

# Cowlitz UIC Project

## **Public Health and Environmental Concerns**

**Clark County Board of Health Work Session: August 22, 2016**

Eric Weber – Principal Hydrogeologist

Washington Licensed Hydrogeologist and Certified Water Rights Examiner

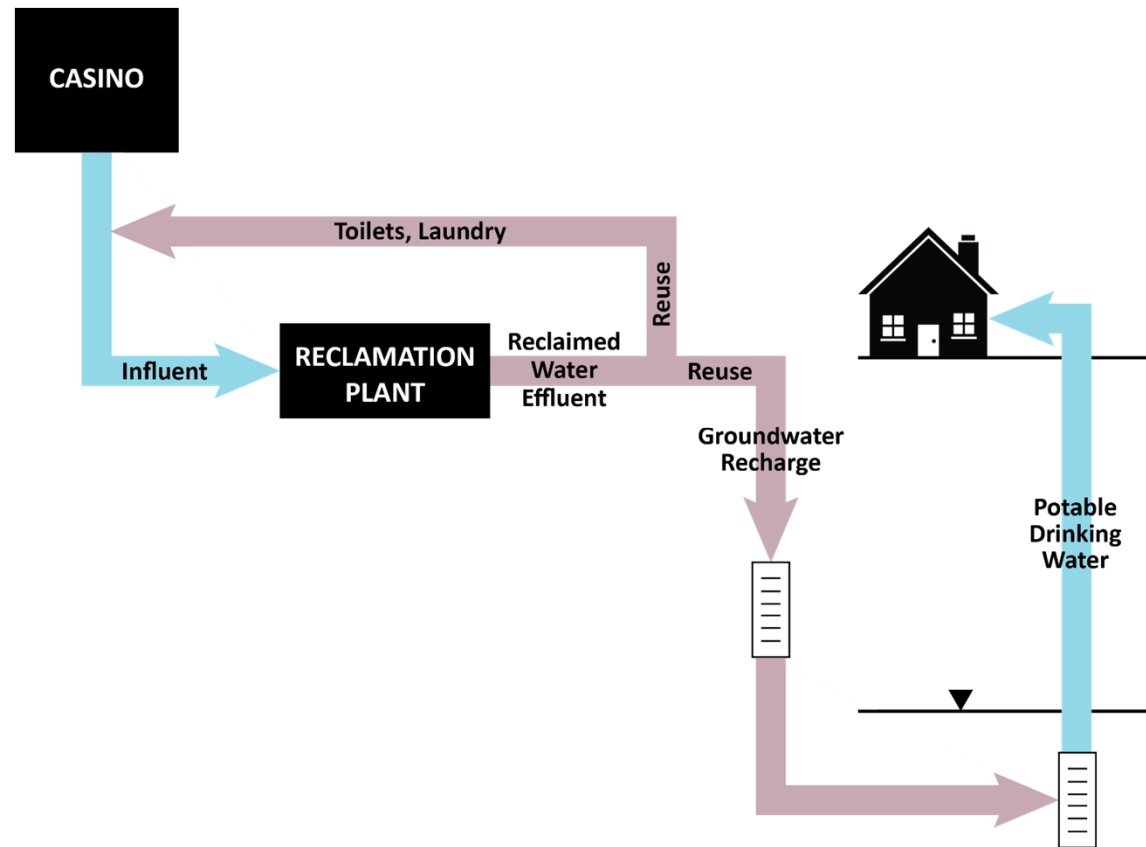
<https://www.epa.gov/ground-water-and-drinking-water/drinking-water-health-advisories-pfoa-and-pfos>



# Work Session Discussion Topics

- Regulatory Background and Compliance
- Water Quality
- UIC Feasibility
- Documentation and Oversight
- Affected Population

# Discussion Topic 1: Regulatory Background and Compliance



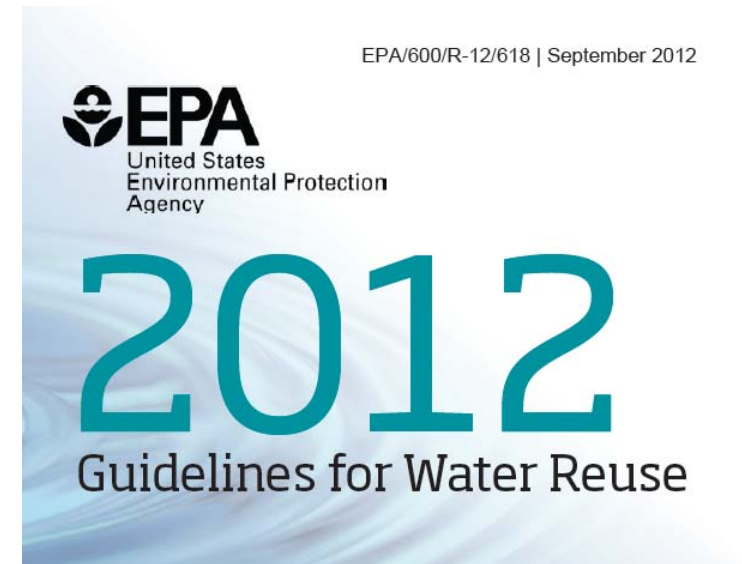
- 1) The UIC Project is a **Reclamation** and **Reuse** project.

