

Republic of the Philippines  
Department of Health  
**BUREAU OF HEALTH FACILITIES AND SERVICES**  
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Annex A – List of Parameters for Each Service Capability

Please tick (✓) appropriate box/es:

SERVICE CAPABILITY				
Bacteriological Analysis	Chemical Analysis		Physical Analysis	Radiological Analysis
<input type="checkbox"/> Total Coliform Test: Multiple Tube Fermentation Technique (MTFT) <input type="checkbox"/> Fecal Coliform Test: MTFT <input type="checkbox"/> Total Coliform Test: Membrane Filtration Technique (MF) <input type="checkbox"/> Fecal Coliform Test: MF <input type="checkbox"/> Gram Stain <input type="checkbox"/> IMVIC Test <input type="checkbox"/> Heterotrophic Plate Count (HPC)	<input type="checkbox"/> Acidity <input type="checkbox"/> Alkalinity <input type="checkbox"/> Aluminum <input type="checkbox"/> Arsenic <input type="checkbox"/> Barium <input type="checkbox"/> Biochemical Oxygen Demand <input type="checkbox"/> Cadmium <input type="checkbox"/> Calcium <input type="checkbox"/> Chloride <input type="checkbox"/> Chloride (Residual) <input type="checkbox"/> Chromium (Hexavalent) <input type="checkbox"/> Copper <input type="checkbox"/> Cyanide <input type="checkbox"/> Fluoride <input type="checkbox"/> Free Carbon Dioxide <input type="checkbox"/> Hardness <input type="checkbox"/> Iron <input type="checkbox"/> Lead <input type="checkbox"/> Magnesium <input type="checkbox"/> Manganese	<input type="checkbox"/> Mercury <input type="checkbox"/> Nitrogen Ammonia <input type="checkbox"/> Nitrogen Nitrate <input type="checkbox"/> Nitrogen Nitrite <input type="checkbox"/> Oil and Grease <input type="checkbox"/> Oxygen Dissolved <input type="checkbox"/> Pesticide <input type="checkbox"/> Phenol <input type="checkbox"/> Phosphate <input type="checkbox"/> Residue <input type="checkbox"/> Selenium <input type="checkbox"/> Silica Dissolved <input type="checkbox"/> Silver <input type="checkbox"/> Sodium <input type="checkbox"/> Sulfate <input type="checkbox"/> Sulfide <input type="checkbox"/> Sulfite <input type="checkbox"/> Surfactants <input type="checkbox"/> Total Organic Carbon <input type="checkbox"/> Total Solids	<input type="checkbox"/> Color <input type="checkbox"/> Odor <input type="checkbox"/> pH Valve <input type="checkbox"/> Specific Conductance <input type="checkbox"/> Taste <input type="checkbox"/> Temperature <input type="checkbox"/> Turbidity	<input type="checkbox"/> Gross Alpha and Gross Beta Radioactivity <input type="checkbox"/> Radium PPG by Radium (Soluble, Suspended and Total) <input type="checkbox"/> Strontium in Water <input type="checkbox"/> Total Radioactive <input type="checkbox"/> Total Radium <input type="checkbox"/> Total, Suspended and Dissolved

Annex B – List of Equipment, Reagent, Laboratory Ware and Materials for Specific Test

**Bacteriological Analysis**

Please tick (✓) appropriate box/es for the test/ method applied:

Test/ Method	Equipment	Reagent/ Media	Laboratory Ware and Materials
<input type="checkbox"/> For All General Bacteriological Preparation and Procedures	<ul style="list-style-type: none"> <li>- Autoclave</li> <li>- Balances, analytical and top-loading</li> <li>- Colony counter</li> <li>- Hot plate with magnetic stirrer</li> <li>- Oven sterilizer</li> <li>- pH Meter</li> <li>- Refrigerator</li> <li>- Stove</li> </ul>	(Refer to specific microbiological test methods below)	<ul style="list-style-type: none"> <li>- Durham tubes, 8 x 45 mm</li> <li>- Erlenmeyer flasks, 250 ml, 500 ml, 1000 ml</li> <li>- Graduated cylinders, 100 ml, 500 ml, 1000 ml</li> <li>- Petri dishes, 15 x 100 mm</li> <li>- Pipets, 10 ml, 1.1 ml</li> <li>- Reagent bottles, brown and clear</li> <li>- Stainless spatulae and spoons</li> <li>- Test tubes, 13 x 100 mm, 15 x 125 mm, 16 x 150 mm, 25 x 150 mm</li> <li>- Test tube caps</li> <li>- Test tubes, screw capped, 16 x 150 mm</li> <li>- Test tube baskets and racks</li> </ul>
<input type="checkbox"/> Total Coliform Test : Multiple Tube fermentation Technique (MTFT)	<ul style="list-style-type: none"> <li>- Bactincinerator or similar flame-sterilization device</li> <li>- Bunsen burner</li> <li>- Incubator, can be maintained at 35± 0.5°C</li> <li>- Isolation hood, laminar flow hood or biological safety cabinet</li> </ul>	<ul style="list-style-type: none"> <li>- Lauryl Tryptose Broth (LTB)</li> <li>- Brilliant Green lactose bile Broth (BGLB)</li> </ul>	<ul style="list-style-type: none"> <li>- Inoculating loops</li> <li>- Pipets, 10 ml</li> </ul>

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<b>Test/ Method</b>	<b>Equipment</b>	<b>Reagent/ Media</b>	<b>Laboratory Ware and Materials</b>
<input type="checkbox"/> Fecal Coliform Tests : MTFT	<ul style="list-style-type: none"> <li>- Bacticinerator or similar flame-sterilization device</li> <li>- Bunsen burner</li> <li>- Isolation hood, laminar flow hood or biological safety cabinet</li> <li>- Water bath Incubator, can be maintained at 44.5°C ± 0.5</li> </ul>	<ul style="list-style-type: none"> <li>- EC Medium (EC)</li> </ul>	<ul style="list-style-type: none"> <li>- Inoculating loops</li> </ul>
<input type="checkbox"/> Total Coliform Test: Membrane Filtration Technique (MF)	<ul style="list-style-type: none"> <li>- Bacticinerator or similar flame-sterilization device</li> <li>- Bunsen burner</li> <li>- Isolation hood, laminar flow hood or biological safety cabinet</li> <li>- Incubator, can be maintained at 35± 0.5°C</li> <li>- Membrane filtration apparatus, manifold and vacuum pump</li> <li>- Microscope, compound</li> <li>- Water bath Incubator, can be maintained at 44.5°C ± 0.5</li> </ul>	<ul style="list-style-type: none"> <li>- LES Endo Agar (Endo)</li> <li>- M-Endo Medium</li> </ul>	<ul style="list-style-type: none"> <li>- Membrane filters, 0.22 µm pore size</li> <li>- Forceps</li> </ul>

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<b>Test/ Method</b>	<b>Equipment</b>	<b>Reagent/ Media</b>	<b>Laboratory Ware and Materials</b>
<input type="checkbox"/> Fecal Coliform Test: MF	<ul style="list-style-type: none"> <li>- Bactincinerator or similar flame-sterilization device</li> <li>- Bunsen burner</li> <li>- Isolation hood, laminar flow hood or biological safety cabinet</li> <li>- Incubator, can be maintained at <math>35 \pm 0.5^{\circ}\text{C}</math></li> <li>- Membrane filtration apparatus, manifold and vacuum pump</li> <li>- Microscope, compound</li> <li>- Water bath Incubator, can be maintained at <math>44.5^{\circ}\text{C} \pm 0.5</math></li> </ul>	<ul style="list-style-type: none"> <li>- M-FC Medium</li> </ul>	<ul style="list-style-type: none"> <li>- Membrane filters, 0.22 <math>\mu\text{m}</math> pore size</li> <li>- Forceps</li> </ul>
<input type="checkbox"/> Presence-Absence (P-A) Coliform Test	<ul style="list-style-type: none"> <li>- Bactincinerator or similar flame-sterilization device</li> <li>- Bunsen burner</li> <li>- Isolation hood, laminar flow hood or biological safety cabinet</li> <li>- Incubator, can be maintained at <math>35 \pm 0.5^{\circ}\text{C}</math></li> </ul>	<ul style="list-style-type: none"> <li>- LTB</li> <li>- P-A Broth</li> </ul>	<ul style="list-style-type: none"> <li>- Graduated cylinder</li> </ul>

