

# James River SWIFT Draft UIC Permit

Summary for PAROC

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# General Overview

- 10 recharge wells at JR WWTP
- 16 mgd
- 10-year permit
- Permit includes nearly all non-regulatory monitoring and critical control points from permit application. EPA previously informed VDH that only “Regulatory Monitoring” would be included
- Monitoring divided into 4 sections
  - Regulatory
  - Non-regulatory performance indicators and VA groundwater protection standards
  - Critical Control Points
  - Groundwater (monitoring wells)
- New pressure limitation of 30 psi at well head.
- PFAS limits will be modified if EPA issues an updated health advisory or PMCL
- Permit does not include EPA’s Unregulated Contaminant Monitoring Rule (UCMR). This consists of 29 PFAS compounds and lithium.
- “Aquifer compatibility” category omitted from SWIFT Water monitoring, included for groundwater monitoring

# Draft Permit has 2 Components

## Statement of Basis

- Reads like an introduction/executive summary to the permit
- General project and permit info
- Discussion of some permit conditions specific to project
  - Other wells in area of review
  - Description of Potomac Aquifer
  - Water quality, non-PMCL constituents
  - PFOA/PFOS reopener
  - Critical control points
  - LRV monitoring (disinfection)
  - Monitoring wells
  - Max injection pressure

## Draft UIC Permit

- I. Effect of Permit
- II. Construction, Operation, and Financial Responsibility
  - Construction requirements
  - Operating requirements
  - Plugging and Abandonment
  - Financial Responsibility
- III. Monitoring and Recordkeeping
  - General
  - Record Retention
  - Monitoring Requirements
  - Reporting and Notification Requirements
- Appendices
  - Tables with monitoring parameters, limits, and frequency requirements
  - Plugging and abandonment procedure

# Statement of Basis

Highlights

# PFOA/PFOS Reopener

Perfluorooctanoic acid (PFOA) and perfluorooctane sulfonic acid (PFOS). JR SWIFT Recharge Water must meet the drinking water health advisory (81 Federal Register 33250 (May 25, 2016)) for perfluorooctanoic acid (PFOA) and perfluorooctane sulfonic acid (PFOS) prior to injection. PFOA and PFOS are persistent in the environment and resistant to typical environmental degradation processes. As a result, they are widely distributed across all trophic levels and are found in soil, air, and groundwater at sites across the United States. The toxicity, mobility, and bioaccumulation potential of PFOA and PFOS result in potential adverse effects on the environment and human health. During the term of this permit, should EPA issue an updated health advisory or PMCL for PFOA/PFOS, EPA will modify the permit, as appropriate, to reflect the new level pursuant to paragraph I.D. of the permit. Monitoring of additional per- and polyfluoroalkyl substance (PFAS) compounds are also required in the draft permit, specifically perfluorobutanoic acid (PFBA), perfluoroheptanoic acid (PFHpA), perfluorohexanesulfonic acid (PFHxS) and perfluorononanoic acid (PFNA).

# TOC and Total Nitrogen Limits

- Total Nitrogen (TN) - 5 mg/l monthly average, 8 mg/l max daily
- Total Organic Carbon (TOC) – 4 mg/l monthly average, 5 mg/l max daily
- TN limit added to ensure injected water meets nitrate PMCL
- TOC limit based on Occoquan Policy chemical oxygen demand (COD) limit (10 mg/l) to protect water as source of indirect potable reuse.
- HRSD worked with Occoquan Service Authority to determine observed COD to TOC ratio
- TOC limit also protects against formation of disinfection byproducts

# Epichlorohydrin and Acrylamide

- Components of polymers potentially used in treatment process
- No EPA-approved method of analysis
- Regulated by Treatment Technique
- HRSD must certify that applied doses are less than drinking water thresholds
- Acrylamide = 0.05% dosed at 1 mg/l or equivalent
- Epichlorohydrin = 0.01% dosed at 20 mg/l

# Bacteria and Viruses

- Total coliform and e.coli – PMCLs
- JR SWIFT designed and operated to achieve 12 log removal value (LRV) for viruses and 10 LRV for Cryptosporidium and Giardia. No applicable federal standards for indirect potable reuse, EPA chose values to be conservative. These values are only mentioned in the Statement of Basis.
- Permit requires monitoring of crypto, giardia, and male-specific and somatic coliphages prior to injection, *and early in the advanced wastewater treatment process* (this requirement not specified in permit)
- Since LRV credit is based on current AWT design, permit requires written EPA approval of any changes to AWT design.



