PUREFLOW© FILTRATION SYSTEMS

HEXAVALENT CHROMIUM REMOVAL

GENERAL MINERAL ANALYSIS AND DESIGN DATA BULLETIN

Chromium salts come in several different forms including trivalent chromium and hexavalent chromium. Trivalent chromium, often referred to as Chromium (III), or Cr^{+3}, is an essential, non-toxic, poorly absorbed nutrient for the human body. Deficiency of Cr^{+3} is reported to cause glucose intolerance. The safe and adequate daily intake of Cr^{+3} is stated to be 0.05 to 0.2 milligrams. Hexavalent chromium, Chromium (VI), or Cr^{+6}, is generally used or produced in industrial processes. Water sources can be affected by hexavalent chromium naturally, or through contamination plumes from industrial centers, landfills and improper discharge of industrial processing streams.

EPA currently regulates chromium (VI), or Cr^{+6}, as part of the total chromium drinking water standard. EPA has an enforceable drinking water standard of 0.1 milligrams per liter (mg / L) or 100 micrograms per liter (µg / L) for total chromium, which includes chromium (VI) and chromium (III). New health effects information has become available since the original standard was set, and EPA is reviewing this information to determine whether there are new health risks that need to be addressed. Additional information can be found on the chromium in drinking water website.

In 1977 California Department of Health Services (CDHS) adopted what was then a “National Drinking Water Standard” for total chromium of 0.050 milligrams per liter (mg / L) or 50 micrograms per liter (µg / L). The total chromium MCL was established to address exposure to chromium (VI) the more toxic form of chromium. Chromium (III), (trivalent chromium) is a required nutrient.

Effective July 1, 2014 California Department of Public Health (CDPH) set the maximum contaminant level for hexavalent chromium (VI) at 0.010 milligrams per liter (mg / L) or 10 micrograms per liter (µg / L). Note: Refer to Drinking Water-Related Regulations at the Drinking Water Law Book.

The General Mineral Analysis and Design data required in this bulletin will provide the water quality information essential to the proper design of pretreatment and filtration systems for the removal of Hexavalent Chromium Cr (VI) from drinking water supplies. The field and laboratory tests must be performed by qualified personnel with appropriate water quality test equipment. We suggest that an independent, certified laboratory perform all of the required tests to insure accuracy. Please complete the following test data form for each water supply to be treated, and return to Pureflow© for evaluation in preparing our preliminary system design and quotation.

TEST PROCEDURES:

a) **Laboratory Test Sampling.** All raw and filtered water samples must be marked with customer name, Well No., date, time the sample is taken and sample category. Laboratory water quality test results must also include the date and time that each sample was taken.

b) **Sample Bottles.** Must meet AWWA standards and should be supplied by the laboratory performing the tests. **Consult with the selected laboratory for the proper sample bottle preparation.**

c) All tests are to be performed according to AWWA standard methods.

d) **Chromium.** Sample bottles are to be unpreserved. The laboratory will filter and buffer the water sample.

e) **Heavy Metals Analysis Sample.** Iron, manganese, cadmium, zinc, and other contaminants such as arsenic, etc. are to be collected in acid washed glass or plastic bottles. Adjust pH to 2 or less with approximately 2 ml of nitric acid per liter to prevent any metals from plating out on the bottle. If raw water is highly buffered it may require more acid. **Atomic Absorption** method should be used for these tests.

f) **General Mineral Analysis Sample.** Should **not** be acidified. If it is acidified it will alter the pH and bicarbonate/carbonate values.

Note: This sample will be used to analyze for anions, cations, and pH.

g) **Total Organic Carbon Sample.** A glass bottle with a teflon lid is required for T.O.C. samples. Refrigerate, or add hydrochloric acid to a pH less than 2.0.

h) **On-site Testing.** Hydrogen sulfide, carbon dioxide, and pH should be determined on-site because of the volatility of these gases and their effect on pH. The "Standard Methods" test utilizing methylene blue is acceptable for hydrogen sulfide determination. Carbon dioxide levels can be determined in the field by the titrimetric method. However, this test should be confirmed by the nomographic method in a laboratory. pH should be determined by the glass electrode method. **Note: pH tests are to be made at the well site, and in the laboratory.**

TESTS TO BE PERFORMED AT WELL SITE

Hydrogen Sulfide (H_2S)_____mg / l Carbon Dioxide (CO_2) _____mg / l pH_____

Ground Water Temperature _____^oF Storage Water Temperature _____^oF Turbidity_____NTU

Chlorine Demand_____mg / l (Break point curve with Free and Total Cl_2)

i) After examining the above data, additional testing may be required to verify data. If sufficient data can not be determined by standard test methods, additional special laboratory tests may be required.

j) Refer to "Standard Methods for the Examination of Water and Wastewater" for additional information regarding analytical protocols.

