NC DENR/DWQ LABORATORY CERTIFICATION

LABORATORY NAME:		CERT #:	
PRIMARY ANALYST:		DATE:	
NAME OF PERSON COMPLETING CHECKLIST (PRINT):			
SIGNATURE OF PERSON COMPLETING CHECKLIST:			

Parameter: **BIOCHEMICAL OXYGEN DEMAND ($BOD_5/CBOD_5$)**
Method: **5–Day BOD Test – DO Probe**

METHOD OF ANALYSIS:

	Standard Methods 18th Edition: 5210 B ☐
	Standard Methods 19th Edition: 5210 B ☐
	Standard Methods 20th Edition: 5210 B ☐
	Standard Methods Online 5210 B-01 (SM 21st) ☐

EQUIPMENT:

	Air incubator or water bath		DO meter (Model):
	Incubation bottles, 60 mL or 300 mL		DO probe **(circle one)**: membrane probe or LDO probe (Luminescence)
	pH meter (Model):		

	PLEASE COMPLETE CHECKLIST IN INDELIBLE INK	Y	N	EXPLANATION
	PRESERVATION and STORAGE			
1	Are samples iced to above freezing but ≤ 6 ºC during shipment? [40 CFR 136 Table II]			
2	Are samples refrigerated to above freezing but ≤ 6 ºC during storage? [40 CFR 136 Table II]			
3	Are samples analyzed within 48 hrs of collection? [40 CFR 136 Table II]			
	PROCEDURE – Meter Calibration			
4	How is the DO meter calibrated? [SM 18th, 19th 5210 B. (4) (g). SM 20th 5210 B. (4) (f) (2). SM 21st B. (5) (g).]			
5	Is the meter calibration documented on day one and day five? [15A NCAC 2H .0805 (a) (7).]			
6	Is the DO meter calibration checked for drift during and at the end of the sample set? [NC WW/GW LC policy based upon SM 21st 5210 B. (5) (g).]			
7	Is the meter calibration drift check documented? [15A NCAC 2H .0805 (a) (7).]			
8	Do the drift checks agree within ± 0.2 mg/L? [NC WW/GW LC policy]			
9	If not, what corrective action is taken? [15A NCAC 2H .0805 (a) (7) (F).]			
	PROCEDURE – Dilution Water			
10	What is the source of dilution water? [SM 18th, 19th, 20th 5210 B. (4) (a). SM 21st 5210 B. (4) (c).]			
11	Is dilution water aged / conditioned? [SM 20th 5210 B. (4) (b). SM 21st 5210 B. (4) (c).]			
12	If so, for how long? [SM 20th 5210 B. (4) (b). SM 21st 5210 B. (4) (c).]			
13	Is the temperature of the dilution water approximately 20 °C before usage? [SM 18th, 19th, 20th 5210 B. (4) (a). SM 21st 5210 B. (5) (a).]			
14	Are the nutrient solutions prepared or purchased? [SM 5210 B. (3).]			
15	If purchased – pillows or individual bottles? [SM 5210 B. (3).]			
16	Is the phosphate buffer, prepared or purchased, documented to be pH 7.2? [SM 5210 B. (3) (a).]			
17	Are nutrients free of precipitation or biological growth? [SM 5210 B. (3).]			
18	Are nutrients added at rate of 1 mL each per liter of dilution water? [SM 18th, 19th, 20th 5210 B. (4) (a). SM 21st 5210 B. (5) (a).]			
	PROCEDURE – Sample Preparation			
19	Are samples adjusted to 20 ± 3 °C before analysis? [NC WW/GW LC policy based upon SM 21st 5210 B. (5) (b).]			