UIC = Underground Injection Control

# Reuse Guidelines: Federal

## CHAPTER 1 Introduction

Recognizing the need to provide national guidance on water reuse regulations and program planning, the U.S. Environmental Protection Agency (EPA) has developed comprehensive up-to-date water reuse guidelines in support of regulations and guidelines developed by states, tribes, and other authorities. Water reclamation and reuse standards in the United States are the responsibility of state and local agencies – there are no federal regulations for reuse.



# Reclamation Plant Requirements: Federal

## Discharge to Surface Water

- Federal Clean Water Act
  - AKART
  - Antidegradation
  - Numeric Standards
- Requires an NPDES Permit

## Discharge to Groundwater<sup>1</sup>

- Federal Safe Drinking Water Act
  - Limited federal oversight
  - No Clean Water Act Compliance
  - Federal UIC Program (40 CFR § 144)
    - No AKART
    - No Antidegradation
    - Limited List of Numeric Standards
- Permit by Rule

**AKART:** Acronym for “all known, available and reasonable methods of treatment ...to control ....pollution (RCW 90.48.010; RCW 90.48.520).

<sup>1)</sup> UIC Project is a discharge to groundwater

# Federal UIC – Permit by Rule

## Only Compliance with Primary Federal Drinking Water Standards

- Disinfectants
- Disinfectant Byproducts
- Inorganic
- Organic
- Micro-organisms

No compliance with State standards  
 No compliance with County standards

OMB No. 2040-0042 Approval Expires 1/31/05

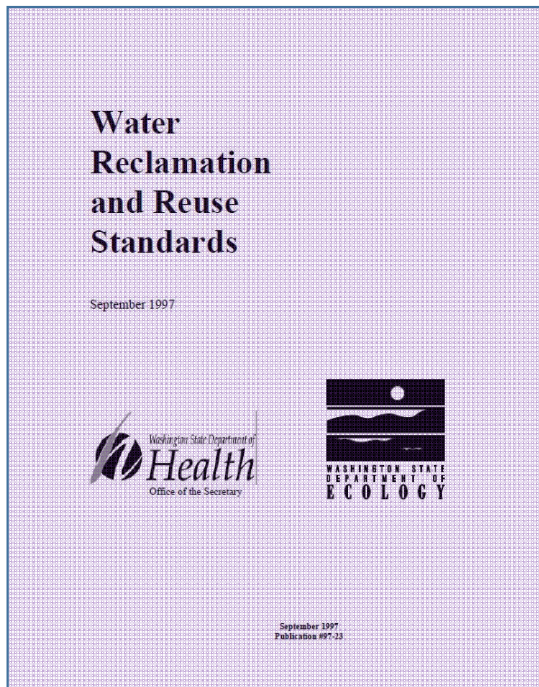
Type or print all information. See reverse for instructions.

