed twice with flow from the outfall and readings should be taken on the third fill.

3) Equipment. Probe(s) will be used to measure pH, temperature, and conductivity. A turbidimeter will be utilized to measure NTUs in discharges.

- Turbidimeter. For calibrating and sampling the turbidimeter, adhere to the FSGA/HAAF NTU Value Field Sample Collection and Turbidimeter Instrument Calibration Guidance as shown in Appendix D.

- Probes. Any probe used to measure pH, temperature, and conductivity must be calibrated and documented at the start of each day when sampling takes place. Readings should be taken directly at the flow of the illicit discharge, if possible. All probes should be cleaned per the manufacturer's instructions before and after a reading as shown in Appendix E and Appendix F.

4) Colorimeter or Test Kits. Containers used to test samples in the colorimeter or test kits must be rinsed twice with sample water before a sample is analyzed. Manufacturer's directions should be followed for all reagents used. After a sample has been analyzed, the container should be rinsed with distilled water. All reagent water must be disposed of properly. Reagents will be checked and replaced prior to their expiration.

5) Fecal Coliform Procedure. Fecal coliform samples must be taken directly in the outfall flow in a sterilized container to avoid contamination. Samples will be de-

chlorinated with sodium thiosulfate and stored in a cooler with ice to be transported to a lab. Fecal coliform samples will be taken to a state certified lab to processing with "chain of custody" documentation. Fecal coliform samples may only be performed once at applicable outfalls during sampling events due to the cost and lab scheduling considerations.

4.5 Enhanced Investigation. If the source(s) of the illicit discharge is not identified after following the procedures described above, a service order or an individual job order will be submitted for either smoke testing or video inspection and removal/sealing off of the illicit connection. The smoke test/video inspection results will be reported to the FSGA/HAAF Directorate of Public Works Environmental Division.

4.6 Point of Contact Follow Up. Conduct a follow up meeting with the facility or facilities point of contact, if not immediately, within 48 hours of the incident. The status of the investigation and initial cause of the discharge will be reported. Additionally, where applicable, any Best Management Practices will be discussed which may need to be implemented or adhered to for the prevention of a reoccurrence of the illicit discharge.

4.7 Corrective Action Timeline. Once the investigation is completed and the source(s) have been determined and corrective actions cannot be implemented immediately; an appropriate timeline for the needed corrective actions will be coordinated with the facility and/or Division, dependent upon the cost and potential impacts to the public health and the environment.

4.8 Final Documentation. The IDDE Complaint Log will be updated to close out the action. Additionally, all illicit discharge investigations will be documented and reported in the MS4 Annual Report. A Memorandum for Record or Executive Summary will be completed noting the illicit discharge investigation information and any corrective actions.

5. Definitions

a. Illicit Connection: any man-made conveyance connecting a non-stormwater discharge directly to a municipal separate storm sewer system.