20	Is each sample pH checked before analysis and adjusted if needed? [NC WW/GW LC policy based upon SM 20th 5210 B. (4) (e) (1).]			
21	What pH criterion is used? **LIST range for adjustment**: [NC WW/GW LC policy based upon SM 20th 5210 B. (4) (e) (1).]			
22	Is each pH adjustment documented? [15A NCAC 2H .0805 (a) (7).]			
23	Are all samples checked for the presence of residual chlorine? [SM 18th, 19th, 20th 5210 B. (4) (e) (2). SM 21st 5210 B. (4) (b) (2).]			
24	How are the samples checked for chlorine? [SM 18th, 19th, 20th 5210 B. (4) (e) (2). SM 21st 5210 B. (4) (b) (2).]			
25	If chlorine is present, is it properly neutralized with sodium sulfite? [SM 18th, 19th, 20th 5210 B. (4) (e) (2). SM 21st 5210 B. (4) (b) (2).]			
26	Is this documented? [15A NCAC 2H .0805 (a) (7).]			
27	How often is sodium sulfite prepared? [SM 5210 B. (3) (f).]			
28	Is hydrogen peroxide (H_2O_2) present in any samples? [SM 21st 5210 B. (4) (b) (5).]			
29	If so, how is hydrogen peroxide treated? [NC WW/GW LC policy based upon SM 21st 5210 B. (4) (b) (5).)			
	PROCEDURE - Seeding			
30	Are samples seeded if required? [SM 18th, 19th, 20th 5210 B. (4) (d) (1). SM 21st 5210 B. (5) (d).]			
31	What is the source of the seeding material? [SM 18th, 19th, 20th, 5210 B. (4) (d) (1). SM 21st 5210 B. (4) (d).]			
32	If commercial seed (e.g., Polyseed®, BioSeed®, etc.) is used, how is it prepared? [Manufacturer's instructions and SM 21st 5210 B. (4) (d).]			
33	List volumes (mL) of seed for each seed control sample.			
34	Is sufficient seed material used in each seed control to yield a seed correction of 0.6 - 1.0 mg/L? [SM 18th, 19th, 20th 5210 B. (4) (d) (2). SM 21st 5210 B. (5) (d).]			
35	Is the seed correction calculated correctly from the seed controls? [SM 18th, 19th, 20th 5210 B. (5). SM 21st 5210 B. (70 (a) (1).]			
36	Is the criterion of a residual DO of at least 1 mg/L and a DO depletion of at least 2 mg/L used for the seed correction calculation? [SM 18th, 19th, 20th 5210 B. (5). SM 21st 5210 B. (7) (a) (1).]			
37	Are the results of all acceptable seed control analyses averaged? [SM 18th, 19th, 20th 5210 B. (5). SM 21st 5210 B. (7) (a) (1).]			
	PROCEDURE- Sample Analysis			
38	If $CBOD_5$ is required, is a nitrification inhibitor added to all samples, seed controls and GGAs? [SM 18th, 19th, 20th 5210 B. (4) (e) (6). SM 21st 5210 B. (5) (e). and 5210 B. (8).]			
39	What nitrification inhibitor is used for $CBOD_5$ samples? [SM 18th, 19th, 20th 5210 B. (4) (e) (6). SM 21st 5210 B. (5) (e).]			
40	Are all samples, seed controls and GGAs for $CBOD_5$ seeded? [NC WW/GW LC policy based upon SM 21st 5210 B. (5) (e).]			
41	Is initial DO of all bottles between 7 and 9 mg/L? [SM 18th, 19th, 20th, 5210 B. (6) (b). SM 21st 5210 B. (8) (b).]			
42	If not, what corrective action is taken? [15A NCAC 2H .0805 (a) (7) (F).]			
43	Are initial DOs measured within 30 minutes of preparing dilutions? [NC WW/GW LC policy based upon SM 20th 5210 B. (4) (g). and SM 21st 5210 B. (5) (g).]			
44	Is the probe rinsed between bottles to prevent contamination? [NC WW/GW LC policy based upon SM 18th, 19th, 20th 5210 B. (4) (f) (2).]			
45	How many dilutions are set for samples? [SM 18th, 19th, 20th 5210 B. (4) (f). SM 21st 5210 B. (5) (c).]			
46	For dilutions with >67% sample (> 201 mL) are extra nutrients added? [NC WW/GW LC policy based upon SM 20th 5210 B. (4) (f). and SM 21st 5210 B. (5) (c) (2).]			
47	Are the samples incubated for five days ± 6 hours? [NC WW/GW LC policy based upon SM 21st 5210 B. (5) (h) and (i).]			
48	Are samples incubated in the dark at 20 ± 1 °C? [SM 18th. 19th, 20th 5210 B. (4) (i). SM 21st 5210 B. (5) (h).]			
49	Are water seals maintained on the bottles during incubation? [SM 18th, 19th, 20th, 5210 B. (4) (i). SM 21st 5210 B. (5) (f).]			
50	Are sufficient sample dilutions analyzed to meet a residual DO of 1.0 mg/L and a DO depletion of at least 2.0 mg/L? [SM 18th, 19th, 20th,			