<b>INVENTORY OF INJECTION WELLS</b> UNITED STATES ENVIRONMENTAL PROTECTION AGENCY OFFICE OF GROUND WATER AND DRINKING WATER <small>(This information is collected under the authority of the Safe Drinking Water Act)</small>		1. DATE PREPARED (Year, Month, Day) 15-07-27	2. FACILITY ID NUMBER WAD607700478						
PAPERWORK REDUCTION ACT NOTICE <small>The public reporting burden for this collection of information is estimated at about 0.5 hour per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Chief, Information Policy Branch, 215E, U.S. Environmental Protection Agency, 401 M Street, SW, Washington, DC 20460, and to the Office of Management and Budget, Paperwork Reduction Project, Washington, DC 20503.</small>		3. TRANSACTION TYPE (Please mark one of the following) <input type="checkbox"/> Deletion <input checked="" type="checkbox"/> First Time Entry <input type="checkbox"/> Entry Change <input type="checkbox"/> Replacement							
4. FACILITY NAME AND LOCATION									
A. NAME (last, first, and middle initial) Cowlitz Reservation Development		C. LATITUDE DEG MIN SEC 45 51 06 6384							
B. STREET ADDRESS/ROUTE NUMBER 3600 NW 319th Street		D. LONGITUDE DEG MIN SEC 122 42 31 4964							
F. CITY/TOWN Ridgefield		G. STATE WA	H. ZIP CODE 98642						
		I. NUMERIC COUNTY CODE 132	J. INDIAN LAND (mark "x") <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No						
5. LEGAL CONTACT:									
A. TYPE (mark "x") <input checked="" type="checkbox"/> Owner <input type="checkbox"/> Operator		B. NAME (last, first, and middle initial) Jyall, William, B. - Chairman Cowlitz Tribe							
C. PHONE (area code and number) (253) 677-4833									
D. ORGANIZATION Cowlitz Indian Tribe		E. STREET/P.O. BOX 1055 9th Ave, Suite B							
F. CITY/TOWN Longview		G. STATE WA	H. ZIP CODE 98632						
I. OWNERSHIP (mark "x") <input type="checkbox"/> PRIVATE <input type="checkbox"/> PUBLIC <input checked="" type="checkbox"/> SPECIFY OTHER <input type="checkbox"/> STATE <input type="checkbox"/> FEDERAL <input type="checkbox"/> Tribal									
6. WELL INFORMATION:									
A. CLASS AND TYPE	B. NUMBER OF WELLS		C. TOTAL NUMBER OF WELLS	D. WELL OPERATION STATUS					COMMENTS (Optional):
	COMM	NON-COMM		UC	AC	TA	PA	AN	
V D	1		1	1					A series of 11 individual vadose zone wells used as a single (1) Class V injection well system, to inject reclaimed water on Tribal Trust Land for the Cowlitz Reservation Development as shown on the attached Sheet C16. The injection system is located in the NE 1/4 of Section 8 and the SE 1/4 of Section 5. The well field will receive an initial flow of 200,000 gallons per day average daily flow and up to 400,000 gallons per day average daily flow upon buildout of the Reservation Development
			0						
			0						
			0						
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			0						
				KEY:					
				DEG = Degree MIN = Minute SEC = Second SECT = Section 1/4 SECT = Quarter Section					
				COMM = Commercial NON-COMM = Non-Commercial AC = Active UC = Under Construction TA = Temporarily Abandoned PA = Permanently Abandoned and Approved by State AN = Permanently Abandoned and not Approved by State					

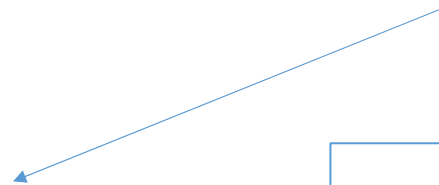
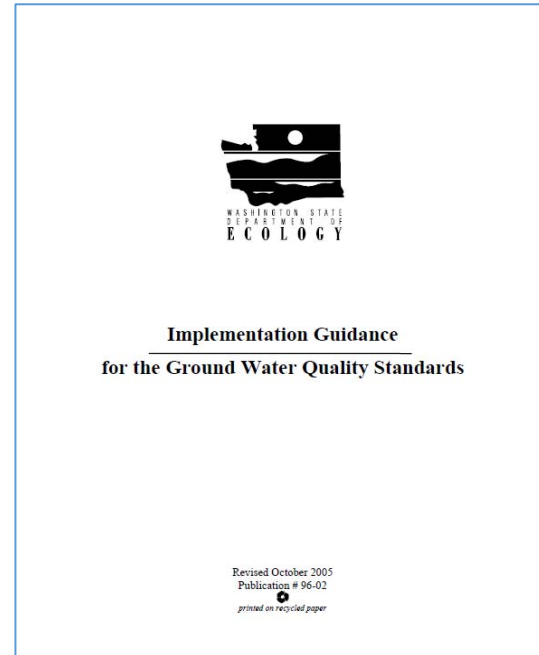
EPA Form 7520-16 (Rev. 8-01)

# Reuse Standards: Washington State

Reclaimed Water Permit  
RCW 90.46



State UIC Permit  
WAC 173-218



# UIC Project Design Standards

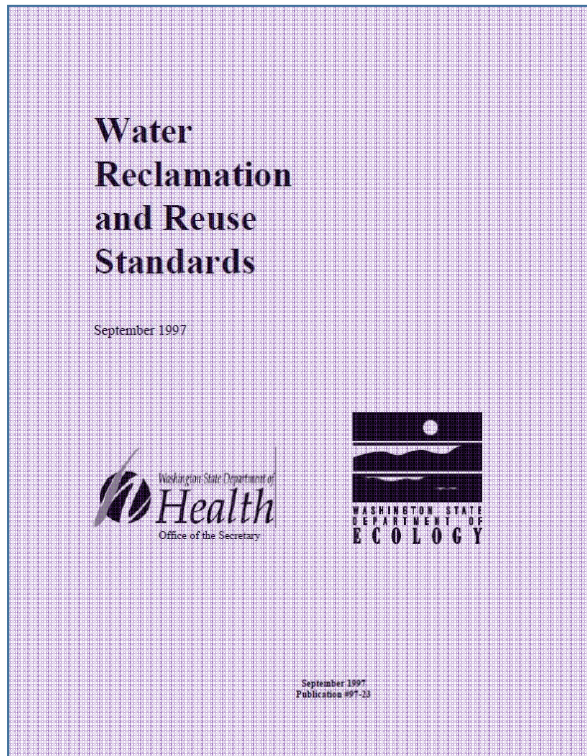
## Guidelines for Use of Reclaimed Water Source: Casino Reclamation Plant Final Feasibility Study June 2015