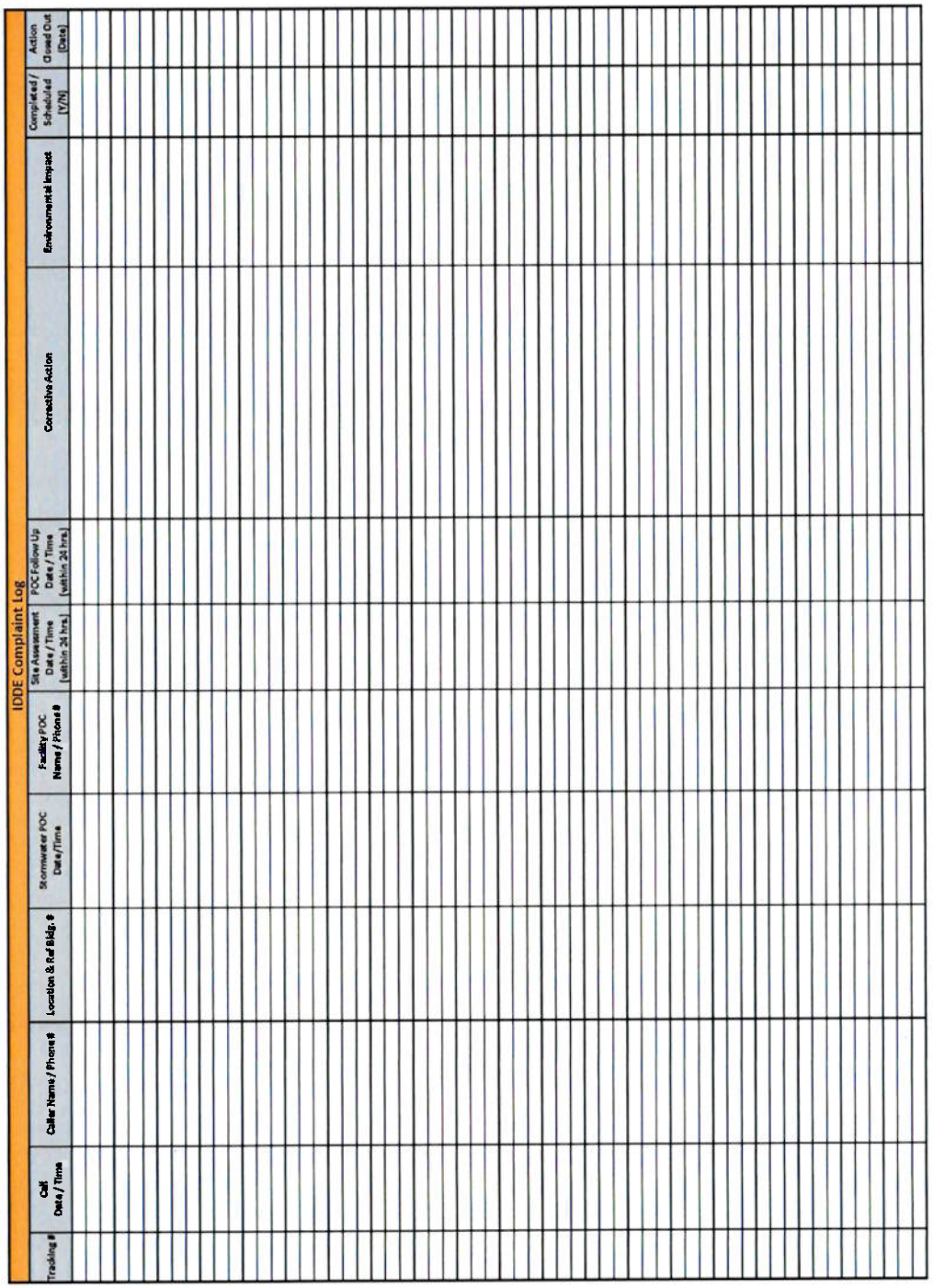
b. Illicit Discharge: any discharge to the municipal separate storm sewer that is not composed entirely of stormwater except discharges pursuant to a National Pollutant Discharge Elimination Systems permit and discharges resulting from firefighting activities.

c. MS4: a conveyance or system of conveyances including roads with drainage systems, municipal streets, catch basins curbs, gutters, ditches, man-made channels or storm drains, owned or operated by a municipality or other public body, designed or used for collecting or conveying stormwater runoff and is not a combined sewer or part of a Publicly Owned Treatment Works or Federally Owed Treatment Works.

d. Outfall: the most downstream point on an MS4 where it discharges to Waters of the State (i.e. final discharge point).

e. Waters of the State: any and all rivers, streams, creeks, branches, lakes, reservoirs, ponds, drainage systems, springs, wells, wetlands, and all other bodies of surface or subsurface water, natural or artificial, lying within or forming a part of the boundaries of the State which are not entirely confined and retained completely upon the property of a single individual, partnership, or corporation.