NOTES:

k) Please provide a schematic drawing of system including well(s), distribution main, reservoir(s), and proposed treatment plant site plot plan. Include minimum and maximum gal. of water stored in reservoir, and maximum residence time that water is stored in the reservoir.

l) If complete, accurate, and representative sample test data can not be obtained, an on-site, continuous flow, pilot study may be required. Please consult Pureflow© for information regarding a pilot filter study.

m) If the Pureflow© filter media is to be backwashed from the filtered water main, the hydraulic parameters (flow, pressure, velocity, etc.) must be evaluated by the Municipal Project Engineer, and / or Consulting Engineer, to assure that the required backwash water is available from the distribution system, and that the water main is properly sized to deliver the flow and pressure required. If the water main cannot supply sufficient flow and pressure, a separate backwash water holding tank and pump may be required.

Customer	Consulting Engineer
Address	Address
City State Zip Code	City State Zip Code
(___) _____ (___) _____	(___) _____ (___) _____
Telephone No. Fax No.	Telephone No. Fax No.
Project Engineer	Project Engineer
E-Mail Address	E-Mail Address

GENERAL INFORMATION

Project Name _____ Well No._____ Date: _____

Min. Flow_____gpm Max. Flow_____gpm Constant Speed Pump ☐ Yes ☐ No

Working Pres._____psi Static Pres._____psi Reservoir Capacity_____gal

Backwash water source: ☐ Reservoir ☐ Water Main ☐ From separate tank……See Note J, Page 3

Backwash water disposal to: ☐ Sewer ☐ Drying Bed ☐ Holding Tank ☐ Other Specify

Backwash water reclamation system required: ☐ Yes ☐ No Water Main Size _____In.

No. of wells to be filtered _____ **NOTE: Fill out one form per well** Depth of Well _____Ft.

New well: ☐ Yes ☐ No Well flow rate when samples taken _____gpm

The well was continuously pumped for _____ hours before sample was taken.

GENERAL MINERAL ANALYSIS

CATIONS	**mg / l**	**meq / l**	**ANIONS**	**mg / l**	**meq / l**
Total Hardness (as $CaCO_3$)	_____		Total Alkalinity (as $CaCO_3$)		_____
Calcium (Ca)	_____	_____	Hydroxide (OH)	_____	_____
Magnesium (Mg)	_____	_____	Carbonate (CO_3)	_____	_____
Sodium (Na)	_____	_____	Bicarbonate (HCO_3)	_____	_____
Potassium (K)	_____	_____	Sulfate (SO_4)	_____	_____
			Chloride (Cl)	_____	_____
			Nitrate (NO_3)	_____	_____
			Fluoride (F)	_____	_____
Total Cations			**Total Anions**		
Milliequivalents / Liter		_____	Milliequivalents / Liter		_____
Total Dis.Solids (TDS)	_____	_____			
Conductivity (µS / cm) _____					

INORGANIC ANALYSIS

Aluminum (Al)	_____	Iron (Fe)	_____
Arsenic (As) Inorganic	_____	Lead (Pb)	_____
Arsenic (As) Organic	_____	Manganese (Mn)	_____
Barium (Ba)	_____	Mercury (Hg)	_____
Cadmium (Cd)	_____	Selenium (Se)	_____
Chromium (Total Cr)	_____	Silver (Ag)	_____
Copper (Cu)	_____	Zinc (Zn)	_____

(Continued on Next Page)

ADDITIONAL ANALYSIS

	Mg / l		
Total Organic Carbon (TOC)	_____	Odor Threshold (TON) at 60°C	_____ Units
Total Trihalomethane Potential (TTHMP)	_____	pH (Laboratory) _____	pH (Field) _____
Trihalomethanes (THM)	_____	Apparent Color (unfiltered)_____	Units
Ammonia (NH_3)	_____	Sand _____	
Silica (Si)	_____	_____NTU Turbidity (Laboratory) _____	N.T.U. Turb.(Field)
Radium (Ra)-226_____pCi / L		Uranium (U) 235 _____pCi / L	
Radium (Ra)-228_____pCi / L		Uranium (U) 238_____pCi / L	
Radon (Rn)_____pCi / L	Strontium-90 (^{90}Sr)_____pCi / L		Tritium (^{3}H)_____pCi / L

Langelier Index:_____ @ Operating Temp. of Well; and _____ @ 140°F

SOURCE OF WATER SAMPLE

☐ Production Well No. _____ ☐ Pilot / Test Well No. _____

NOTES: _____

_____

_____

_____

Local Representative

PUREFLOW© FILTRATION SYSTEMS

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Purveyors to the Water/Wastewater Industry Since 1972

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