In 1997, the Washington State guidelines **Water Reclamation and Reuse Standards** were adopted, directing the State Departments of Ecology and Health to jointly administer the reclaimed water program (Washington State Department of Ecology and Washington State Department of Health, 1997). The standards emphasize public health protection and provide design, treatment, and use area criteria for the following reclaimed water categories: general requirements (e.g., land application, impoundments, commercial and industrial uses), use in both natural and constructed wetlands, and **groundwater recharge (direct and surface percolation)**. The **commercial use category includes toilet and urinal flushing**. The standard requires that reclaimed water used for toilets and urinals in commercial facilities, including hotels and motels, must meet **Class A** reclaimed water requirements or better. As mentioned previously, the proposed WRP will utilize MBR technology and will be designed to produce water meeting **Class A** performance standards.

1. The Cowlitz Feasibility Study recognizes WRRS
2. The Cowlitz Feasibility Study recognizes direct groundwater recharge as a reuse category
3. The Cowlitz Feasibility Study recognizes toilet flushing as a reuse category
4. The Cowlitz Feasibility Study proposes to treat to the WRRS standard for toilet flushing
5. However, the Cowlitz Feasibility Study Ignores the WRRS standard for direct aquifer recharge



# What Are State Reuse Standards?



**Appendix A**  
**Washington Reuse Class Standards**  
(Source: Chapter E1 Water Reclamation and Reuse 2006, Criteria for Sewage Works Design (Orange Book))

Table 1 summarizes the treatment and water quality requirements for each reuse class in Washington State. Table 2 contains the reuse class and additional water quality and treatment requirements for various reuse applications in Washington.

**Table 1. Reuse Class and Water Quality Requirements**

Class	Oxidized BOD and TSS (mg/L)	Coagulated	Filtered Turbidity (NTU)	Disinfection (Total Coliform/100 mL) Not to Exceed	
				7-day Median	Single Sample
A	30	Yes	2	2.2	23
B	30	No	No	2.2	23
C	30	No	No	23	240
D	30	No	No	240	No standard

**Table 2. Treatment Requirements by Reuse Application Type**

Reuse Application <sup>1</sup>	Treatment Requirements
<b>Direct Aquifer Recharge Injection</b>	
Nonpotable Aquifers	Class A plus BOD and TSS ≤ 5 mg/L
Potable Aquifers	Class A plus Reverse Osmosis BOD and TSS ≤ 5 mg/L Total Coliforms 1/100 mL, TOC ≤ 1.0 mg/L Nitrogen ≤ 10 mg/L, Turbidity ≤ 0.1 mg/L Meet Groundwater Standards Meet Drinking Water MCLs
<b>Surface Percolation for Groundwater Recharge</b>	
	Class A plus Nitrogen Removal Meet Groundwater Standards Meet Drinking Water Standards
<b>Stream Flow Augmentation</b>	
	Class A plus project specific requirements Meet Federal Water Pollution Control Act Meet Surface Water Standards Meet EPA Clean Water Act

Reclaimed Water Feasibility Study A-1

Standard Reuse Requirements

Nonpotable Reuse Requirements

Potable Reuse Requirements

# UIC Project Versus State Reuse Standards

## UIC Project

Table 3. MBR Performance Criteria to Achieve Class A Reclaimed Water (Ecology, 2015)

Treatment Step	Parameter	Units	Performance Criteria
Biological Oxidation:	BODs	mg/L	30
	Dissolved Oxygen	mg/L	must be present
	pH	units	6-8
Membrane Filtration:	Turbidity (average)	NTU	0.2
	Turbidity (maximum)	NTU	0.5
Disinfection:	Total Coliform (7-day median) <sup>a</sup>	MPN/100 mL	</= 2.2
	Total Coliform (single sample)	MPN/100 mL	</= 23

<sup>a</sup> A virus challenge study or equivalent shall demonstrate a 4-log virus inactivation through the micro-filtration (MF) or ultra-filtration (UF) process.