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Test/ Method	Equipment	Reagent/ Media	Laboratory Ware and Materials
<input type="checkbox"/> Colilert	<ul style="list-style-type: none"> <li>- Bacticinerator or similar flame-sterilization device</li> <li>- Bunsen burner</li> <li>- Comparator (from the manufacturer)</li> <li>- Isolation hood, laminar flow hood or biological safety cabinet</li> <li>- Incubator, can be maintained at <math>35 \pm 0.5^{\circ}\text{C}</math></li> <li>- Sealer (from the manufacturer)</li> <li>- Ultraviolet light, 366 nm</li> <li>- Water bath incubator</li> </ul>	<ul style="list-style-type: none"> <li>- Colilert</li> <li>- Colilert 18</li> <li>- Colilert MW</li> <li>- Colisure</li> </ul>	<ul style="list-style-type: none"> <li>- 51 well microplate (from the manufacturer)</li> <li>- Test tube rack</li> </ul>
<input type="checkbox"/> Gram Stain	<ul style="list-style-type: none"> <li>- Bacticinerator or similar flame-sterilization device</li> <li>- Bunsen burner</li> <li>- Isolation hood, laminar flow hood or biological safety cabinet</li> <li>- Incubator, can be maintained at <math>35 \pm 0.5^{\circ}\text{C}</math></li> <li>- Microscope, compound</li> </ul>	<ul style="list-style-type: none"> <li>- Nutrient Agar</li> <li>- Crystal Violet</li> <li>- Gram's Iodine</li> <li>- 95% Ethyl Alcohol</li> <li>- Safranin O</li> </ul>	<ul style="list-style-type: none"> <li>- Forceps</li> <li>- Microscope glass slides</li> <li>- Staining rack</li> <li>- Wash bottle</li> </ul>
<input type="checkbox"/> IMViC tests	<ul style="list-style-type: none"> <li>- Bacticinerator or similar flame-sterilization device</li> <li>- Bunsen burner</li> <li>- Isolation hood, laminar flow hood or biological safety cabinet</li> <li>- Incubator, can be maintained at <math>35 \pm 0.5^{\circ}\text{C}</math></li> </ul>	<ul style="list-style-type: none"> <li>- Nutrient Agar</li> <li>- Tryptone Broth (TB)</li> <li>- MR-VP medium (MRVP)</li> <li>- Simmon's Citrate Agar (SCA)</li> <li>- Kovac's reagent</li> <li>- Methyl red solution</li> <li>- Barritt's reagent (a naphthol solution)</li> <li>- O'Meara's reagent (KOH solution)</li> </ul>	<ul style="list-style-type: none"> <li>- Inoculating loops</li> <li>- Pasteur pipets</li> </ul>

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<b>Test/ Method</b>	<b>Equipment</b>	<b>Reagent/ Media</b>	<b>Laboratory Ware and Materials</b>
<input type="checkbox"/> Heterotrophic Plate Count (HPC)	<ul style="list-style-type: none"> <li>- Bacticinerator or similar flame-sterilization device</li> <li>- Bunsen burner</li> <li>- Colony counter</li> <li>- Isolation hood, laminar flow hood or biological safety cabinet</li> <li>- Incubator, can be maintained at 35± 0.5°C</li> <li>- Vortex mixer</li> </ul>	<ul style="list-style-type: none"> <li>- Phosphate Buffer Solution (PBS)</li> <li>- 0.1% Peptone water</li> <li>- Plate Count Agar (PCA)</li> <li>- Tryptic Soy Agar (TSA)</li> </ul>	<ul style="list-style-type: none"> <li>- Petri dishes</li> <li>- Pipets, 10 ml., 1.1 ml, 1.0 ml</li> <li>- Bent-glass rod (spreader), if spread plate techniques is used</li> </ul>

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Annex B – Minimum Equipment, Reagent and Laboratory Ware for Specific Test

**Chemical Analysis (Inorganic Chemical Constituent With Health Significance)**

Please tick (✓) appropriate box/es for the constituent used:

Constituent	Test/ Method	Equipment	Reagent/ Media	Laboratory Ware and Materials
<input type="checkbox"/> Antimony (Sb)	<ul style="list-style-type: none"> <li>- FAAS</li> <li>- EAAS</li> <li>- ICP</li> </ul>	<ul style="list-style-type: none"> <li>- FAAS</li> <li>- EAAS</li> <li>- ICP</li> </ul>	<ul style="list-style-type: none"> <li>- Nitric Acid</li> <li>- Hydrochloric Acid</li> <li>- Standard Sb</li> <li>- Calibration standards</li> <li>- QC standards</li> </ul>	<ul style="list-style-type: none"> <li>- For FAAS: Acetylene Gas</li> <li>- For EAAS/ ICP: Argon</li> <li>- Hotplate</li> <li>- Fume hood</li> </ul>
<input type="checkbox"/> Arsenic (As)	<ul style="list-style-type: none"> <li>- ICP</li> <li>- Hydride Generation AAS</li> <li>- EAAS</li> <li>- Silver Diethyldithiocarbamate Method (SDDC)</li> </ul>	<ul style="list-style-type: none"> <li>- ICP</li> <li>- Hydride Generation AAS</li> <li>- EAAS</li> <li>- For SDCC: Spectrophotometer</li> </ul>	<p>For Hydride Generation AAS/ EAAS:</p> <ul style="list-style-type: none"> <li>- Nitric Acid</li> <li>- Hydrochloric Acid</li> <li>- Standard As</li> <li>- Calibration standards</li> <li>- QC standards</li> <li>- Sodium Borohydrate</li> <li>- Sodium Iodide</li> <li>- Potassium Persulfate</li> <li>- Perchloric Acid</li> </ul> <p>For SDDC:</p> <ul style="list-style-type: none"> <li>- Acetic Acid</li> <li>- Sodium Acetate</li> <li>- Sodium Borohydride solution</li> <li>- Hydrochloric Acid</li> <li>- Lead Acetate</li> <li>- Silver Diethyldithiocarbamate</li> <li>- Standard As</li> </ul>	<ul style="list-style-type: none"> <li>- For ICP/ EAAS: Argon</li> <li>- For ICP/ AAS/ EAAS: Reaction Cell</li> <li>- For SDCC: Arsine generator</li> <li>- Hotplate</li> <li>- Fume hood</li> </ul>
<input type="checkbox"/> Barium (Ba)	<ul style="list-style-type: none"> <li>- FAAS</li> <li>- EAAS</li> <li>- ICP</li> </ul>	<ul style="list-style-type: none"> <li>- FAAS</li> <li>- EAAS</li> <li>- ICP</li> </ul>	<ul style="list-style-type: none"> <li>- Nitric Acid</li> <li>- Hydrochloric Acid</li> <li>- Standard Ba</li> <li>- Calibration standards</li> <li>- QC standards</li> </ul>	<ul style="list-style-type: none"> <li>- For FAAS: Acetylene Gas</li> <li>- For EAAS/ ICP: Argon</li> <li>- Hotplate</li> <li>- Fume hood</li> </ul>

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Constituent	Test/ Method	Equipment	Reagent/ Media	Laboratory Ware and Materials
<input type="checkbox"/> Boron (B)	<ul style="list-style-type: none"> <li>- ICP</li> <li>- Carmine/ Curcumine Method</li> </ul>	<ul style="list-style-type: none"> <li>- ICP</li> <li>- Spectrophotometer</li> </ul>	For ICP: <ul style="list-style-type: none"> <li>- Nitric Acid</li> <li>- Hydrochloric Acid</li> <li>- Standard B</li> <li>- Calibration standards</li> <li>- QC standards</li> </ul> For Carmine/ Curcumine: <ul style="list-style-type: none"> <li>- Hydrochloric Acid</li> <li>- Standard B</li> <li>- Sulfuric</li> </ul>	<ul style="list-style-type: none"> <li>- For ICP: Argon</li> <li>- Hotplate</li> <li>- Fume hood</li> </ul>

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Constituent	Test/ Method	Equipment	Reagent/ Media	Laboratory Ware and Materials
<input type="checkbox"/> Cadmium (Cd)	<ul style="list-style-type: none"> <li>- FAAS</li> <li>- EAAS</li> <li>- ICP</li> <li>- Anodic Stripping Voltammetry (ASV)</li> <li>- Dithizone Method</li> </ul>	<ul style="list-style-type: none"> <li>- FAAS</li> <li>- EAAS</li> <li>- ICP</li> <li>- For ASV: Electrochemical analyzer</li> <li>- For Dithizone: Spectrophotometer</li> </ul>	For FAAS/ EAAS/ ICP/ ASV: <ul style="list-style-type: none"> <li>- Nitric Acid</li> <li>- Hydrochloric Acid</li> <li>- Standard Cd</li> <li>- Calibration standards</li> <li>- QC standards</li> </ul> For ASV: <ul style="list-style-type: none"> <li>- Nitrogen high purity</li> <li>- Electrolyte buffer (Phosphate/ Citrate)</li> <li>- Mercury</li> <li>- Mercuric Nitrate</li> <li>- Reference electrode filling solution</li> <li>- Amalgamated Zn</li> <li>- Hydrochloric Acid</li> <li>- Vanadous Chloride</li> <li>- HF</li> <li>- Methanol</li> <li>- Siliconizing solution</li> <li>- Alumina grits</li> </ul> For Dithizone <ul style="list-style-type: none"> <li>- Standard Cd</li> <li>- Sodium Potassium Tartrate</li> <li>- Sodium Hydroxide</li> <li>- Potassium Cyanide</li> <li>- Hydroxylamine HCl</li> <li>- Dithizone</li> <li>- Chloroform</li> <li>- Tartaric Acid</li> <li>- Hydrochloric Acid</li> <li>- Thymol Blue</li> <li>- Sodium Hydroxide</li> </ul>	<ul style="list-style-type: none"> <li>- For FAAS: Acetylene Gas</li> <li>- For EAAS/ ICP: Argon</li> <li>- Hotplate</li> <li>- Fume hood</li> <li>- For ASV: Electrodes and cells</li> </ul>

