PUB LIMS Operational Summary Report

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This report summarizes sampling program outputs, reporting   
limit distributions, and parameter classifications from the   
LIMS system. Charts referenced represent frequency distributions,   
distinct sampling coverage, and classification breakdowns.

Charts  
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1. Counts by Frequency per Matrix  
 [CHART: counts\_by\_freq\_matrix.png]  
 - Distribution mains dominate quarterly and monthly schedules.  
  
2. Distinct Sampling Points by Source  
 [CHART: distinct\_sampling\_points\_by\_source.png]  
 - Direct supply has the highest count (~310 points).  
  
3. Parameters by Classification  
 [CHART: parameters\_by\_classification.png]  
 - Radiological Quality accounts for majority of tests   
 (>900,000 codes).  
  
4. RL Distribution  
 [CHART: rl\_distribution.png]  
 - Most results clustered ≤ 1.0 mg/L with secondary peaks   
 at 5, 9, 12 mg/L bins.  
  
5. Sampling Workflow  
 [FLOW: samp\_workflow.png]

Key Highlights  
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Category | Observation  
------------------------------------------------------------  
Sampling Frequency | Distribution mains dominate quarterly   
 | and monthly schedules.  
  
Sampling Points | Direct supply has the highest count   
 | (~310 points).  
  
Parameter Classes | Radiological Quality accounts for   
 | majority of tests (>900,000 codes).  
  
RL Distribution | Most results clustered ≤ 1.0 mg/L with   
 | secondary peaks at 5, 9, 12 mg/L bins.

Predefined Q&A Knowledge Base (QA\_BANK)  
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1. pH Trend (6 months)  
 - Stability observed across reservoirs (6.5–8.5 guideline).   
 - Notable rise in Marina due to algal bloom.  
 Follow-ups: Why was pH high in June–July? Show MacRitchie vs Bedok trend.  
  
2. Chlorine Residuals (last quarter)  
 - Avg. 0.45 mg/L with controlled peak at 0.55 mg/L (maintenance).   
 - No microbiological impact observed.  
 Follow-ups: Why spike in June? Weekly breakdown? Alert if >0.6 mg/L.  
  
3. Turbidity (Plant A)  
 - Improved from 0.30 NTU (Apr) → 0.18 NTU (Jul).   
 - Filter optimisation and headloss-based triggers effective.  
 Follow-ups: Why higher in Apr? Show daily data. Compare Plant A vs B.  
  
4. Lead & Copper (yearly)  
 - Lead stable (0.002–0.004 mg/L), Copper stable (0.10–0.14 mg/L).   
 - QC via ICP-MS and ICP-OES.  
 Follow-ups: Why higher Cu in Aug? Monthly comparison? Alert for exceedances.  
  
5. Coliforms (West region)  
 - One isolated hit in May (1 CFU/100 mL); flushed and resolved.   
 - No systemic issues.  
 Follow-ups: Why detected in May? Incident timeline? Regional comparison.  
  
6. Root Cause – High pH (Marina)  
 - Driven by algal bloom, low inflow, high DO during midday.   
 - Actions: Aeration curtains, PAC dosing.  
 Follow-ups: Show pH vs DO overlay. List bloom days. Chlorophyll-a levels.  
  
7. Ad-hoc Samples (Bedok, 3 months)  
 - Total: 45 bottles. Triggered by rainfall & maintenance.   
 - Parameters: Metals, Turbidity, Microbiology.  
 Follow-ups: Breakdown by parameter. Turbidity vs TSS after storm. Micro positives?  
  
8. Turnaround Time (RW Inlet)  
 - Microbiology: 3–4 days. Physico-chemical: 2–3 days.   
 - Metals: 5–7 days. Organics: 5–10 days.  
 Follow-ups: Expedite with TAT-PRIORITY. Show pending QA. What causes delays?