## Comparison With State Potable Reuse Requirements

Parameter	State	UIC Project
Reverse Osmosis	Yes	No
BOD	≤ 5 mg/L	≤ 30 mg/L
TSS	≤ 5 mg/L	-
TOC	≤ 1.0 mg/L	-
Turbidity	≤ 0.1 NTU	≤ 0.2 NTU
Total Coliform	≤ 1/100 mL	≤ 2.2/100 mL
Nitrogen	≤ 10 mg/L	≤ 10 mg/L
GW Quality Standards	Yes	No
Primary Drinking Water Standards	Yes	Yes

- 1) UIC Project does not meet most potable requirements
- 2) UIC Project does not meet nonpotable requirements

# Nitrate: Indian Health Service Comments

**Schruhl, Derek**

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**From:** Anderson, Steven J (IHS/DES) <Steven.Anderson@ihs.gov> ← From Indian Health Service  
**Sent:** Tuesday, September 08, 2015 5:42 PM  
**To:** Contreras, Peter; Schruhl, Derek ← To EPA  
**Subject:** Anderson Reply Meeting Request  
  
**Follow Up Flag:** Follow up  
**Flag Status:** Completed

Hi Peter and Derek, I think we could have predicted another meeting after the response. I am away in Spokane this week for work but I may not be essential to the meeting. I think our response to them needs to be "yes we can easily imagine them operating a system such as they have described" - if redundancy, reliability, and verification monitoring is addressed at an adequate level to insure the aquifer remains drinking water quality. That is where I believe I missed something in my review. They were proposing 10mg/l Nitrate and that is not OK because that is the MCL for Nitrate. The very highest we could approve is 5mg/l which is the action level where increased monitoring must take place. Since I don't have the package with me I don't recall the exact quality they called out. If you prefer to wait till the later date that is fine with me also. I am not copying Mike or Bill on this email.

- 1) Indian Health Service "not OK" with UIC Project nitrate standard
- 2) Tribe does not appear to have addressed IHS concerns

# What are the State GW Quality Standards?



## Implementation Guidance for the Ground Water Quality Standards

- 1.0 Applicability
- 2.0 Process For Using
- 3.0 Antidegradation Policy
- 4.0 Hydrogeologic Study
- 5.0 Monitoring Plan
- 6.0 Numerical Limits
- 7.0 Enforcement
- 8.0 Special Protection Areas

## Abstract

This guidance document explains and interprets the Ground Water Quality Standards (Chapter 173-200 WAC). The objective of this document is to promote consistent statewide implementation of these standards for all activities which have a potential to degrade ground water quality. The standards are a regulatory approach to protect and preserve ground water quality. The Ground Water Quality Standards are preventative in nature and protect all waters in the saturated zone. **The goal of the standards is to maintain a high quality of ground water and to protect existing and future beneficial uses through the reduction or elimination of contaminants discharged to the subsurface. The goal is achieved through three mechanisms:**

1. **AKART** – all know available and reasonable methods of prevention, control and treatment. All wastes must be provided with AKART prior to entry into the state's waters, regardless of the quality of water.

1. The **antidegradation** policy which mandates the protection of background water quality and prevents the degradation of water quality which would harm a beneficial use or violate the Ground Water Quality Standards.
2. The human health and welfare based standards which include **numeric and narrative standards**.

The standards affect all activities which have a potential to impact ground water quality. This includes both point source and nonpoint source activities. **Activities which are regulated by these standards include municipal wastewater treatment facilities**, surface impoundments, industrial facilities, ground water recharge projects, land application projects, mines, landfills injection wells, agricultural activities, and septic systems.

This guidance document implements the Ground Water Quality Standards for all activities regulated by Ecology which have a potential to contaminate ground water. This applies to only those activities which are not covered by another regulation, general permit, guidelines or BMPs, which include ground water protection provisions.

## 1) The UIC Project does not appear to be complying with any of the main provisions of the Groundwater Quality Standards

# Tribe Understands RO is the Drinking Water Standard

TECHNICAL MEMORANDUM (CONTINUED)

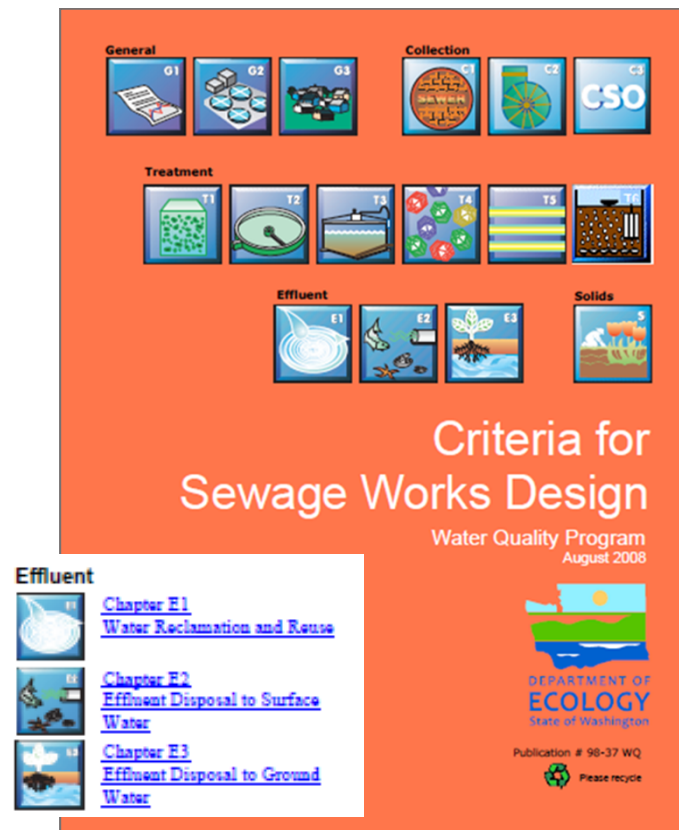
**Reverse Osmosis Water Purification (Future If Required)** Source: Casino Reclamation Plant Final Feasibility Study June 2015