Appendix A



IDDE Complaint Log												
Tracking #	Call Date / Time	Caller Name / Phone #	Location & Ref Bldg. #	Stormwater POC Date/Time	Facility POC Name / Phone #	Site Assessment Date / Time (within 24 hrs.)	POC Follow Up Date / Time (within 24 hrs.)	Corrective Action	Environmental Impact	Completed / Scheduled (Y/N)	Action Closed Out (Date)

Appendix B

FORT STEWART/HUNTER ARMY AIRFIELD
STORMWATER E&S CONSTRUCTION INSPECTION CHECKLIST

Construction Site: _____

	Description	Yes	No*	N/A
1	Have all temporary BMPs been installed as required by the ES&PCP?			
2	Are all temporary BMPs being maintained as required?			
3	Are all temporary stockpiles located in approved areas and BMPs implemented to prevent sediment and erosion?			
4	Are sediment, debris, mud and/or soils being cleaned from public roads?			
5	Are dust control measures being appropriately implemented?			
6	Have all areas with exposed soils had land disturbance occur or been temporarily/permanently stabilized with in the past 14 days with the implementation of acceptable soil stabilization practices?			
7	Are all discharge points free of any noticeable pollutant discharges?			
8	Are all materials and equipment properly covered and/or have appropriate BMPs (i.e. fuel storage tanks-secondary containment, POLs and/or hazardous materials)?			
9	Are all material handling, equipment, and storage areas clean and free of spills, leaks and other deleterious materials?			
10	Are spill kits located on site near construction equipment and accessible for quick response to spills?			
11	Are all on-site traffic routes, parking, and storage of equipment and supplies restricted to designated areas?			
12	Is a concrete/mortar washout being utilized and maintained?			
13	Is construction site free of trash and other debris?			
	a. Are there appropriate roll off containers for recyclable materials and trash?			
14	Has the operator/contractor provided proof that required inspections are being conducted and the record keeping is up-to-date?			
15	Is the Erosion & Sedimentation Plan redlined and/or updated with required signatures and notations?			
16	Does the operator/contractor have state certified E&S personnel on-site during any land disturbance?			
	a. Are copies of the certifications of all certified E&S personnel kept on-site?			
17	Have contractors collected rain event sampling per NPDES permitting requirements and submitted documentation of these events certified mail to EPD?			

- **If any answer is "no", describe needed correction(s) below. Indicate the location of needed correction(s). Provide any additional comments.**

_____ _____ _____

Weather Condition **Rainfall Amount** **Date**

_____

Signature of Environmental Assessment Personnel

Revised July 2024

Appendix C

Fort Stewart/Hunter Army Airfield
Stormwater Compliance Program
Dry Weather Screening Outfall Inspection

Installation: Outfall Sub-basin: Inspector: Signature: _____

Outfall Name	Date	Inspected during dry weather conditions	Flow Present	Photo taken	Additional information provided

Revised Jan 24

The following additional information only applies when an outfall has flow present:

Outfall Name	Emergent Vegetation	Algae Growth	Odor	Color	Clarity	Floatable solids	Deposits / Stains	pH S.U.	Chlorine mg/L	Comments

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Appendix D

FSGA/HAAF Nephelometric Turbidity Unit (NTU) Value Field Sample Collection and Turbidimeter Instrument Calibration

NTU Value Field Sample Collection:

1. Obtain a clean sample cuvette.
2. Rinse the cuvette with ½ of the sample water, cap the cuvette with the black top, and invert several times. Discard the first rinsing and repeat the rinsing procedure two more times.
3. Completely fill the rinsed cuvette with a grab sample [prevent debris from entering sample cuvette while collecting water sample] and then cap the cuvette.
4. Ensure that the outside of the cuvette is dry, clean, and free from smudges.
5. Turn on the turbidimeter by pressing the ON/OFF button (numbers should be flashing).
6. Place the cuvette into the turbidimeter and press it down until it snaps fully into the sample well.
7. Press and hold down the ← button and release when the display is flashing. The measured turbidity is recorded after the display has stopped flashing.
8. For photo documentation of the reading, ensure that you have a reference point, structure, etc....to identify the particular location associated with the site.