# Lead and Copper

The NPDWRs require public water systems to control **lead and copper** through a treatment technique to control the corrosiveness of the water; controlling the corrosivity prevents leaching of lead or copper from the distribution system into tap water. This does not apply to this draft permit because the injected water is not entering a distribution system. However, in order to evaluate lead and copper levels in the SWIFT water, the draft permit requires the permittee to monitor for lead and copper.

# Other monitoring constituents and omissions

- Total dissolved solids – important for aquifer compatibility. No limit, but SWIFT water TDS should be similar to native aquifer TDS.
- Heterotrophic plate count – purpose of regulation is to ensure water quality is maintained throughout distribution system, not applicable to this permit.
- Chlorine dioxide – disinfectant subject to maximum level in drinking water. Not used at JR SWIFT, therefore monitoring is not required.
- Non-regulatory performance indicators selected based on studies by National Water Research Institute and Southern California Coastal Water Research Project
- Virginia groundwater standards not covered by PMCL monitoring are also included

# Monitoring Wells

- Permit requires establishment of a monitoring well network to evaluate the cumulative effects of the operation of the JR SWIFT injection wells.
- Document baseline groundwater quality
- “Groundwater quality impacts may include changes resulting from the mixing of JR SWIFT recharge water with native groundwater or the release of a constituent contained in the UPA or MPA aquifer material”
- “Groundwater quality monitoring results will be used by EPA to ensure that the injection wells are not endangering USDWs...”

# Recharge Wells and Recharge

- Design and construction requirements to prevent migration of fluids outside of intended recharge zone(s).
  - Surface casing to prevent short-circuit flow of surface water into deeper aquifers
  - Bentonite grout seals to isolate UPA and MPA from each other
- Maximum Injection Pressure – 30 psi limit at well head.  
“Approximates the pressure on the recharge zones under historical artesian conditions”.

# Draft UIC Permit

Summary and Highlights

# Overview of Text

- General requirements, conditions, and logistics of the permit
- Reiterates and expands on a lot of what is stated in the Statement of Basis
- More detail on well construction requirements
- Expressly prohibits injection of water that does not meet PMCLs and/or PFOA/PFOS requirements
- Modification clause – Region III Water Division Director may reopen permit to modify parameters and limits at any time (or revoke + reissue)
- Record keeping requirements
- Monitoring requirements
  - 4 tables
  - Compliance determination – running annual average vs. single-instance
  - Reporting and notification requirements
- Plugging and abandonment

Monitoring Requirements divided into 4 tables, primary difference is the reporting requirement in the event of an exceedance

Monitoring Table	Reporting Requirement
Regulatory	24 hours - oral notification to EPA 14 days – written report identifying potential cause and mitigation plan
Non-regulatory Performance Indicators and VA groundwater protection standards	Conduct investigation on cause of exceedance Provide written report on results within 30 days of conclusion of investigation
Critical Control Points	If sampling results necessitate a change in operations, written report identifying potential cause and plan for mitigation (quarterly)
Groundwater	If sampling results necessitate a change in operations, written report identifying potential cause and plan for mitigation (quarterly)

## Regulatory Monitoring

Parameter	Monitoring Frequency	Compliance Determination	Notes
EPA Drinking Water PMCLs	Monthly	PMCL	See expanded list of EPA PMCLs for constituents and limits
<i>Cryptosporidium</i> , <i>Giardia</i> , <i>Legionella</i> , male-specific and somatic coliphages	Quarterly	Monitoring only	
Chloramine, Chlorine	Daily	4 mg/L Running Annual Average (RAA)	
Total Nitrogen	5x/week	5 mg/L monthly average, 8 mg/L max day	
Individual Filter Effluent Turbidity	15-min	95% < 0.15 each month Never > 0.3 in 2 consecutive 15-min measurements	
Combined Filter Effluent Turbidity	15-min	95% < 0.15 each month	Added by EPA
Total Organic Carbon (TOC)	3x/week	4 mg/L monthly average, 5 mg/L max day	
Total Coliform	5x/week	95% < 2 CFU/mL each month	PMCL, added to table due to more frequent monitoring
E. Coli	5x/week	Non-detect, single-instance	PMCL, added to table due to more frequent monitoring
Asbestos	Quarterly	7 MFL (million fibers/liter), RAA	PMCL, added to table due to less frequent monitoring
Nitrate and Nitrite	5x/week	10 mg/L and 1 mg/L respectively, single-instance	PMCL, added to table due to more frequent monitoring
Lead and Copper	Monthly	Monitoring only	Typically a distribution system issue
Acrylamide and Epichlorohydrin	Monthly	Treatment Technique	
PFOA + PFOS	Quarterly	70 ng/L, single-instance	Added by EPA