This section describes an option for adding RO treatment for further purification of water from the MBR treatment plant. As mentioned previously, Parametrix recommends that the MBR plant be designed and constructed to allow for addition of a water purification system (reverse osmosis) should higher level of treatment be required by EPA for groundwater protection in the future.

Treatment of domestic wastewater by micro-filtration (MF) or ultra-filtration (UF), followed by RO, is the current standard treatment technology for meeting drinking water standards and removing pharmaceutical chemicals from wastewater (EPA, 2012). The RO treatment plant system would receive flows from the reclaimed water storage tank and thus flows to the RO will be pre-filtered by MF or UF through the MBR process. A conceptual flow schematic of the RO treatment process is shown in Figure 6 and a conceptual building layout is shown in

- 1) The Cowlitz Feasibility Study recognizes that reverse osmosis is the EPA standard for drinking water
- 2) The Cowlitz Feasibility Study recognizes that RO is the EPA standard for removing unregulated contaminants
- 3) However the UIC Project ignores the GW recharge and drinking water elements of the UIC project

# Criteria for Sewage Works Design: The Standard of Practice



## Purpose of the Manual

1. To ensure that the design of sewage collection and treatment system is consistent with public health, water quality, and biosolids management objectives of Washington State.
2. To establish a basis for the design and review of plans and specifications for sewage treatment works and sewerage systems
3. To establish the minimum requirements and limiting factors utilized by the Washington State Department of Ecology and the Washington State Department of Health for review of sewage treatment works and sewerage system plans and specifications.
4. To assist the owner of the authorized engineer in the preparation of plans, specifications, reports, and other data.
5. To guide departments in their determination of whether an approval, permit, and/or a certificate for a sewerage treatment works or sewerage system should be issued.

- 1) The UIC Project is ignoring the Orange Book requirements for discharge to groundwater.

# Criteria for Sewage Works Design: Section E1



## E1 Water Reclamation and Reuse

This chapter covers the concept of using adequately and reliably treated sewage treatment plant effluent (reclaimed water) for beneficial purposes. Laws, regulations, and other requirements related to water reclamation and reuse are described, as well as design and construction considerations for development of a water reclamation project. The level of treatment and allowable uses for Class A, B, C, and D reclaimed water are discussed. Also included in this chapter is a discussion of the various options for water reuse such as on-site applications, wetlands discharge, ground water recharge, indirect potable reuse, and streamflow augmentation.

- 1) The UIC Project is not following Section E1 Requirements

### E1-8.4.2 Direct Injection

Verify compliance with treatment, water quality, operational, and pilot plant study requirements of **Articles 3, 4, 6, and 11 of the Water Reclamation and Reuse Standards** for direct ground water recharge. The treatment and water quality requirements apply to the reclaimed water at the point of injection.

### E1-8.1 Ground Water Protection Areas

The following ground water protection areas have been recognized in state and federal laws and regulations:

- (1) Wellhead protection areas: Zones 1, 2, 3; contribution; influence.
- (2) Sole source aquifer.
- (3) Aquifer protection area (Chapter 36.36 RCW).
- (4) Critical aquifer recharge area (Growth Management Act).
- (5) Special (ground water) protection area (WAC 173-200-090).
- (6) Ground water management area (RCW 90.44.400; Chapter 173-100 WAC).

For project sites located within or near a designated ground water protection area, the facilities plan or project engineering report should identify the type of area and any special requirements to be placed on the project.

# Criteria For Sewage Works Design: Section E3

August 2008 E3-1



## E3 Effluent Disposal to Ground Water

This chapter describes the regulations, standards, policies, and guidance related to discharge of treated municipal wastewater to ground water. References are made to the "Implementation Guidance for the Ground Water Quality Standards" (guidance document) which was developed to explain and interpret the means to implement the state Water Quality Standards for Ground Water.

1) The UIC Project is not following Section E3 requirements.