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Constituent	Test/ Method	Equipment	Reagent/ Media	Laboratory Ware and Materials
<input type="checkbox"/> Chromium	<ul style="list-style-type: none"> <li>- FAAS</li> <li>- EAAS</li> <li>- ICP</li> <li>- Colorimetric</li> </ul>	<ul style="list-style-type: none"> <li>- FAAS</li> <li>- EAAS</li> <li>- ICP</li> <li>- Spectrophotometer</li> </ul>	<ul style="list-style-type: none"> <li>- Nitric Acid</li> <li>- Hydrochloric Acid</li> <li>- Standard Cr</li> <li>- Calibration standards</li> <li>- QC standards</li> <li>- Sulfuric Acid</li> <li>- Phosphoric Acid</li> <li>- Methyl Orange</li> <li>- Hydrogen Peroxide</li> <li>- Ammonium Hydroxide</li> <li>- Potassium Permanganate</li> <li>- Sodium Azide</li> <li>- Diphenylcarbazide</li> <li>- Chloroform</li> <li>- Cupferron</li> </ul>	<ul style="list-style-type: none"> <li>- For FAAS: Acetylene Gas</li> <li>- For EAAS/ ICP: Argon</li> <li>- Hotplate</li> <li>- Fume hood</li> </ul>
<input type="checkbox"/> Cyanide	<ul style="list-style-type: none"> <li>- Titrimetric</li> <li>- Colorimetric</li> <li>- CN Selective Electrode (CNSE)</li> </ul>	<ul style="list-style-type: none"> <li>- For Colorimetric: Spectrophotometer</li> <li>- For CNSE: Expanded scale pH meter or specific ion meter</li> </ul>	<ul style="list-style-type: none"> <li>- Sodium Hydroxide</li> <li>- Magnesium Chloride</li> <li>- Sulfuric Acid</li> <li>- Lead Carbonate</li> <li>- Sulfamic Acid</li> <li>For Titrimetric:</li> <li>- P-dimethylaminobenzalrhodanine</li> <li>- Acetone</li> <li>- Standard Silver Nitrate</li> <li>- Potassium Dichromate</li> <li>For Colorimetric:</li> <li>- Chloramine –T</li> <li>- Standard CN</li> <li>- Barbituric Acid</li> <li>- Pyridine</li> <li>- Sodium Acetate</li> <li>- Sodium Hydroxide</li> <li>For CNSE:</li> <li>- Standard CN</li> <li>- Sodium Hydroxide</li> <li>- Potassium Nitrate</li> </ul>	<ul style="list-style-type: none"> <li>- Cyanide distillation apparatus</li> <li>- For Titrimetric/ CNSE: Koch Microburette</li> <li>- For CNSE: Cyanide-ion-selective electrode</li> </ul>

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Constituent	Test/ Method	Equipment	Reagent/ Media	Laboratory Ware and Materials
<input type="checkbox"/> Fluoride	<ul style="list-style-type: none"> <li>- Ion chromatography (IC)</li> <li>- Ion-selective electrodes (ISE)</li> <li>- SPADNS</li> <li>- Complexone Method</li> </ul>	<ul style="list-style-type: none"> <li>- IC</li> <li>- For ISE: Expanded scale pH meter or specific ion meter</li> <li>- For SPADNS: Spectrophotometer</li> <li>- For Complexone: Fluoride manifold</li> </ul>	<ul style="list-style-type: none"> <li>- Standard Fluoride</li> <li>For IC:                             <ul style="list-style-type: none"> <li>- Eluent solution</li> <li>- Regenerate solution</li> </ul> </li> <li>For ISE:                             <ul style="list-style-type: none"> <li>- Glacial Acetic Acid (HAc)</li> <li>- Sodium Chloride</li> <li>- Cyclohexylenediaminetetra Acetic Acid (CDTA)</li> <li>- Sodium Hydroxide</li> </ul> </li> <li>For SPADNS:                             <ul style="list-style-type: none"> <li>- Zirconyl Chloride</li> </ul> </li> <li>For Complexone:                             <ul style="list-style-type: none"> <li>- Sulfuric Acid</li> <li>- Sodium Acetate</li> <li>- Glacial Acetic Acid</li> <li>- Alizarin Fluorine</li> <li>- Ammonium Hydroxide</li> <li>- Lanthanum Nitrate</li> <li>- Tertiary Butanol</li> <li>- Polyoxyethylene 23 lauryl ether</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>- For ISE: Fluoride electrode</li> </ul>

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<input type="checkbox"/> Lead (Pb)	<ul style="list-style-type: none"> <li>- FAAS</li> <li>- EAAS</li> <li>- ICP</li> <li>- Anodic Stripping Voltammetry (ASV)</li> <li>- Dithizone Method</li> </ul>	<ul style="list-style-type: none"> <li>- FAAS</li> <li>- EAAS</li> <li>- ICP</li> <li>- For ASV: Electrochemical analyzer</li> <li>- For Dithizone: Spectrophotometer</li> </ul>	<ul style="list-style-type: none"> <li>- Standard Lead</li> <li>- Calibration standards</li> <li>- QC standards</li> <li>For FAAS/ EAAS/ ICP/ ASV:               <ul style="list-style-type: none"> <li>- Nitric Acid</li> <li>- Hydrochloric Acid</li> </ul> </li> <li>For ASV:               <ul style="list-style-type: none"> <li>- Nitrogen high purity</li> <li>- Electrolyte buffer (phosphate/Citrate)</li> <li>- Mercury</li> <li>- Mercuric Nitrate</li> <li>- Reference electrode filling solution</li> <li>- Amalgamated Zn</li> <li>- Hydrochloric Acid</li> <li>- Vanadous chloride</li> <li>- HF</li> <li>- Methanol</li> <li>- Siliconizing solution</li> <li>- Alumina grits</li> </ul> </li> <li>For Dithizone:               <ul style="list-style-type: none"> <li>- Nitric Acid</li> <li>- Ammonium Hydroxide</li> <li>- Ammonium Citrate</li> <li>- Sodium Sulfite</li> <li>- Potassium Cyanide</li> <li>- Hydroxylamine HCl</li> <li>- Dithizone</li> <li>- Chloroform</li> <li>- Iodine</li> <li>- Potassium Iodide</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>- For FAAS: Acetylene Gas</li> <li>- For EAAS/ ICP: Argon</li> <li>- Hotplate</li> <li>- Fume hood</li> <li>- For ASV: Electrodes and cells</li> </ul>

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<input type="checkbox"/> Total Mercury (Hg)	<ul style="list-style-type: none"> <li>- Cold vapor AAS</li> <li>- ICP/ MS</li> </ul>	<ul style="list-style-type: none"> <li>- Cold vapor AAS</li> <li>- ICP/ MS</li> </ul>	<ul style="list-style-type: none"> <li>- Standard Hg</li> <li>- Calibration standards</li> <li>- QC standards</li> <li>For Cold vapor AAS:               <ul style="list-style-type: none"> <li>- Nitric Acid</li> <li>- Potassium Permanganate</li> <li>- Potassium Persulfate</li> <li>- Sodium Chloride</li> <li>- Hydroxylamine sulfate/chloride</li> <li>- Stannous Chloride</li> <li>- Hydrochloric Acid</li> <li>- Sulfuric Acid</li> </ul> </li> </ul>	
<input type="checkbox"/> Nickel (Ni)	<ul style="list-style-type: none"> <li>- FAAS</li> <li>- EAAS</li> <li>- ICP</li> </ul>	<ul style="list-style-type: none"> <li>- FAAS</li> <li>- EAAS</li> <li>- ICP</li> </ul>	<ul style="list-style-type: none"> <li>- Nitric Acid</li> <li>- Hydrochloric Acid</li> <li>- Standard Ni</li> <li>- Calibration standards</li> <li>- QC standards</li> </ul>	<ul style="list-style-type: none"> <li>- For FAAS: Acetylene Gas</li> <li>- For EAAS/ ICP: Argon</li> <li>- Hotplate</li> <li>- Fume hood</li> </ul>
<input type="checkbox"/> Nitrate (NO <sub>3</sub> <sup>-</sup> )	<ul style="list-style-type: none"> <li>- Nitrate Electrode Method (NEM)</li> <li>- Cd Reduction Method (CRM)</li> <li>- Ion chromatography (IC)</li> </ul>	<ul style="list-style-type: none"> <li>- For NEM: pH meter, expanded-scale</li> <li>- For CRM: Spectrophotometer</li> <li>- IC</li> </ul>	<ul style="list-style-type: none"> <li>- Standard Nitrate</li> <li>For NEM:               <ul style="list-style-type: none"> <li>- Aluminum Sulfate</li> <li>- Silver Sulfate</li> <li>- Boric Acid</li> <li>- Sulfamic Acid</li> <li>- Sodium Hydroxide</li> </ul> </li> <li>For CRM:               <ul style="list-style-type: none"> <li>- Cd granules</li> <li>- Hydrochloric Acid</li> <li>- Copper Sulfate</li> <li>- Color reagent: phosphoric acid, sulfanilamide, N-(1-naphthyl)-ethylenediamine dihydrochloride</li> <li>- Ammonium Chloride</li> <li>- EDTA</li> </ul> </li> <li>For IC:               <ul style="list-style-type: none"> <li>- Eluent solution</li> <li>- Regenerant solution</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>For NEM:               <ul style="list-style-type: none"> <li>- Double –junction reference electrode</li> <li>- Nitrate Ion electrode</li> </ul> </li> <li>For CRM:               <ul style="list-style-type: none"> <li>- Reduction column</li> </ul> </li> </ul>