## Non-Regulatory Performance Indicator

Parameter	Monitoring Frequency	Health Advisory Limit
1,4-dioxane	Quarterly	1 µg/L
17-β-Estradiol	Quarterly	0.9 ng/L
N,N-diethyl-metatoluamide (DEET)	Quarterly	200 µg/L
Ethinyl Estradiol	Quarterly	280 ng/L
N-Nitroso-dimethylamine (NDMA)	Weekly	10 ng/L
Perchlorate	Quarterly	6 µg/L
Tris(2carboxyethyl)phosphine (TCEP)	Quarterly	5 µg/L
Cotinine	Quarterly	1 µg/L
Primidone	Quarterly	10 µg/L
Phenytoin	Quarterly	2 µg/L
Meprobamate	Quarterly	200 µg/L
Atenolol	Quarterly	4 µg/L
Carbamazepine	Quarterly	10 µg/L
Estrone	Quarterly	320 ng/L
Sucralose	Quarterly	150 mg/L
Triclosan	Quarterly	2,100 µg/L

and

## VA Groundwater Standards Monitoring

Parameter	Monitoring Frequency	Threshold Value
Aldrin/Dieldrin	Monthly	0.003 µg/l
DDT	Monthly	0.001 µg/l
Kepone	Monthly	None
Mirex	Monthly	None
Phenols	Monthly	0.001 mg/l
Strontium-90	Monthly	8 pCi/l
Tritium	Monthly	20,000 pCi/l

## Critical Control Points

Parameter	Threshold Value
SWIFT Feed Turbidity	3.5 NTU alert value, 5 NTU alarm value
SWIFT Feed Conductivity	1,500 microSiemens per centimeter alert value, 2,000 microSiemens per centimeter alarm value
SWIFT Feed Total Inorganic Nitrogen	4.0 mg/L-N alert value, 5.0 mg/L-N alarm value
Preformed Chloramine Failure (if used for bromate suppression)	failure
Total Chlorine Upstream of Ozone (if used for bromate suppression)	2.0 mg/L alert value, 1.0 mg/L alarm value
Monochloramine Upstream of Ozone (if used for bromate suppression)	2.0 mg/L alert value, 1.0 mg/L alarm value
Ozone Feed Failure	failure
High Ozone Dose	7.0 mg/L alert value, 8.0 mg/L alarm value
Biofilter Individual Effluent Turbidity	0.1 NTU alert value, 0.15 NTU alarm value
Biofilter Combined Effluent Turbidity	0.1 NTU alert value, 0.15 NTU alarm value
GAC Combined Effluent TOC, Instantaneous Online Analyzer	4.0 mg/L alert value, 5.0 mg/L alarm value
GAC Combined Effluent Nitrite	0.25 mg/L-N alert value, 0.5 mg/L-N alarm value
GAC Combined Effluent Ammonia	0.1 mg/L-N alert value, 0.3 mg/L-N alarm value
UV Reactor Dose	< 120% of Dose Setpoint alert value, < 105% of Dose Setpoint alarm value
SWIFT Water Total Nitrogen	4.5 mg/L-N alert value, 5.0 mg/L-N alarm value

## Aquifer Characteristics and Compatibility

Parameters	
Dissolved Oxygen	Sodium, total
Temperature	Calcium, total
pH	Sulfate
Specific Conductivity	Chloride
ORP	Bromide
Aluminum, dissolved	Alkalinity
Aluminum, total	Total Kjeldahl Nitrogen
Arsenic, dissolved	Ammonia
Iron, dissolved	Total Phosphorus
Iron, total	Orthophosphate
Manganese, dissolved	Silica as SiO <sub>2</sub>
Manganese, total	Hardness, total
Potassium, total	