- E3-1 Regulatory Framework..... 2**
  - E3-1.1 Chapter 173-216 WAC, State Waste Discharge Permit Program .....2
  - E3-1.2 Chapter 173-200 WAC, Water Quality Standards for Ground Waters of the State of Washington.....2
  - E3-1.3 Implementation Guidance for the Ground Water Quality Standards.....2
- E3-2 Regulated Ground Water Discharge Activities ..... 3**
  - E3-2.1 Land Treatment of Wastewater ....3
  - E3-2.2 Drainfield Disposal.....4
  - E3-2.3 Water Reuse Through Ground Water Recharge.....4
  - E3-2.4 Impoundments.....4
- E3-3 Antidegradation Policy..... 4**
- E3-4 Ground Water Quality Standards Checklist..... 5**
- E3-5 References ..... 6**



## Discussion Topic 2: Water Quality Concerns

- Chlorine
- Total Dissolved Solids
- Contaminants of Emerging Concern

# Disinfection: Chlorine and UV



## Cowlitz Indian Tribe

### Chlorine

- Required as a residual in transmission lines for toilet/laundry reuse (WRRS)
- Required to prevent clogging of wells (because of high BOD/TOC in effluent)
- Causes high levels of carcinogenic disinfection by-products
- Tribe requested to eliminate UV as a disinfectant and use only chlorine

July 20, 2015

Mr. Peter Contreras  
EPA Region 10, Ground Water Unit  
1200 6th Avenue, Suite 900  
Seattle, WA 98101

Re: Request for Approval, Class V Injection Well – Cowlitz Indian Tribe

We have also provided preliminary plans for the water reclamation plant and injection well field (approximately 30 percent complete) so that you may review our progress and the finer details of the system. There are a few of the fine points that we would like to bring to your attention:

- The design includes both UV and sodium hypochlorite disinfection; however, the Cowlitz Indian Tribe is requesting that the disinfection system be limited to sodium hypochlorite (intended to have 0.5 mg/L minimum chlorine residual) to limit biological growth in the injection wells and to facilitate reuse of the water inside of the casino resort and for other non-potable uses. We request your concurrence in using a sodium hypochlorite system only without UV disinfection.

# Chlorine Water Quality Concerns

## Trihalomethanes

Trichloromethane:  $\text{CHCl}_3$

Dibromochloromethane:  $\text{CHClBr}_2$

Bromodichloromethane:  $\text{CHCl}_2\text{Br}$

Tribromomethane:  $\text{CHBr}_3$

## Halo-acetic Acids

monochloroacetic acid (MCA)  $\text{ClCH}_2\text{COOH}$

dichloroacetic acid (DCA)  $\text{Cl}_2\text{CHCOOH}$

trichloroacetic acid (TCA)  $\text{Cl}_3\text{CCOOH}$

monobromoacetic acid (MBA)  $\text{BrCH}_2\text{COOH}$

dibromoacetic acid (DBA)  $\text{Br}_2\text{CHCOOH}$



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 10  
1200 Sixth Avenue, Suite 900  
Seattle, Washington 98101-3140

OFFICE OF  
COMPLIANCE AND ENFORCEMENT

September 4, 2015

Reply To: OCE-101

Mr. Bill Iyall, P.E.  
Chairman  
Cowlitz Indian Tribe  
P.O. Box 2547  
Longview, Washington 98632-8594

Re: Cowlitz Indian Tribe Water Reclamation Plan Feasibility Study  
UIC ID # WA132T5-30-13798

### Injectate

- Under 40 C.F.R. § 144.12, an owner or operator is prohibited from injecting fluid into an underground source of drinking water, which may cause a violation of any primary drinking water regulation under 40 C.F.R. Part 141 or adversely affect the health of persons. This means the recharged water must meet the primary drinking water regulations and must not cause the degradation of groundwater below the primary drinking water standards. Injecting reclaimed water containing up to 0.5 mg/L of chlorine may cause the formation of disinfection byproducts or have other unanticipated impacts on the aquifer. Please consider technologies or methods that do not introduce chlorine into the underground source of drinking water (e.g., disinfection).