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Constituent	Test/ Method	Equipment	Reagent/ Media	Laboratory Ware and Materials
<input type="checkbox"/> Nitrite (NO <sub>2</sub> <sup>-</sup> )	<ul style="list-style-type: none"> <li>- Colorimetric (Diazotization)</li> <li>- Ion Chromatography (IC)</li> </ul>	<ul style="list-style-type: none"> <li>- For Colorimetric: Spectrophotometer</li> <li>- IC</li> </ul>	<ul style="list-style-type: none"> <li>- Standard Nitrite</li> </ul> For Colorimetric: <ul style="list-style-type: none"> <li>- Phosphoric acid</li> <li>- Sulfanilamide</li> <li>- N-(1-naphthyl)-ethylenediamine dihydrochloride</li> </ul> For IC: <ul style="list-style-type: none"> <li>- Eluent solution</li> <li>- Regenerant solution</li> </ul>	
<input type="checkbox"/> Selenium (Se)	<ul style="list-style-type: none"> <li>- Hydride Generation AAS</li> <li>- EAAS</li> <li>- ICP</li> <li>- Colorimetric</li> <li>- Fluorometric</li> </ul>	<ul style="list-style-type: none"> <li>- Hydride Generation AAS</li> <li>- EAAS</li> <li>- ICP</li> <li>- For Colorimetric: Spectrophotometer</li> <li>- For Fluorometric: Fluorometer</li> </ul>	<ul style="list-style-type: none"> <li>- Selenium standard</li> <li>- Calibration standards</li> <li>- QC standards</li> </ul> For Hydride Generation AAS/ EAAS: <ul style="list-style-type: none"> <li>- Nitric Acid</li> <li>- Hydrochloric Acid</li> <li>- Standard As</li> <li>- Sodium Borohydrate</li> <li>- Sodium Iodide</li> <li>- Potassium Persulfate</li> <li>- Perchloric Acid</li> </ul> For Colorimetric/ Fluorometric: <ul style="list-style-type: none"> <li>- HCL</li> <li>- Ammonium Hydroxide</li> <li>- Cyclohexane</li> <li>- 2,3 Diaminonaphthalene (DAN) solution</li> <li>- Hydroxylamine EDTA</li> <li>- Disodium EDTA</li> </ul>	<ul style="list-style-type: none"> <li>- For EAAS/ ICP: Argon</li> <li>- For AAS/ EAAS/ ICP: Reaction Cell</li> <li>- Hotplate</li> <li>- Fume hood</li> </ul> For Colorimetric/ Fluorometric: <ul style="list-style-type: none"> <li>- Water bath</li> <li>- pH meter</li> <li>- Centrifuge</li> <li>- Shaker</li> </ul>

Annex B – Minimum Equipment, Reagent and Laboratory Ware for Specific Test

**Chemical Analysis (Organic Chemical Constituent)**

Please tick (✓) appropriate box/es for the constituent used:

Constituent	Test/ Method	Equipment	Reagent/ Media	Laboratory Ware and Materials
<input type="checkbox"/> Volatile Organic Compounds (e.g. benzene, toluene, chloromethane, chlorobenzene, etc.); Volatile Aromatic; Volatile Halocarbons; 1,2 (EDB) Dibromoethane; 1,2 Dibromo-3- Chloropropane (DBCP)	<ul style="list-style-type: none"> <li>- GC/PID</li> <li>- GC/ELCD</li> <li>- GC/MS</li> </ul>	<ul style="list-style-type: none"> <li>- GC/PID</li> <li>- GC/ELCD</li> <li>- GC/MS</li> </ul>	<ul style="list-style-type: none"> <li>- Standard solution</li> <li>- Internal standards/surrogate standards</li> <li>- Calibration standards</li> <li>- QC standards</li> <li>- Sample prep/extraction supplies</li> <li>LLE</li> <li>- Sodium Hydroxide</li> <li>- Sodium Sulfate</li> <li>- Sodium Thiosulfate</li> <li>- Sulfuric Acid</li> <li>- Acetone</li> <li>- Methanol</li> <li>- Methylene Chloride</li> <li>SPE</li> <li>- Appropriate solvent</li> </ul>	<ul style="list-style-type: none"> <li>- Purge and Trap system or Headspace autosampler</li> <li>LLE</li> <li>- Drying column</li> <li>- Kuderna-Danish set up</li> <li>- Vials</li> <li>SPE</li> <li>- SPE column</li> <li>- Sample concentrator</li> <li>Gas</li> <li>- Nitrogen gas*</li> <li>- Hydrogen gas*</li> <li>- Helium gas*</li> <li>* gases depend on the equipment</li> </ul>
<input type="checkbox"/> Trihalomethanes and Chlorinated Organic Solvents	<ul style="list-style-type: none"> <li>- GC/MS</li> <li>- GC-ECD</li> </ul>	<ul style="list-style-type: none"> <li>- GC/MS</li> <li>- GC-ECD</li> </ul>	<ul style="list-style-type: none"> <li>LLE</li> <li>- Extraction Solvent (pentane, hexane, MTBE)</li> <li>- Methyl Alcohol</li> <li>- Neat Standard materials – Calibration standards</li> <li>- Internal Standard</li> <li>- Stock Standards</li> <li>- QC standards</li> <li>- Calibration standards</li> </ul>	<ul style="list-style-type: none"> <li>- Sample vials</li> <li>- Microsyringes</li> <li>- Extraction vessel</li> <li>- Specific columns</li> <li>- Mechanical Shaker</li> <li>Gas</li> <li>- Nitrogen gas*</li> <li>- Hydrogen gas*</li> <li>- Helium gas*</li> <li>* gases depend on the equipment</li> </ul>

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Constituent	Test/ Method	Equipment	Reagent/ Media	Laboratory Ware and Materials
<input type="checkbox"/> Disinfection By Products: Haloacetic Acids and Trichlorophenol	- GC-ECD	- GC-ECD	LLE - Extraction Solvent (MTBE) - Methanol, pesticide grade - Sodium Sulfate - Ammonium Chloride - Reagents for Diazomethane generation - Diethylene glycol monoethylether - N-methyl-N-nitroso-p-toluene sulfonamide - Ethyl Ether, absolute - Potassium Hydroxide - Standard materials - Internal Standard - Surrogate Standards - Calibration Standards - QC standards - Silica Gel - Sulfuric Acid - Copper Sulfate pentahydrate	- Sample vials - Microsyringes - Extraction vessel - Specific columns - Mechanical Shaker - Volumetric flask, 2,5, 10 ml
<input type="checkbox"/> Disinfection by Products: Aldehydes	- PFBHA LLE GC	- GC-ECD	- Hexane, UV grade - Methanol - Ammonium Chloride - Sulfuric Acid - Organic free reagent water - Buffer pH 6: Potassium hydrogen phthalate, Sodium Hydroxide - Derivatizing agent: PFBHA (2,3,4,5,6 pentafluorobenzyl-hydroxylamine hydrochloride) - Aldehyde standard - Internal standard - Surrogate standard - Calibration standard - QC standard	- Sample containers and extraction vials: 40 ml screw top - Microsyringe - Volumetric flask, 5, 10, 25 ml - Syringe: 20 ml, hypodermic - Automatic pipette dispenser - Water bath or incubator - Pasteur pipette

