

Attachment J-C21.1 Cooling Towers and Water Quality Parameters

Cooling Tower Water Systems located at Glenn Research Center shall be maintained to the water quality listed in the table below. All towers shall maintain Cycles of Concentration from 2.0 – 6.0. Corrosion Coupons shall monitor corrosion within the systems.

Table A: Water Quality Requirements for Cooling Towers

PROPERTY OF WATER	REQUIRED LEVELS
pH	7.5-9.0
Hardness	30-100 ppm CaCO ₃
Alkalinity	500 ppm Max CaCO ₃
Iron Content	3.0 ppm
Soluble Copper	0.2 ppm Max
Total Dissolved Solids (TDS)	1500 ppm Max
Sulfates	250 ppm Max
Silica	150 ppm Max
Chlorides	250 ppm Max Cl 410 ppm Max NaCl
Aerobic Plate Count	1000 organisms/ml 10 CFU/ml Legionella
Steel Corrosion*	<1.5 mpy
Copper Corrosion*	<0.1 mpy

*Confirmed through use of corrosion coupons

Table B: Cooling Tower Systems and Capacities

LOCATION	ASSET #	EQUIPMENT DESCRIPTION	BASIN CAPACITY (GAL)	ENTIRE SYSTEM CAPACITY (GAL)	MAKE-UP WATER AVERAGE (GAL/YR) OVER 10 YEARS
LARGE COOLING TOWERS > 50,000 MBH					
010-OUTSIDE	1122673	COOLING TOWER #1	850,000	1,200,000	26,251,062
082-OUTSIDE	1122669	COOLING TOWER #4	100,000		
070-OUTSIDE	1122671	COOLING TOWER #3	502,000	1,602,000	22,321,898
126-OUTSIDE	2004011	COOLING TOWER #6	900,000		
093-OUTSIDE	2004043	COOLING TOWER #5	800,000	900,000	20,568,288

SMALL COOLING TOWERS < 50,000 MBH					
301- OUTSIDE	1130148	COOLING TOWER	2,300	2,800	698,020
301- OUTSIDE	7003688	COOLING TOWER	2,000	2,400	273,730
302- OUTSIDE	1110893	COOLING TOWER	1,000	1,400	412,980
333- OUTSIDE	1117603	COOLING TOWER	2,100	2,500	941,000

1. Water Quality Assurance Testing
 - I. Cooling Tower Water Testing
 - i. Monthly testing of Large Cooling Tower Water Systems shall be completed and recorded for the following parameters

pH	
Silica	_____ ppm
Iron (total, as Fe (2) O(3))	_____ ppm
Copper	_____ ppm
Hardness (CaCO3)	_____ ppm
Chloride	_____ ppm
Alkalinity (CaCO3)	_____ ppm
Conductivity	_____ micromho/cm
Total Dissolved Solids	_____ ppm
Phosphonate (PO4)	_____ ppm
Molybdate	_____ ppm
Biocide	_____ ppm
Bacteria Colony Count	_____ colonies/mL
Makeup Water pH	_____ micromho/cm
Makeup Water Iron	_____ ppm
Makeup Water Silica	_____ ppm
Makeup Water Hardness	_____ ppm
Makeup Water Alkalinity	_____ ppm
Makeup Water Chloride	_____ ppm
Makeup Water Conductivity	
Written Evaluation Summary	

- ii. Quarterly testing of Small Cooling Tower Water Systems shall be completed and recorded for the following parameters:

pH	
Silica	_____ ppm
Iron (total, as Fe (2) O(3))	_____ ppm
Copper	_____ ppm
Hardness (CaCO3)	_____ ppm
Chloride	_____ ppm
Alkalinity (CaCO3)	_____ ppm
Conductivity	_____ micromho/cm
Total Dissolved Solids	_____ ppm
Phosphonate (PO4)	_____ ppm
Molybdate	_____ ppm
Biocide	_____ ppm
Bacteria Colony Count	_____ colonies/mL
Makeup Water pH	_____ micromho/cm
Makeup Water Iron	_____ ppm
Makeup Water Silica	_____ ppm
Makeup Water Hardness	_____ ppm
Makeup Water Alkalinity	_____ ppm
Makeup Water Chloride	_____ ppm
Makeup Water Conductivity	
Written Evaluation Summary	