	5210 B. (4) (f). SM 21st 5210 B. (5) (c).]			
51	Are all dilutions meeting this criterion averaged for final BOD results? [SM 18th, 19th, 20th, 5210 B. (5). SM 21st 5210 B. (7) (b).]			
52	Are seed corrections properly subtracted from the seeded samples? [SM 18th, 19th, 20th, 5210 B. (5). SM 21st 5210 B. (7) (a) (1).]			
53	Is the final BOD of the samples properly calculated? [SM 18th, 19th, 20th, 5210 B. (5). SM 21st 5210 B. (7) (a) (1).]			
	QUALITY CONTROL			
54	Is the date/time samples are setup documented? [15A NCAC 2H .0805 (a) (7) (H).]			
55	Is the date/time samples are taken out of the incubator documented? [15A NCAC 2H .0805 (a) (7) (H).]			
56	Are incubator temperatures documented? [15A NCAC 2H .0805 (a) (7) (J).]			
56	Is a dilution water blank analyzed? [SM 18th, 19th, 20th, 5210 B. (4) (h). SM 21st 5210 B. (6) (c).]			
57	Is the dilution water blank depletion ≤ 0.20 mg/L? [NC WW/GW LC policy based upon SM 21st 5210 B. (6) (c).]			
58	If not, what corrective action is taken? [15A NCAC 2H .0805 (a) (7) (F).]			
59	Is a glucose-glutamic acid standard (GGA) analyzed with each set of samples? [SM 18th, 19th, 20th 5210 B. (4) (c). SM 21st 5210 B. (6) (b).]			
60	What is the source of the GGA standard? [SM 18th, 19th, 20th 5210 B. (3) (h). and (4) (c). SM 21st 5210 B. (3) (h). and (6) (b).]			
61	How frequently is the GGA standard made? [NC WW/GW LC policy based upon SM 21st 5210 B. (3) (h).]			
62	Is the GGA standard analyzed at a 2% dilution? [SM 18th, 19th, 20th 5210 B. (4) (c). SM 21st 5210 B. (6) (b).]			
63	Is the GGA standard seeded? [SM 18th, 19th, 20th 5210 B. (6). SM 21st 5210 B. (8).]			
64	Is the value of the GGA standard 198 ± 30.5 mg/L? [NC WW/GW LC policy based upon SM 20th 5210 B. (6).			
65	What is the acceptance criterion of the CBOD GGA standard? [NC WW/GW LC policy based upon SM 20th 5210 B. (6) **or** NC WW/GW LC policy based upon guidance from EPA Region IV.			
66	If not, what corrective action is taken? [15A NCAC 2H .0805 (a) (7) (F).]			
67	Is a seeded blank analyzed? (Recommendation)			
68	What is the average typical difference between the seeded blank and the calculated seed correction factor?			
69	Are 5% of the samples set in duplicate? [15A NCAC 2H .0805 (a) (7) (C).]			
70	Do duplicates check within 30% of each other? [NC WW/GW LC policy based upon SM 21st 5210 B. (7) (b).]			
71	Is the data qualified on the Discharge Monitoring Report (DMR) or client report if Quality Control (QC) requirements are not met? [NC WW/GW LC policy based upon 15A NCAC 2B .0506 (b) (3) (J). and SM 21st 5210 B. (7) (b).]			
72	What is the reporting limit (PQL)? [SM 18th, 19th, 20th 5210 B. (6) (b).]			
73	What is the most recent review/revision date of the SOP? [15A NCAC 2H .0805 (a) (7).]			

Additional Comments:

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Inspector: _____ Date: _____