Turbidimeter Instrument Calibration:

1. Turn on the turbidimeter by pressing the ON/OFF button.
2. Press "CAL" once. The "CAL" block will illuminate on the display with "1" indicating the standard required for this step of the calibration. This is the first standard that should be used in a full calibration.
3. Insert the 1000 NTU standard (CAL 1) into the sample well and press down until the cuvette snaps fully into the instrument. Align the indexing ring with the arrow on the instrument.
4. Wait for the reading to stabilize. Once the reading has stabilized press the ← button to indicate to the instrument that is should calibrate on this point.
5. When the instrument has completed calibration on this point, it prompts you to insert the next calibration standard into the sample well (CAL 2).
6. Repeat steps 2-5 for each calibration standard. When you calibrate on CAL 4 (turbidity free water), the instrument will automatically exit out of calibration returning back to the normal operating mode.

NOTE: Per manufacture recommendations for continued accuracy, the turbidimeter needs calibration at least once every quarter (every three months). The calibration standards should be replaced annually to ensure accuracy, due to shelf life of these standards. When ordering, ensure enough lead time to obtain the new standards for un-interrupted calibration of this instrument.

Appendix E

FSGA/HAAF YSI PRO20 Dissolved Oxygen Measurement & Calibration

Dissolved Oxygen Measurement Collection:

1. Before taking measurements, be sure the instrument has been calibrated to ensure the most accurate readings.
2. Turn the instrument on and wait 5-15 minutes if using a polarographic sensor.
3. If using a field cable/sensor, install the sensor guard to protect the sensor and membrane.
4. Place the probe in the sample to be measured and give the probe a quick shake to release any air bubbles.
5. Allow the temperature readings to stabilize.
6. Next, stir the probe in the sample to overcome the stirring dependence of the dissolved oxygen sensor.
7. You must provide at least 6 inches (16 cm) per second of water movement.
8. Once the values plateau and stabilize you may record the measurement and/or store the data set.
9. The dissolved oxygen reading will drop over time if stirring is ceased.
10. If placing the DO sensor into a stream or fast flowing waters it is best to place it perpendicular to the flow and NOT facing into the flow.
11. If using the DO sensor in an aeration tank/basin it is helpful to make sure bubbles do not burst on the membrane.
12. This may cause unstable readings to occur.
13. You should be able to prevent this by pointing the sensor upwards so it's facing the sky and twist tying, zip tying, or rubber banding the bulkhead to the cable.
14. Essentially making a simple curve to the cable without bending or breaking the cable will allow you to lower the sensor into the aeration tank while the sensor points skyward and the bubbles are no longer bursting on the membrane surface.

Barometer Calibration:

1. The barometer in the Pro20 is calibrated at the factory.
2. The barometer reading must be accurate to ensure accurate % calibrations and DO readings.
3. If your barometer requires an adjustment, use the up or down arrow keys to highlight the barometer box on the run screen, then press enter.
4. Next, use the up or down arrow keys to adjust the barometer reading to the local, true barometric pressure.
5. Continually depress the up or down arrow keys to change the barometer value more rapidly.
6. Press enter to confirm and save the barometer adjustment.
7. Do not use a barometer value that is corrected to sea level.
8. Laboratory barometer readings are usually "true" (uncorrected) values of air

pressure and can be used "as is" for barometer calibration.

9. Weather service readings are usually not "true", i.e., they are corrected to sea level, and therefore cannot be used until they are "uncorrected".
10. An approximate formula for this "uncorrection" is: True BP = [Corrected BP] – [2.5 * (Local Altitude in ft. above sea level/100)].
11. Although the barometer range is 400.0 to 999.9 mmHg, you will be unable to adjust the value across the entire range.
12. The barometer is very accurate and the instrument will not allow you to adjust the value drastically beyond what it is measuring during calibration.

Dissolved Oxygen Calibration:

1. The Pro20 can be easily calibrated with the press of one key by enabling One Touch Cal in the System Setup menu and following the One Touch Calibration procedure.
2. Ensure the barometer is reading accurately before performing a One Touch Calibration, DO %, or DO Local% calibration.
3. These calibration procedures use the barometer reading during calibration.
4. If the barometer reading is erroneous during a calibration, your dissolved oxygen values will be inaccurate.
5. It is not necessary to calibrate in both % and mg/L or ppm.
6. Calibrating in % will simultaneously calibrate mg/L and ppm and vice versa.
7. YSI recommends calibrating dissolved oxygen in % for both ease and accuracy.