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Constituent	Test/ Method	Equipment	Reagent/ Media	Laboratory Ware and Materials
<input type="checkbox"/> Polynuclear Aromatic Hydrocarbons, Phthalates, Phenolics	<ul style="list-style-type: none"> <li>- GCMS</li> </ul>	<ul style="list-style-type: none"> <li>- GCMS</li> </ul>	<ul style="list-style-type: none"> <li>- Sodium Hydroxide solution, 10 N</li> <li>- Sodium Sulfate</li> <li>- Sodium Thiosulfate</li> <li>- Sulfuric Acid, 1+1</li> <li>- Acetone, Methanol, Methylene Chloride, pesticide quality</li> <li>- Stock standard solution</li> <li>- Calibration standards</li> <li>- QC standards</li> </ul>	LLE <ul style="list-style-type: none"> <li>- Drying column</li> <li>- Kuderna-Danish set up</li> <li>- Vials</li> <li>- Separatory funnel, 2 L</li> <li>- Drying column, chromatographic</li> <li>- Water bath</li> <li>- Continuous liquid extractor</li> </ul>
<input type="checkbox"/> Polychlorinated biphenyls	<ul style="list-style-type: none"> <li>- GCMS</li> <li>- GC-ECD</li> </ul>		GCMS <ul style="list-style-type: none"> <li>- Sodium Hydroxide solution, 10 N</li> <li>- Sodium Sulfate</li> <li>- Sodium Thiosulfate</li> <li>- Sulfuric Acid, 1+1</li> <li>- Acetone, Methanol, Methylene Chloride, pesticide quality</li> <li>- Standard solution</li> <li>- Calibration standards</li> <li>- QC standards</li> </ul> GC-ECD <ul style="list-style-type: none"> <li>- Hexane</li> <li>- Petroleum Ether</li> <li>- Diethyl Ether</li> <li>- Ethyl Acetate</li> <li>- Methylene Chloride</li> <li>- Magnesia-silica gel</li> <li>- Sodium Sulfate</li> <li>- Silanized glass wool</li> <li>- Carrier gas: Nitrogen and Argon Methane</li> <li>- PCB reference material</li> <li>- Calibration standards</li> <li>- QC standards</li> </ul>	GCMS LLE <ul style="list-style-type: none"> <li>- Drying column</li> <li>- Kuderna-Danish set up</li> <li>- Vials</li> <li>- Separatory funnel, 2 L</li> <li>- Drying column, chromatographic</li> <li>- Water bath</li> <li>- Continuous liquid extractor</li> </ul> GC-ECD LLE <ul style="list-style-type: none"> <li>- Drying column</li> <li>- Kuderna-Danish set up</li> <li>- Vials</li> <li>- Separatory funnel, 2 L</li> <li>- Drying column, chromatographic</li> <li>- Water bath</li> <li>- Continuous liquid extractor</li> <li>- Glass wool</li> </ul>

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Constituent	Test/ Method	Equipment	Reagent/ Media	Laboratory Ware and Materials
<input type="checkbox"/> Organochlorine pesticides	<ul style="list-style-type: none"> <li>- GC-ECD</li> <li>- GCMS</li> </ul>		GC-ECD <ul style="list-style-type: none"> <li>- Hexane</li> <li>- Petroleum Ether</li> <li>- Diethyl Ether</li> <li>- Ethyl Acetate</li> <li>- Methylene Chloride</li> <li>- Magnesia-silica gel</li> <li>- Sodium Sulfate</li> <li>- Silanized glass wool</li> <li>- Carrier gas: Nitrogen and Argon Methane</li> <li>- OCP reference material</li> <li>- Calibration standards</li> <li>- QC standards</li> </ul> GCMS <ul style="list-style-type: none"> <li>- Sodium Hydroxide solution, 10 N</li> <li>- Sodium Sulfate</li> <li>- Sodium Thiosulfate</li> <li>- Sulfuric Acid, 1+1</li> <li>- Acetone, Methanol, Methylene Chloride, pesticide quality</li> <li>- Stock standard solution</li> <li>- Calibration standards</li> <li>- QC standards</li> </ul>	GC-ECD LLE <ul style="list-style-type: none"> <li>- Drying column</li> <li>- Kuderna-Danish set up</li> <li>- Vials</li> <li>- Separatory funnel, 2 L</li> <li>- Drying column, chromatographic</li> <li>- Water bath</li> <li>- Continuous liquid extractor</li> <li>- Glass wool</li> </ul> GCMS LLE <ul style="list-style-type: none"> <li>- Drying column</li> <li>- Kuderna-Danish set up</li> <li>- Vials</li> <li>- Separatory funnel, 2 L</li> <li>- Drying column, chromatographic</li> <li>- Water bath</li> <li>- Continuous liquid extractor</li> </ul>
<input type="checkbox"/> Carbamate Pesticides	<ul style="list-style-type: none"> <li>- HPLC</li> </ul>	<ul style="list-style-type: none"> <li>- HPLC equipped with column</li> </ul>	<ul style="list-style-type: none"> <li>- Methanol</li> <li>- Sodium Hydroxide, 0.05 N</li> <li>- 2-Mercaptoethanol solution</li> <li>- Sodium Borate</li> <li>- OPA reaction solution (O-phthalaldehyde)</li> <li>- Monochloroacetic acid buffer</li> <li>- Stock pesticide solution</li> <li>- Calibration standards</li> <li>- QC standards</li> <li>- Sample bottle, 120 ml screw cap polypropylene</li> </ul>	<ul style="list-style-type: none"> <li>- Micro-filter</li> </ul>

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Constituent	Test/ Method	Equipment	Reagent/ Media	Laboratory Ware and Materials
<input type="checkbox"/> Acid Herbicide Compound	- GC-ECD	- GC-ECD (Micro Liquid-Liquid Extraction GC)	<ul style="list-style-type: none"> <li>- 5 MTBE</li> <li>- Sodium Sulfate</li> <li>- Methanol</li> <li>- Reagents for diazomethane generation               <ul style="list-style-type: none"> <li>- Sodium Hydroxide</li> <li>- N-methyl-N-nitroso-p-toluene sulfonamide</li> </ul> </li> <li>- Silica gel</li> <li>- Sulfuric Acid</li> <li>- Copper Sulfate pentahydrate</li> <li>- Analytical standards</li> <li>- Calibration standards</li> <li>- QC standards</li> </ul>	<ul style="list-style-type: none"> <li>- Sample and extraction vials, 40 or 60 ml screw cap vials, TFE silicon</li> <li>- Microsyringe</li> <li>- Syringe, 30 ml</li> <li>- Microvolumetric flask: 2, 10 ml</li> <li>- Mechanical shaker</li> <li>- Extract and standard solution storage container: 1.8 ml clear glass, 14 ml amber glass screw cap vials with TFE-lines silicone septa</li> <li>- Transfer pipette (Pasteur pipette)</li> <li>- Salt scoop</li> <li>- Diazomethane generator</li> <li>- pH strips</li> </ul>

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Constituent	Test/ Method	Equipment	Reagent/ Media	Laboratory Ware and Materials
<input type="checkbox"/> Glyphosate Herbicides	- Liquid Chromatographic Post-Column Fluorescence	- HPLC w/ fluorescence detector	<ul style="list-style-type: none"> <li>- Phosphoric Acid</li> <li>- Sulfuric Acid</li> <li>- Hydrochloric Acid</li> <li>- Potassium Dihydrogen Phosphate</li> <li>- Disodium Ethylenediamine Tetraacetic Dihydrate (EDTA)</li> <li>- Oxidation Reagent:                             <ul style="list-style-type: none"> <li>- Sodium Chloride</li> <li>- Sodium Hydroxide</li> <li>- Calcium Hypochlorite</li> </ul> </li> <li>- Pot Dihydrogen Phosphate</li> <li>- Fluorogenic labeling reagent                             <ul style="list-style-type: none"> <li>- 0-phthaldehyde</li> <li>- 2-mercaptoethanol</li> <li>- Boric Acid powder</li> <li>- Potassium Hydroxide</li> </ul> </li> <li>- Glyphosate analytical standards</li> <li>- Amino Methylphosphoric Acid analytical standard</li> <li>- Glyphosate and AMPA fortification standard</li> <li>- Glyphosate and AMPA HPLC calibration standard</li> </ul>	<ul style="list-style-type: none"> <li>- Filter, 0.45 um</li> <li>- Round bottom flask, 500 ml</li> <li>- Rotary evaporator</li> <li>- Nitrogen gas for drying</li> <li>- Filter paper</li> </ul>

Annex B – Minimum Equipment, Reagent and Laboratory Ware for Specific Test

**Chemical Analysis (Disinfection and other Disinfection by Products)**

Please tick (✓) appropriate box/es for the constituent used:

Constituent	Test/ Method	Equipment	Reagent/ Media	Laboratory Ware and Materials
<input type="checkbox"/> Chlorine (Cl <sub>2</sub> ) Residual	<ul style="list-style-type: none"> <li>- Iodometric Method</li> <li>- Amperometric Titration</li> </ul>		For Iodometric: <ul style="list-style-type: none"> <li>- Acetic Acid, conc</li> <li>- Potassium Iodide</li> <li>- Standard Sodium Thiosulfate 0.1 N</li> <li>- Potassium Bi-iodate or Potassium Iodate or K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub></li> <li>- Starch indicator</li> <li>- Iodine</li> </ul> For Amperometric: <ul style="list-style-type: none"> <li>- Standard phenylarsine oxide titrant: w/ Sodium Hydroxide, Hydrochloric Acid, starch</li> <li>- Phosphate buffer solution, pH 7: Potassium Dihydrogen Phosphate, Disodium Hydrogen Phosphate, Sodium Hypochlorite, Chlorine, Potassium Iodide</li> <li>- Acetate buffer: Sodium Acetate, conc. Acetic Acid</li> </ul>	For Amperometric: <ul style="list-style-type: none"> <li>- End point detection apparatus: cell unit connected to micrometer with reference electrode</li> <li>- Agitator</li> </ul>

