PUREFLOW© FILTRATION SYSTEMS

SELENIUM REMOVAL

GENERAL MINERAL ANALYSIS

AND

DESIGN DATA BULLETIN

Dissolved selenium (Se) occurs naturally in water supplies as a result of sulfides or native sulfur deposits, not artificial contamination. Well waters generally have higher selenium concentrations than surface waters due to the fact that they have greater exposure to selenium bearing minerals. The United States Environmental Protection Act (USEPA) has established regional Maximum Contaminant Levels (MCL) for selenium that are based on the probable daily ingestion of water. The optimum selenium level established by the United States Public Health Service (USPHS) is one-half of the MCL. The EPA MCL for selenium is 0.05 mg / L (50 µg / L).

Although selenium is an essential trace element, it is toxic if taken in excess. Exceeding the tolerable Uptake Level of 400 micrograms per day can lead to selenosis. Symptoms of selenosis include gastrointestinal disorders, hair loss, fatigue, irritability and neurologic damage.

Selenium contamination in drinking water supplies can also result when agricultural runoff flows through soil and causes high concentrations of selenates that can leach the soluble selenium compounds into the water supply.

Selenium can be efficiently removed from drinking water supplies to below the EPA and USPHS standards, when complete and accurate water quality data is available.

The General Mineral Analysis and Design information requested in this bulletin will provide us with the water quality information that is required to ensure that the test data provided to Pureflow© is accurate and complete. These data are essential for the proper design of the pretreatment, process, and regeneration systems. 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. **Please complete the following test data form for each water supply to be treated, and return to Pureflow© for evaluation in preparing our system design and quotation.**

TEST PROCEDURES:

a) **Laboratory Test Reports.** All raw and filtered water samples must be marked with Well No., date and time the sample was taken. 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. Three (3) one (1) quart bottles are to be marked with Well No., date, sample category (Heavy Metal, Gen. Mineral, T.O.C.) and customer name.

c) **Heavy Metals Analysis Sample.** Iron, manganese, cadmium, zinc, etc. samples 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.

d) **General Mineral Analysis Sample (including selenium).** Should be acidified with nitric acid as noted above.

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

e) **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.

f) **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)

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

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

NOTES:

i) Please provide schematic drawing of system including well(s), distribution main, reservoir, and proposed treatment plant site plot plan. Include minimum and maximum gal. of water stored in reservoir, and maximum water flow (gpm) from main that can be used to backwash filter.

j) If complete, accurate, and representative sample test data cannot be obtained, an on-site, continuous flow, pilot study may be required. Please consult Pureflow© for information regarding our Pureflow© Mobile Pilot Filter Laboratory.

k) Treated well water is normally used to backwash / regenerate the media. However, if the Pureflow© 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 ensure that the required backwash / regeneration 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 can not 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 / Regen water source: ☐ From well ☐ From water main ☐ From tank...See Note k, Page 2

Backwash / Regen water disposal to: ☐ Sewer ☐ Drying Bed ☐ Holding Tank ☐ Other (Specify)

Backwash / Regen water reclamation system required: ☐ Yes ☐ No Water Main Size _____in.

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

New well: ☐ Yes ☐ No Well flow rate when samples taken _____gpm
How long was well continuously pumped before samples were 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		_____
			Phenolphthalein		
Total Dis.Solids (TDS)	_____	_____	Alkalinity (P) (As $CaCO_3$)	_____	_____
Conductivity (µS / CM) _____					

INORGANIC ANALYSIS

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

(Continued on Next Page)

ADDITIONAL ANALYSIS

	mg / l	meq / l		
Total Organic Carbon (TOC)	_____	_____	Odor Threshold (TON) at 60°C	_____ Units
Trihalomethanes (THM)	_____	_____	Apparent Color (unfiltered)	_____ Units
Ammonia (NH_3)	_____	_____	pH (Laboratory)	_____
Silica (Si)	_____	_____	Turbidity (Laboratory)	_____ N.T.U.
			Radon (Rn)_____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