One Touch Dissolved Oxygen Calibration:

1. Perform this calibration procedure when One Touch Cal is enabled in the System Setup menu.
2. If using a field cable, install the sensor guard onto the probe.
3. Moisten the sponge in the grey calibration/storage sleeve with a small amount of water and install it over the sensor guard.
4. The sleeve should be moist, but should not have excess water that could cause water droplets to get on the membrane.
5. The storage sleeve ensures venting to the atmosphere.
6. If using the ProBOD sensor/cable assembly, place the probe in 300 ml BOD bottle with a small amount of water (1/8 inch or 0.3 cm).
7. The dissolved oxygen and temperature sensors should not be immersed in water.
8. If the calibration/storage sleeve is not available, substitute with a chamber of 100% relative humidity, vented to the atmosphere (not completely sealed).
9. Power the instrument on and wait approximately 5 to 15 minutes for the storage chamber to become completely saturated and to allow the sensor to stabilize if using a Polarographic sensor.
10. If using a galvanic sensor, wait approximately 5 to 10 minutes for the chamber to become completely saturated. Auto Shutoff time should be disabled or set to

at least 20 minutes, see System Setup menu for more information on adjusting the Auto Shutoff.

11. Ensure the barometer reading is accurate.
12. If necessary, perform a barometer calibration.
13. Press and hold the Calibrate key for 3 seconds.
14. The Pro20 will indicate Calibrating %DO on the display and automatically calibrate the sensor to the barometer and salinity correction values.
15. This may take up to 2 minutes depending on the age of the sensor and membrane.
16. You may press the Cal key at this time to cancel the calibration.
17. Calibration Successful will display for a few seconds to indicate a successful calibration and then the instrument will return to the run screen.
18. If the calibration is unsuccessful, an error message will display on the screen.
19. Press the Cal key to exit the calibration error message and return to the run screen.
20. See the Troubleshooting guide for possible solutions.

Dissolved Oxygen % Calibration:

1. Perform this calibration procedure when One Touch Cal is disabled in the System Setup menu.
2. Prepare a 100% humid environment for the sensor as described in the previous calibration section.
3. Power the instrument on and wait approximately 5 to 15 minutes for the storage chamber to become completely saturated and to allow the sensor to stabilize if using a Polarographic sensor.
4. If using a galvanic sensor, wait approximately 5 to 10 minutes for the chamber to become completely saturated.
5. Auto Shutoff time should be disabled or set to at least 20 minutes, see System Setup menu for more information on adjusting the Auto Shutoff.
6. Ensure the barometer reading is accurate.
7. If necessary, perform a barometer calibration.
8. Press and hold the Calibrate key for 3 seconds.
9. Highlight % and press enter.
10. The Pro20 will display the current DO% and temperature readings along with the % calibration value.
11. The % calibration value is based on the barometer reading.
12. Wait at least 3 seconds, then, once the DO% and temperature readings are stable, press enter to complete the calibration.
13. Or, press the Cal key to cancel the calibration.
14. Calibration Successful will display for a few seconds to indicate a successful calibration and then the instrument will return to the run screen.
15. If the calibration is unsuccessful, an error message will display on the screen.
16. Press the Cal key to exit the calibration error message and return to the run screen.
17. See the Troubleshooting guide for possible solutions.