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Constituent	Test/ Method	Equipment	Reagent/ Media	Laboratory Ware and Materials
<input type="checkbox"/> Chlorine (Cl <sub>2</sub> ) Residual	- DPD Ferrous Titration		For DPD Ferrous Titration: - Phosphate buffer solution: Potassium Dihydrogen Phosphate, Disodium Hydrogen Phosphate, EDTA, Mercuric Chloride - N, N-Diethyl-p-phenylenediamine (DPD) oxalate w/ Sulfuric Acid, EDTA - Standard Ferrous ammonium sulfate titrant: w/ Sulfuric Acid, Phosphoric Acid, Barium Diphenylamine Sulfonate, Potassium Dichromate - Potassium Iodide - Sodium Arsenite solution - Thioacetamide - Glycine solution - Barium Chloride	

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Constituent	Test/ Method	Equipment	Reagent/ Media	Laboratory Ware and Materials
<input type="checkbox"/> Chlorine (Cl <sub>2</sub> ) Residual	<ul style="list-style-type: none"> <li>- DPD Colorimetric Method</li> <li>- Syringaldazine</li> <li>- Iodometric Electrode Technique</li> </ul>	<ul style="list-style-type: none"> <li>- For DPD Colorimetric/ Syringaldazine: Photometer/ Spectrophotometer</li> </ul>	<p>For DPD Colorimetric:</p> <ul style="list-style-type: none"> <li>- Phosphate buffer solution: Potassium Dihydrogen Phosphate, Disodium Hydrogen Phosphate, EDTA, Mercuric Chloride</li> <li>- N, N-Diethyl-p-phenylenediamine (DPD) oxalate: w/ Sulfuric Acid, EDTA</li> <li>- Standard Ferrous ammonium sulfate titrant: w/ Sulfuric Acid, Phosphoric Acid, Barium Diphenylamine Sulfonate, Potassium Dichromate</li> <li>- Potassium Iodide</li> <li>- Sodium Arsenite solution</li> <li>- Thioacetamide</li> <li>- Chlorine demand free water</li> </ul> <p>For Syringaldazine:</p> <ul style="list-style-type: none"> <li>- Chlorine demand free water</li> <li>- 2- propanol</li> <li>- Buffer: Potassium Dihydrogen Phosphate, Disodium Hydrogen Phosphate</li> <li>- Hypochlorite solution</li> </ul> <p>For Iodometric Electrode:</p> <ul style="list-style-type: none"> <li>- pH 4 buffer solution: Sodium Acetate, conc. Acetic Acid</li> <li>- Chlorine demand free water</li> <li>- Standard Potassium iodate</li> </ul>	<p>For Syringaldazine:</p> <ul style="list-style-type: none"> <li>- Ultrasonic agitator</li> <li>- 30.5 cm Vigerux column</li> </ul> <p>For Iodometric Electrode:</p> <ul style="list-style-type: none"> <li>- Platinum and Iodide ion-selective electrode</li> </ul>

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Constituent	Test/ Method	Equipment	Reagent/ Media	Laboratory Ware and Materials
<input type="checkbox"/> Iodine (I <sub>2</sub> )	<ul style="list-style-type: none"> <li>- Leuco Crystal Violet Method</li> <li>- Amperometric Titration</li> </ul>	<ul style="list-style-type: none"> <li>- For Leuco Crystal Violet: Photometer/ Spectrophotometer</li> </ul>	<ul style="list-style-type: none"> <li>- Iodine demand free water</li> <li>- Standard Iodine</li> <li>- Standard Sodium Thiosulfate</li> <li>- Potassium Iodide</li> <li>- Standard Sodium Thiosulfate 0.1 N</li> <li>- Potassium Bi-iodate or Potassium Iodate or Potassium Dichromate</li> <li>- Starch indicator</li> <li>For Amperometric:               <ul style="list-style-type: none"> <li>- Standard phenylarsine oxide titrant: w/ Sodium Hydroxide, Hydrochloric Acid, starch</li> <li>- Acetate buffer: Sodium Acetate, conc. Acetic Acid</li> </ul> </li> </ul>	For Amperometric: <ul style="list-style-type: none"> <li>- End point detection apparatus: cell unit connected to micrometer with reference electrode</li> <li>- Agitator</li> </ul>
<input type="checkbox"/> Cyanogen Chloride	<ul style="list-style-type: none"> <li>- Colorimetric</li> </ul>	<ul style="list-style-type: none"> <li>- Spectrophotometer</li> </ul>	<ul style="list-style-type: none"> <li>- Chloramine –T</li> <li>- Standard CN</li> <li>- Barbituric Acid</li> <li>- Pyridine</li> <li>- Sodium Acetate</li> <li>- Sodium Hydroxide</li> <li>- Sodium Chloride</li> <li>- Sodium Carbonate</li> <li>- Sulfuric Acid</li> <li>- EDTA</li> <li>- Formaldehyde</li> <li>- Phosphate buffer: Sodium dihydrogen phosphate monohydrate</li> </ul>	<ul style="list-style-type: none"> <li>- Cyanide distillation apparatus</li> </ul>

Annex B – Minimum Equipment, Reagent and Laboratory Ware for Specific Test

**Chemical Analysis (Physical and Chemical Quality for Acceptability Aspects)**

Please tick (✓) appropriate box/es for the constituent used:

Constituent	Test/ Method	Equipment	Reagent/ Media	Laboratory Ware and Materials
<input type="checkbox"/> Color	- Visual comparison Method - Spectrophotometric Method	- Spectrophotometer	- Potassium Chloroplatinate - Cobaltous Chloride - Sodium Hydroxide - Sulfuric Acid	- Nessler tubes 100 ml, short form - Filtration apparatus
<input type="checkbox"/> Turbidity	- Nephelometric Method	- Nephelometer/Turbidimeter	- Turbidity standards	
<input type="checkbox"/> Acidity	- Titration Method		- Carbon dioxide free water - Potassium Hydrogen Phthalate - Sodium Hydroxide - Phenolphthalein	
<input type="checkbox"/> Alkalinity	- Titration Method		- Sodium Carbonate - Standard Sulfuric Acid, 0.02 N - Methyl Red indicator - Bromcresol Green indicator	
<input type="checkbox"/> Hardness	- EDTA Titrimetric Method		- Buffer Solution: - Ammonium Chloride - Ammonium Hydroxide - EDTA - Complexing agent: - Sodium Hydroxide, Sodium Cyanide - Sodium Sulfide nonahydrate - Magnesium salt of 1,2 cyclohexane diaminetetraacetic acid (MgCDTA) - Indicators: Eriochrome black T or Calmagite - Standard EDTA 0.01 M	
<input type="checkbox"/> Conductivity		- Conductivity meter		

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Constituent	Test/ Method	Equipment	Reagent/ Media	Laboratory Ware and Materials
<input type="checkbox"/> Total Solids	- Gravimetric	- Drying Oven		- Evaporating Dish - Dessicator
<input type="checkbox"/> Total Dissolved Solids	- Gravimetric	- Drying Oven		- Evaporating Dish - Dessicator - Glass fiber filter - Filtration apparatus
<input type="checkbox"/> Total Suspended Solids	- Gravimetric	- Drying Oven		- Evaporating Dish - Dessicator - Glass fiber filter - Filtration apparatus
<input type="checkbox"/> Aluminum (Al)	- FAAS - EAAS - ICP - Eriochrome Cyanide R	- FAAS - EAAS - ICP - For Eriochrome Cyanide R: Spectrophotometer	- Nitric Acid - Hydrochloric Acid - Standard Al - Calibration standards - QC standards For Eriochrome Cyanide R: - Sulfuric Acid - Ascorbic Acid - Buffer reagent: Sodium Acetate, Acetic Acid - Stock dye solution: Solochrome Cyanide or Eriochrome Cyanide R - Methyl Orange - EDTA - Sodium Hydroxide	- For FAAS: Acetylene Gas - For EAAS/ ICP: Argon - Hotplate - Fume hood - For Eriochrome Cyanide R: Nessler tubes, 50 ml