- Included for both SWIFT Water monitoring and Groundwater Monitoring in permit application
- Permit includes these parameters for Groundwater Monitoring only
- This is the only major omission from the application to the permit

# Groundwater Monitoring

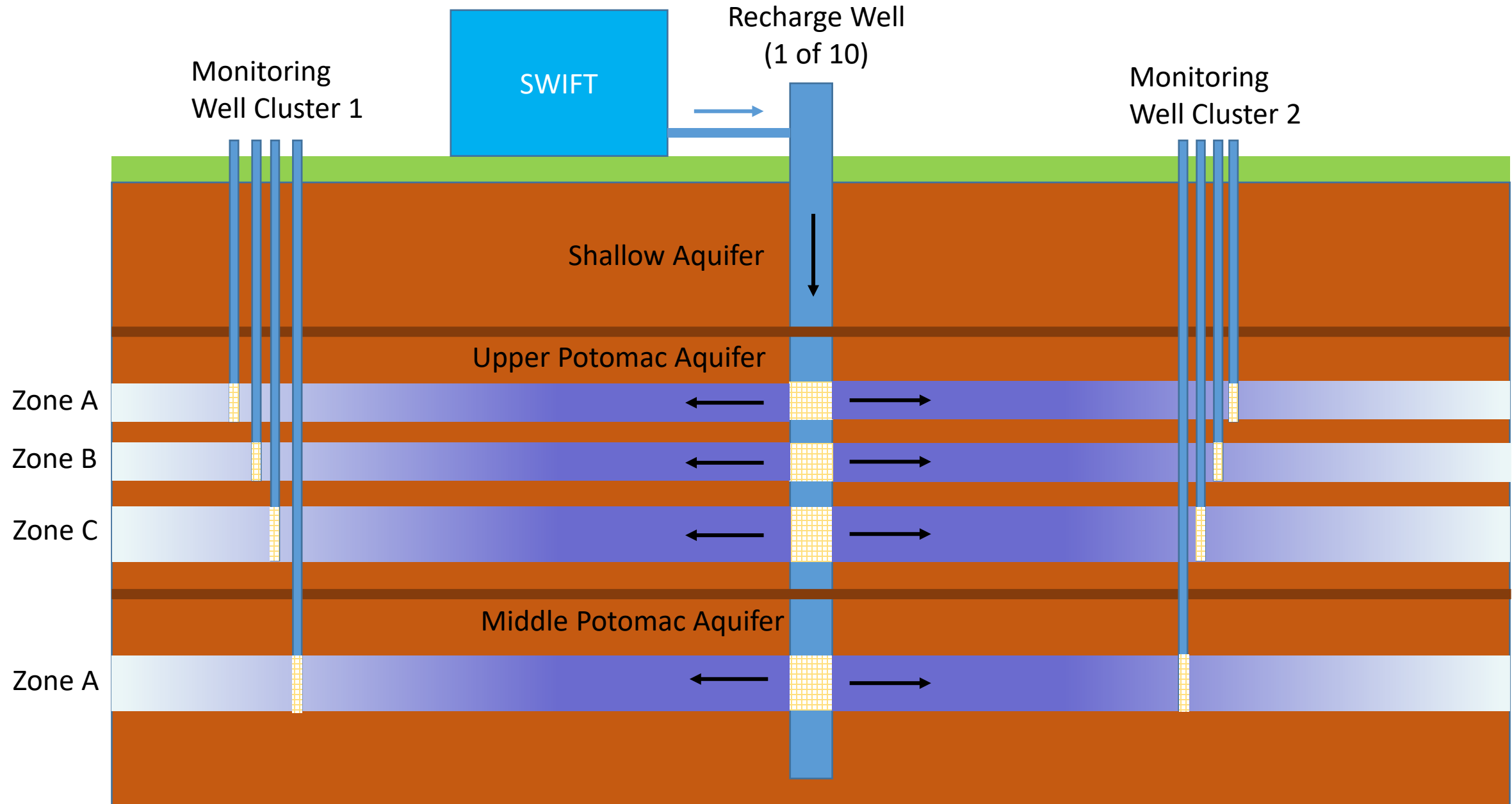
- All Regulatory and Non-regulatory parameters from permit application are included (including Aquifer Compatibility list)
- Baseline monitoring required for all parameters
- Frequency after baseline varies between quarterly and annually
- No numerical limits included