Dissolved Oxygen Local % Enabled Calibration:

1. Perform this calibration procedure when DO Local% is enabled in the System Setup menu.
2. Prepare a 100% humid environment for the sensor as described in the One Touch Calibration section.
3. Power the instrument on and wait approximately 5 to 15 minutes for the storage chamber to become completely saturated and to allow the sensor to stabilize if using a Polarographic sensor.
4. If using a galvanic sensor, wait approximately 5 to 10 minutes for the chamber to become completely saturated.
5. Auto Shutoff time should be disabled or set to at least 20 minutes, see System Setup menu for more information on adjusting the Auto Shutoff.
6. Ensure the barometer reading is accurate. If necessary, perform a barometer calibration.
7. Press and hold the Calibrate key for 3 seconds.
8. % Local will be automatically highlight, press enter.
9. The Pro20 will display the current DO% and temperature readings along with the % calibration value.
10. The % calibration value will always be 100% for DO Local%.
11. Wait at least 3 seconds, then, once the DO% and temperature readings are stable, press enter to complete the calibration.
12. Or, press the Cal key to cancel the calibration.
13. Calibration Successful will display for a few seconds to indicate a successful calibration and then the instrument will return to the run screen.
14. If the calibration is unsuccessful, an error message will display on the screen. Press the Cal key to exit the calibration error message and return to the run screen.
15. See the Troubleshooting guide for possible solutions.

Dissolved Oxygen MG/L Calibration:

1. Power the instrument on and place the sensor into a sample that has been titrated to determine the dissolved oxygen concentration.
2. Continuously stir or move the probe through the sample at a rate of at least ½ foot per second (16 cm per second) during the entire calibration process.
3. A stir plate may be helpful in this calibration.
4. Allow the dissolved oxygen and temperature readings to stabilize.
5. This may take 5 to 15 minutes, depending on the age of the instrument, type of sensor, and condition of the sensor.
6. Press the Calibrate key.
7. Highlight mg/L and press enter.
8. Use the up and down arrow keys to adjust the mg/L reading to the value of the titrated sample.
9. Press enter to confirm the value and calibrate or press the Cal key to cancel the calibration.

10. Calibration Successful will display for a few seconds to indicate a successful calibration and then the instrument will return to the run screen.
11. If the calibration is unsuccessful, an error message will display on the screen.
12. Press the Cal key to exit the calibration error message and return to the run screen.
13. See the Troubleshooting guide for possible solutions.

Appendix F

FSGA/HAAF pHTestr 30 Calibration & Measurement

Before you begin:

1. Condition the pHTestr 30 electrodes by immersing it in electrode storage solution or tap water for at least 30 minutes before use. **DO NOT use de-ionized water.**
2. Ensure that the pHSpear electrode is always soaked in the electrode storage solution or tap water via its protective cap.

pH Buffer Set Selection: The tester features USA (pH 4.01, pH 7.00, and pH 10.01) or NIST (pH 4.01, pH 6.86, and pH 9.18) standards. Select either one to suit the requirements.

1. While pressing the HOLD/ENT button, switch on the tester by pressing the ON/OFF button.
2. Release the HOLD/ENT button. The display will flash either USA or NIST.
3. Press the CAL button to toggle between the two buffers set standards.
4. Press the HOLD/ENT button to confirm the selection of the buffer set.

pH Calibration: Calibration should be performed regularly, preferably once a week. You can calibrate up to three points using either the USA or the NIST buffer set standards.

1. Press ON/OFF button to switch unit on
2. Dip electrode about 2 to 3 cm into the pH standard buffer solution.
3. Press the CAL button to enter calibration mode. The 'CAL' indicator will be shown. The upper display will show the measured reading based on the last calibration while the lower display will indicate the pH standard buffer solution. (Note: All testers have a duel display during calibration mode and to abort calibration, press the 'CAL' button).
4. Allow about 2 minutes for the tester reading to stabilize before pressing the HOLD/ENT button to confirm the first calibration point. The upper display will be calibrated to the pH standard buffer solution and the lower display will then be toggling in between readings of the next pH standard buffer solution.
5. Repeat with other buffers if necessary. Rinse electrode in tap water before dipping into the next buffer.