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Constituent	Test/ Method	Equipment	Reagent/ Media	Laboratory Ware and Materials
<input type="checkbox"/> Chloride (Cl <sup>-</sup> )	<ul style="list-style-type: none"> <li>- Argentometric Method</li> <li>- Potentiometric Method</li> <li>- Automated Ferricyanide Method</li> <li>- Ion Chromatography</li> </ul>	<ul style="list-style-type: none"> <li>- For Potentiometric Method: Electronic voltmeter</li> <li>- Mechanical stirrer</li> <li>- For Automated Ferricyanide Method: Automated analytical equipment</li> <li>- Ion Chromatograph</li> </ul>	<p>For Argentometric Method:</p> <ul style="list-style-type: none"> <li>- Potassium Chromate</li> <li>- Standard Silver Nitrate: 0.0141 N</li> <li>- Standard Sodium Chloride: 0.0141 N</li> </ul> <p>For Potentiometric Method:</p> <ul style="list-style-type: none"> <li>- Standard Sodium Chloride, 0.0141 N</li> <li>- Nitric Acid, conc.</li> <li>- Standard Silver Nitrate, 0.0141 N</li> <li>- Pretreatment reagents: Sulfuric Acid (1+1), Hydrogen Peroxide, Sodium Hydroxide, 1 N</li> </ul> <p>For Automated Ferricyanide Method:</p> <ul style="list-style-type: none"> <li>- Color Reagent:</li> <li>- Stock Mercuric Thiocyanate</li> <li>- Stock Ferric Nitrate</li> <li>- Polyxylene 23 lauryl ether</li> <li>- Standard chloride solution</li> </ul> <p>For Ion Chromatography:</p> <ul style="list-style-type: none"> <li>- Eluent solution: Sodium bicarbonate</li> <li>- Regenerant solution: Sulfuric Acid, 0.025 N</li> <li>- Standard Chloride solution</li> </ul>	<ul style="list-style-type: none"> <li>- For Potentiometric Method: Glass and silver-silver chloride electrode</li> <li>- For Automated Ferricyanide Method: Filters 480 nm</li> </ul>

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<input type="checkbox"/> Copper (Cu)	<ul style="list-style-type: none"> <li>- FAAS</li> <li>- EAAS</li> <li>- ICP</li> <li>- Neocuproin Method</li> <li>- Bathocuproin Method</li> </ul>	<ul style="list-style-type: none"> <li>- FAAS</li> <li>- EAAS</li> <li>- ICP</li> <li>- For Neocuproin Method/ Bathocuproin Method: Spectrophotometer/ Filter photometer</li> </ul>	<ul style="list-style-type: none"> <li>- Nitric Acid</li> <li>- Hydrochloric Acid</li> <li>- Standard Cu</li> <li>- Calibration standards</li> <li>- QC standards</li> <li>For Neocuproin Method:               <ul style="list-style-type: none"> <li>- Redistilled water, copper free</li> <li>- Standard Cu</li> <li>- Sulfuric Acid, conc.</li> <li>- Hydroxylamine hydrochloride</li> <li>- Sodium Citrate</li> <li>- Chloroform</li> <li>- Ammonium Hydroxide</li> <li>- Congo red paper</li> <li>- Methanol</li> <li>- Nitric Acid, conc.</li> <li>- Hydrochloric Acid, conc.</li> </ul> </li> <li>For Bathocuproin Method:               <ul style="list-style-type: none"> <li>- Redistilled water, copper free</li> <li>- Standard Cu</li> <li>- Hydroxylamine Hydrochloride</li> <li>- Sodium Citrate</li> <li>- Disodium Bathocuproin Disulfonate solution</li> <li>- Chloroform</li> <li>- Hydrochloric Acid, conc</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>- For FAAS: Acetylene Gas</li> <li>- For EAAS/ ICP: Argon</li> <li>- Hotplate</li> <li>- Fume hood</li> <li>- For Neocuproin Method: Separatory funnel, 125 ml</li> <li>- For Bathocuproin Method: Nessler tubes 100 ml tall form</li> <li>- Acid washed glassware</li> </ul>

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Constituent	Test/ Method	Equipment	Reagent/ Media	Laboratory Ware and Materials
<input type="checkbox"/> Iron (Fe)	<ul style="list-style-type: none"> <li>- FAAS</li> <li>- EAAS</li> <li>- ICP</li> <li>- Phenanthroline Method</li> <li>- Bathocuproin Method</li> </ul>	<ul style="list-style-type: none"> <li>- FAAS</li> <li>- EAAS</li> <li>- ICP</li> <li>- For Phenanthroline Method/ Bathocuproin Method: Spectrophotometer/ Filter photometer</li> </ul>	<ul style="list-style-type: none"> <li>- Nitric Acid</li> <li>- Hydrochloric Acid</li> <li>- Standard Fe</li> <li>- Calibration standards</li> <li>- QC standards</li> <li>For Phenanthroline Method:               <ul style="list-style-type: none"> <li>- Standard Fe</li> <li>- Hydroxylamine Hydrochloride</li> <li>- Sodium Acetate</li> <li>- Phenanthroline</li> <li>- Ammonium Acetate buffer: w/ glacial acetic acid</li> <li>- Disopropyl or isopropyl ether</li> <li>- Hydrochloric Acid, conc.</li> </ul> </li> <li>For Bathocuproin Method:               <ul style="list-style-type: none"> <li>- Redistilled water, copper free</li> <li>- Standard Cu</li> <li>- Hydroxylamine Hydrochloride</li> <li>- Sodium Citrate</li> <li>- Disodium Bathocuproin Disulfonate solution</li> <li>- Chloroform</li> <li>- Hydrochloric Acid, conc</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>- For FAAS: Acetylene Gas</li> <li>- For EAAS/ ICP: Argon</li> <li>- Hotplate</li> <li>- Fume hood</li> <li>- For Phenanthroline Method: Nessler tubes 100 ml tall form</li> <li>- Acid washed glassware</li> <li>- Separatory funnel, 125 ml</li> </ul>

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Constituent	Test/ Method	Equipment	Reagent/ Media	Laboratory Ware and Materials
<input type="checkbox"/> Manganese (Mn)	<ul style="list-style-type: none"> <li>- FAAS</li> <li>- EAAS</li> <li>- ICP</li> <li>- Persulfate Method</li> </ul>	<ul style="list-style-type: none"> <li>- FAAS</li> <li>- EAAS</li> <li>- ICP</li> <li>- For Persulfate Method: Spectrophotometer/ Filter photometer</li> </ul>	<ul style="list-style-type: none"> <li>- Nitric Acid</li> <li>- Hydrochloric Acid</li> <li>- Standard Mn</li> <li>- Calibration standards</li> <li>- QC standards</li> <li>For Persulfate Method:</li> <li>- Standard Mn</li> <li>- Special reagent: Mercuric Sulfate</li> <li>- Nitric Acid, conc.</li> <li>- Silver Nitrate</li> <li>- Hydrogen Peroxide</li> <li>- Ammonium Persulfate</li> <li>- Phosphoric Acid</li> </ul>	<ul style="list-style-type: none"> <li>- For FAAS: Acetylene Gas</li> <li>- For EAAS/ ICP: Argon</li> <li>- Hotplate</li> <li>- Fume hood</li> <li>- For Persulfate Method: Nessler tubes 100 ml tall form</li> </ul>
<input type="checkbox"/> Sodium (Na)	<ul style="list-style-type: none"> <li>- FAAS</li> <li>- ICP</li> </ul>	<ul style="list-style-type: none"> <li>- FAAS</li> <li>- ICP</li> </ul>	<ul style="list-style-type: none"> <li>- Nitric Acid</li> <li>- Hydrochloric Acid</li> <li>- Standard Sodium</li> <li>- Calibration standards</li> <li>- QC standards</li> </ul>	<ul style="list-style-type: none"> <li>- For FAAS: Acetylene Gas</li> <li>- For EAAS/ ICP: Argon</li> <li>- Hotplate</li> <li>- Fume hood</li> </ul>

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Constituent	Test/ Method	Equipment	Reagent/ Media	Laboratory Ware and Materials
<input type="checkbox"/> Zinc (Zn)	<ul style="list-style-type: none"> <li>- FAAS</li> <li>- EAAS</li> <li>- ICP</li> <li>- Dithizone Method I</li> <li>- Dithizone Method II</li> </ul>	<ul style="list-style-type: none"> <li>- FAAS</li> <li>- EAAS</li> <li>- ICP</li> <li>- For Dithizone Method I: Spectrophotometer/ Filter photometer</li> <li>- pH meter</li> </ul>	<ul style="list-style-type: none"> <li>- Nitric Acid</li> <li>- Hydrochloric Acid</li> <li>- Standard Zn</li> <li>- Calibration standards</li> <li>- QC standards</li> <li>For Dithizone Method I:</li> <li>- Zinc free, water</li> <li>- Standard Zn</li> <li>- Sodium Acetate</li> <li>- Acetic Acid, 1+7</li> <li>- Sodium Thiosulfate</li> <li>- Stock Dithizone</li> <li>- Carbon Tetrachloride</li> <li>- Sodium Citrate</li> <li>- Hydrochloric Acid, conc.</li> <li>For Dithizone Method II:</li> <li>- Zinc free, water</li> <li>- Standard Zn</li> <li>- Methyl Red</li> <li>- Acetic Acid, conc.</li> <li>- Ammonium Hydroxide</li> <li>- Potassium Cyanide</li> <li>- Stock Dithizone</li> <li>- Carbon Tetrachloride</li> <li>- Sodium Citrate</li> <li>- Bis (2-hydroxyethyl dithiocarbamate solution) diethanolamine, Carbon Disulfide, Methanol</li> <li>- Sodium Sulfide</li> <li>- Nitric Acid, 6 N</li> <li>- Hydrogen Sulfide</li> </ul>	<ul style="list-style-type: none"> <li>- For FAAS: Acetylene Gas</li> <li>- For EAAS/ ICP: Argon</li> <li>- Hotplate</li> <li>- Fume hood</li> <li>- For Dithizone Method I: Separatory funnel, 125 ml</li> <li>- Nessler tubes</li> <li>- Acid washed glassware</li> </ul>