Portion of Groundwater Monitoring Table

Parameter	Monitoring Cluster 1 and 2. Upper Zone A	Monitoring Cluster 1 and 2. Upper Zone B	Monitoring Cluster 1 and 2. Upper Zone C	Monitoring Cluster 1 and 2. Middle Zone A
<b>Regulatory Parameters</b>				
Total Nitrogen	B, Q	B, Q	B, Q	B, Q
Turbidity	B, Q	B, A	B, A	B, A
TOC	B, Q	B, Q	B, Q	B, Q
TDS	B, Q	B, Q	B, Q	B, Q
<b>Microorganisms</b>				
Male-specific and somatic coliphages	B, Q	B, A	B, A	B, A
Cryptosporidium	B, Q	B, A	B, A	B, A
Giardia lamblia	B, Q	B, A	B, A	B, A

See next slide for illustration of Monitoring Well clusters

# Illustration of SWIFT Monitoring Well Clusters



# Complete List of EPA PMCL Constituents and Limits

Constituent	PMCL (mg/L)	Constituent	PMCL (mg/L)	Constituent	PMCL (mg/L)
<b>Disinfection Byproducts</b>		<b>Organic Chemicals</b>		<b>Organic Chemicals (continued)</b>	
Bromate	0.010	Alachlor	0.002	1,2-Dichloropropane	0.005
Chlorite	1.0	Atrazine	0.003	Di(2-ethylhexyl) adipate	0.4
Haloacetic acids (HAA5)	0.060	Benzene	0.005	Di(2-ethylhexyl) phthalate	0.006
Total Trihalomethanes (TTHMs)	0.080	Benzo(a)pyrene	0.0002	Dinoseb	0.007
<b>Inorganic Chemicals</b>		Carbofuran	0.04	Dioxin (2,3,7,8-TCDD)	0.00000003
Antimony	0.006	Carbon Tetrachloride	0.005	Diquat	0.02
Arsenic	0.010	Chlordane	0.002	Endothall	0.1
Asbestos	7 MFL	Chlorobenzene	0.1	Endrin	0.002
Barium	2	2,4-D	0.07	Ethlybenzene	0.7
Beryllium	0.004	Dalapon	0.2	Ethylene dibromide	0.00005
Cadmium	0.005	1,2-Dibromo-3chloropropane (DBCP)	0.0002	Glyphosate	0.7
Chromium	0.1	o-Dichlorobenzene	0.6	Heptachlor	0.0004
Cyanide	0.2	p-Dichlorobenzene	0.075	Heptachlor epoxide	0.0002
Fluoride	4.0	1,2-Dichloroethane	0.005	Hexachlorobenzene	0.001
Mercury	0.002	1,1-Dichloroethylene	0.007	Hexachlorocyclopentadiene	0.05
Nitrate	10	cis-1,2-Dichloroethylene	0.07	Lindane	0.0002
Nitrite	1	trans-1,2-Dichloroethylene	0.1	Methoxychlor	0.04
Selenium	0.05	Dichloromethane	0.005	Oxamyl (Vydate)	0.2
Thallium	0.002				

## Complete List of EPA PMCL Constituents and Limits (Continued)

Constituent	PMCL (mg/L)
<b>Organic Chemicals (continued)</b>	
Polychlorinated biphenyls	0.0005
Pentachlorophenol	0.001
Picloram	0.5
Simazine	0.004
Styrene	0.1
Tetrachloroethylene	0.005
Toluene	1
Toxaphene	0.003
2,4,5-TP (Silvex)	0.05
1,2,4-Trichlorobenzene	0.07
1,1,1-Trichloroethane	0.2
1,1,2-Trichloroethane	0.005
Trichloroethylene	0.005
Vinyl chloride	0.002
Xylenes (total)	10

Constituent	PMCL (mg/L)
<b>Radionuclides</b>	
Alpha particles	15 picocuries per Liter (pCi/L)
Beta particles and photon emitters	4 millirems per year
Radium 226 and Radium 228 (combined)	5 pCi/L
Uranium	30 ug/L