Note: The calibration mode allows you to perform up to three (3) calibration points before returning to the measurement mode automatically. However, if you opted to have only one or two calibration points, simply skip the remaining calibration points by exiting to the measurement mode by pressing the CAL button.

pH Measurement:

1. Press the ON/OFF button to switch the tester on.

2. Dip the electrode about 2 to 3 cm into the test solution. Stir and let the reading stabilize. For pHSpear, pierce the penetrating tip electrode through your semi solid sample as per the desired depth. Rotate left and right several times and tilt to ensure sample contact.
3. Note the pH value or press HOLD/ENT button to freeze the reading. To release the reading, press HOLD/ENT again.
4. Press ON/OFF to turn off tester. If you do not press a button for 8.5 minutes, the tester will automatically shut off to conserver batteries.

HOLD Function: This feature lets you freeze the display for a delayed observation.

1. Press HOLD/ENT button to freeze the measurement. A 'HOLD' indicator will be displayed and the measurement will be frozen.
2. Press HOLD/ENT again to release the measurement. The 'HOLD' indicator will not be displayed anymore indicating the held measurement is released.

User Reset: You can reset the pH calibration to the factory default by using the user reset function. Buffer set selection and temperature user calibration (pHTestr 30) are not affected by the user reset function.

1. Switch off the tester.
2. While pressing the 'CAL' button, press and release the ON/OFF button to enter the 'User Reset' selection menu. The screen will display 'rSt' on the bottom display with a flashing 'NO' selection.
3. Use the 'CAL' button to toggle between 'NO' and 'YES' selection.
   - NO deactivates reset selection.
   - YES activates the reset selection.
4. Press the HOLD/ENT button to confirm the selection made.
5. If you have selected "YES', the unit will show 'CO' momentarily and proceed to the measurement mode with the calibration reset back to factory default value.
6. If 'NO' is selected, the unit will proceed to the measurement mode without any calibration reset performed.

ATC-Automatic Temperature Compensation: (**Only for pHTestr 10, 20, and 30**) Through its in-built temperature sensor, the measurement error due to the changes in electrode sensitivity due to changes in temperature is compensated to give the actual pH reading of the sample measured.

Temperature Calibration (Only for pHTestr 30): From the measurement mode,

1. Press the HOLD/ENT button to bring the tester to the 'HOLD' mode.
2. Press the CAL button for 3 seconds to switch to the ^{0}C or ^{0}F mode setting selection screen. Pressing the CAL button continuously for 3 seconds allows you to toggle in between the ^{0}C and ^{0}F mode setting selection screen.
3. Release the CAL button to confirm your mode selection and the display will go to the temperature calibration mode with the upper display flashing. The upper display shows

the current measured temperature reading based on the last set offset and lower display shows the current measured temperature reading based on factory default calibration.

4. Dip the tester into a solution of known temperature and allow time for the in-built temperature sensor to stabilize
5. Press the HOLD/ENT button to set the upper display to the temperature value of the solution.
6. Once the new temperature setting is reached, the new value is automatically confirmed and returns to the measurement mode if no button is pressed after 5 seconds.

Note: To exit this program without confirming the calibration, press the CAL button before the automatic confirmation takes place.

Electrode Maintenance:

1. Rinse the electrode with tap water or electrode storage solution after each measurement. Care has to be taken not to damage the sensor's glass electrode especially while rinsing the pHSpear penetrating tip electrode.
2. In aggressive chemicals, dirty or viscous solutions, and solutions with heavy metals or proteins, take readings quickly and rinse electrode immediately afterward. For the pHSpear, the remnants of the semi solid samples on the penetrating electrode can be removed by rubbing it with some table salt and then rinsing. Mild detergent can be used to wash the penetrating electrode clean
3. If possible, keep a small piece of paper or sponge in the electrode cap—moistened with clean water or electrode storage solution (NOT de-ionized water)—and close the cap over the electrode. For pHSpear, ensure that the electrode is kept soaked in electrode storage solution or tap water via its protective cap.

Note: It is necessary that you recalibrate your tester prior to measurement after an electrode replacement.

Applications: Water Quality testing, Pools, Aquaculture, Water and Wastewater Treatment, Ecology Studies, Boilers, Steam Generators, Car washes, Sanitation Plants, Labs, Food Sectors and more….