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Constituent	Test/ Method	Equipment	Reagent/ Media	Laboratory Ware and Materials
<input type="checkbox"/> Zinc (Zn)	<ul style="list-style-type: none"> <li>- Zincon Method</li> </ul>	<ul style="list-style-type: none"> <li>- Spectrophotometer/ Filter photometer</li> <li>- pH meter</li> </ul>	For Zincon Method: <ul style="list-style-type: none"> <li>- Zinc free, water</li> <li>- Standard Zn</li> <li>- Sodium Ascorbate</li> <li>- Sodium Hydroxide</li> <li>- Boric Acid</li> <li>- Zincon reagent in methanol</li> <li>- Cyclohexanone, purified</li> <li>- Hydrochloric Acid</li> <li>- Potassium Cyanide</li> </ul>	
<input type="checkbox"/> Silica	<ul style="list-style-type: none"> <li>- Gravimetric</li> <li>- Molybdosilicate Method</li> <li>- Heteropoly Blue Method</li> </ul>	<ul style="list-style-type: none"> <li>- For Molybdosilicate Method / Heteropoly Blue Method: Spectrophotometer/ Filter photometer</li> </ul>	<ul style="list-style-type: none"> <li>- Hydrochloric Acid, 1+1, 1+50</li> <li>- Sulfuric Acid, 1+1</li> <li>- Hydrofluoric Acid, 48%</li> <li>- Perchloric Acid, 72%</li> </ul> For Molybdosilicate Method: <ul style="list-style-type: none"> <li>- Sodium Bicarbonate</li> <li>- Sulfuric Acid, 1N</li> <li>- Hydrochloric Acid 1+1</li> <li>- Ammonium Molybdate</li> <li>- Oxalic Acid</li> <li>- Standard Silica</li> </ul> For Heteropoly Blue Method: <ul style="list-style-type: none"> <li>- Sodium Bicarbonate</li> <li>- Sulfuric Acid, 1N</li> <li>- Hydrochloric Acid 1+1</li> <li>- Ammonium Molybdate</li> <li>- Oxalic Acid</li> <li>- Standard Silica</li> <li>- 1-amino-2-naphthol-4-sulfonic acid</li> <li>- Sodium Sulfite</li> <li>- Sodium Bisulfite</li> </ul>	<ul style="list-style-type: none"> <li>- Platinum crucible with covers</li> <li>- Platinum evaporating dish, 200 ml</li> </ul>

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<input type="checkbox"/> Sulfide (S <sup>-</sup> )	<ul style="list-style-type: none"> <li>- Methylene Blue</li> <li>- Gas Dialysis, Automated Methylene Blue Method (ask for the diagram)</li> <li>- Iodometric Method</li> <li>- Ion Selective Electrode Method</li> </ul>	<ul style="list-style-type: none"> <li>- For Methylene Blue: Spectrophotometer/ Filter photometer</li> <li>- For Gas Dialysis, Automated Methylene Blue Method: Automated Analytical Equipment</li> <li>- For Ion Selective Electrode Method: pH meter</li> <li>- Magnetic Stirrer</li> </ul>	<p>For Methylene Blue:</p> <ul style="list-style-type: none"> <li>- Amine Sulfuric Acid stock solution: N, N dimethyl-p-phenylenediamine oxalate, Sulfuric Acid</li> <li>- Amine Sulfuric Acid reagent</li> <li>- Ferric Chloride</li> <li>- Diammonium Hydrogen Phosphate</li> <li>- Methylene Blue</li> <li>- Sodium Sulfide</li> </ul> <p>For Gas Dialysis, Automated Methylene Blue Method:</p> <ul style="list-style-type: none"> <li>- N, N dimethyl-p-phenylenediamine dihydrochloride</li> <li>- Hydrochloric Acid, 6 n</li> <li>- Ferric Chloride</li> <li>- Sodium Hydroxide, 0.01 N</li> <li>- Standard Sulfide (Sodium Sulfide)</li> <li>- Zinc Acetate</li> </ul> <p>For Iodometric Method:</p> <ul style="list-style-type: none"> <li>- Hydrochloric Acid, 6 N</li> <li>- Standard Iodine solution, 0.0250 N</li> <li>- Potassium Iodide</li> <li>- Standard Sodium Thiosulfate, 0.0250N</li> <li>- Starch solution</li> </ul> <p>For Ion Selective Electrode Method:</p> <ul style="list-style-type: none"> <li>- Alkaline antioxidant reagent: Sodium Hydroxide, Ascorbic Acid, Disodium EDTA</li> <li>- Lead Perchlorate (0.1M)</li> <li>- Sulfide standard (Sodium)</li> </ul>	<ul style="list-style-type: none"> <li>- For Ion Selective Electrode Method: Silver/sulfide electrode</li> <li>- Double junction reference electrode</li> <li>- Electrode polishing Strip</li> <li>- Electrochemical cell</li> <li>- Gas dispersion tube</li> </ul>

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<input type="checkbox"/> Sulfate (SO <sub>4</sub> <sup>-2</sup> )	<ul style="list-style-type: none"> <li>- Ion Chromatographic Method</li> <li>- Gravimetric Method with Ignition of Residue</li> <li>- Gravimetric Method with Drying of Residue</li> <li>- Turbidimetric</li> </ul>	<ul style="list-style-type: none"> <li>- Ion Chromatograph</li> <li>- For Gravimetric Method with Ignition of Residue/ Gravimetric Method with Drying of Residue: Drying Oven</li> <li>- Drying Oven</li> <li>- For Turbidimetric: Spectrophotometer/ Filter photometer/ Nephelometer</li> <li>- Magnetic stirrer</li> </ul>	<p>For Ion Chromatographic Method:</p> <ul style="list-style-type: none"> <li>- Eluent solution: Sodium Bicarbonate-Sodium Carbonate</li> <li>- Regenerant solution: Sulfuric Acid, 0.025 N</li> <li>- Standard Sulfate</li> </ul> <p>For Gravimetric Method with Ignition of Residue/ Gravimetric Method with Drying of Residue:</p> <ul style="list-style-type: none"> <li>- Methyl Red</li> <li>- Hydrochloric Acid, 1+1</li> <li>- Barium Chloride solution</li> <li>- Silver Nitrate-Nitric Acid reagent</li> <li>- Silicone fluid</li> </ul> <p>For Turbidimetric:</p> <ul style="list-style-type: none"> <li>- Buffer solution A: Magnesium Chloride, Sodium Acetate, Potassium Nitrate, Acetic Acid or</li> <li>- Buffer solution B: Magnesium Chloride, Sodium Acetate, Potassium Nitrate, Sodium Sulfate, Acetic Acid</li> <li>- Barium Chloride, crystals, 20 to 30 mesh</li> <li>- Standard Sulfate</li> </ul>	<p>For Gravimetric Method with Ignition of Residue/ Gravimetric Method with Drying of Residue:</p> <ul style="list-style-type: none"> <li>- Evaporating Dish</li> <li>- Dessicator</li> <li>- Acid washed filter paper or Membrane filter, 0.45 um</li> <li>- Filtration apparatus</li> </ul> <p>For Turbidimetric:</p> <ul style="list-style-type: none"> <li>- Stopwatch</li> <li>- Measuring spoon</li> </ul>

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<input type="checkbox"/> Sulfate (SO <sub>4</sub> <sup>-2</sup> )	- Automated Methylthymol Blue Method (ask for the diagram)	- Automated analytical equipment	- Barium Chloride solution - Methylthymol Blue reagent with Barium Chloride solution, 1 N HCl, 95% ethanol - Buffer solution: Ammonium Chloride, Ammonium Hydroxide - EDTA reagent - Sodium Hydroxide, 0.36 N - Standard sulfate	- Ion Exchange column
<input type="checkbox"/> pH	- Electrometric Method	- pH meter	- pH standards: 4, 7, 10	

Note: For analytes/parameters not included in the list and with PNSDW (2007) standards being performed by the laboratory, the list of equipment, reagents and laboratory supplies shall be submitted to NRL-EAMC for evaluation.

- FAAS – Flame Atomic Absorption Spectrometry
- EAAS – Electrothermal Atomic Absorption Spectrometry
- GC – Gas Chromatography
- ECD – Electron Capture Detector
- MS – Mass Spectrophotometer
- PID – Photoionization Detector
- HPLC – High-performance Liquid Chromatography
- ICP – Inductively Coupled Plasma
- IC – Ion Chromatography
- PFBHA – Pentafluorobenzyl-hydroxylamine
- PNSDW – Philippine National Standards for Drinking Water (2007)

Reference: Standard Methods for the Examination of Water and Wastewater, 19<sup>th</sup> and 20<sup>th</sup> ed.