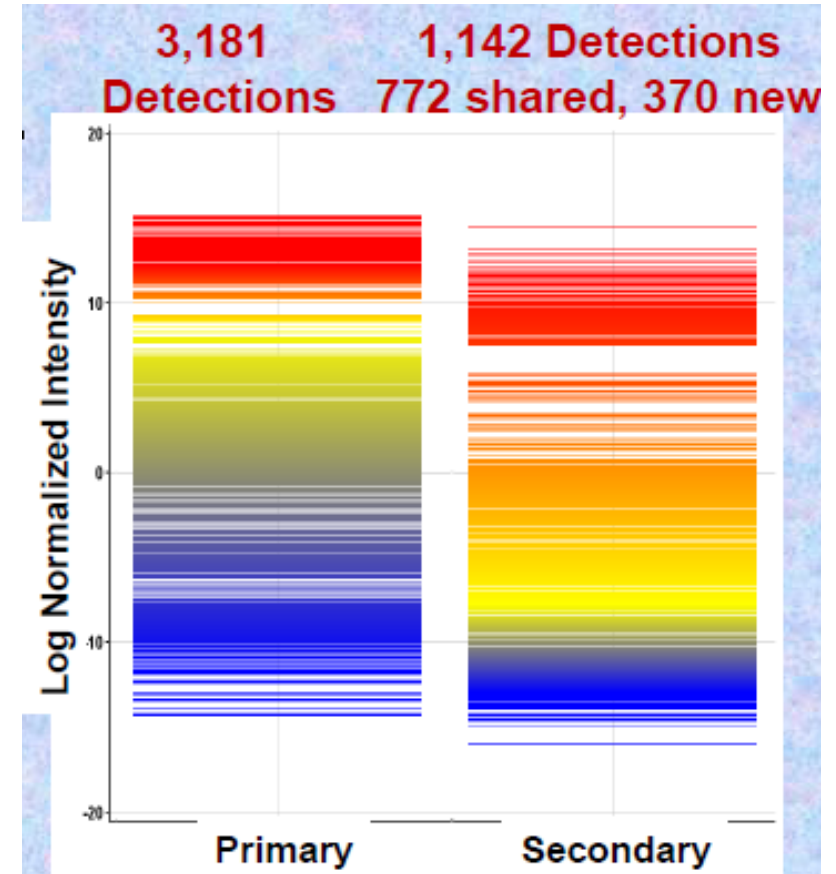
# Contaminants of Emerging Concern

Table 2. Examples of CEC Categories and Associated Effects

Use Category	Where has it been detected? <sup>(1)</sup>	Suspected health effects from environmental exposure <sup>(2)</sup>
Antibiotics	Groundwater, surface water, wastewater treatment plant effluent, land applied biosolids, potable water, recycled water	Antibiotic resistance in disease causing bacteria complicating treatment of infections
Disinfectants	Wastewater treatment plant effluent, treated potable water, ground and surface waters, recycled water	Genotoxicity, cytotoxicity, carcinogenicity
Fire retardants	Rivers down gradient of landfills and PBDE manufacturing sites, sewage sludge, natural waterways, sediments, bioaccumulation in fish, whales and other aquatic organisms	Endocrine disruption, indications of increased risk for cancer
Industrial additives	Industrial and household waste, soil	Can be toxic to animals, ecosystems, and humans
Life-style products (Caffeine, Nicotine)	Potable water, groundwater and surface waters affected by sewage or wastewater treatment plant effluent	Can cause cellular stress, negative effects on reproductive activity in animals
Nonprescription drugs	Wastewater treatment plant effluent, surface water, potable water, recycled water	Unknown health effects
Other prescription drugs	Potable water, recycled water, groundwater, surface water, wastewater treatment plant effluent, land applied biosolids	Increased cancer rates, organ damage
Personal care products	Ground-waters, surface waters, sewage, wastewater treatment plant effluent, biosolids, aquatic sediments, biological samples (bioaccumulated in fish tissues)	Bacterial resistance, endocrine disruption
Pesticides	Groundwater, surface water, potable water, recycled water	Endocrine disruption
Plasticizers	Surface water	Endocrine disruption, increased risk of cancer
Reproductive hormones	Surface waters, potable water, recycled water, wastewater	Endocrine disruption
Solvents	Groundwater, soil, potable water	Endocrine disruption, liver and kidney damage, respiratory impairment, cancer
Steroids	Surface waters, groundwater, potable water, recycled water, wastewater, sewage, effluent, biosolids	Endocrine disruption


Arroyo 2013. University of Arizona Water Resources Center

Landau Associates



Kolodziej 2016. Unpublished data from Center of Urban Waters – Tacoma, WA

# Are CECs a Real Concern?



**EPA**  
United States  
Environmental Protection  
Agency

**FACT SHEET**  
**PFOA & PFOS Drinking Water**  
**Health Advisories**

**Overview**

EPA has established health advisories for PFOA and PFOS based on the agency's assessment of the latest peer-reviewed science to provide drinking water system operators, and state, tribal and local officials who have the primary responsibility for overseeing these systems, with information on the health risks of these chemicals, so they can take the appropriate actions to protect their residents. EPA is committed to supporting states and public water systems as they determine the appropriate steps to reduce exposure to PFOA and PFOS in drinking water. As science on health effects of these chemicals evolves, EPA will continue to evaluate new evidence.

**Background on PFOA and PFOS**

PFOA and PFOS are fluorinated organic chemicals that are part of a larger group of chemicals referred to as perfluoroalkyl substances (PFASs). PFOA and PFOS have been the most extensively produced and studied of these chemicals. They have been used to make carpets, clothing, fabrics for furniture, paper packaging for food and other materials (e.g., cookware) that are resistant to water, grease or stains. They are also used for firefighting at airfields and in a number of industrial processes.

<https://www.epa.gov/ground-water-and-drinking-water/drinking-water-health-advisories-pfoa-and-pfos>

Landau Associates

## City of Newburgh

Press Release

83 Broadway, Newburgh, N.Y. 12550  
(845) 569-7301– Fax: (845) 569-7370

*For immediate release*  
**May 2, 2016**

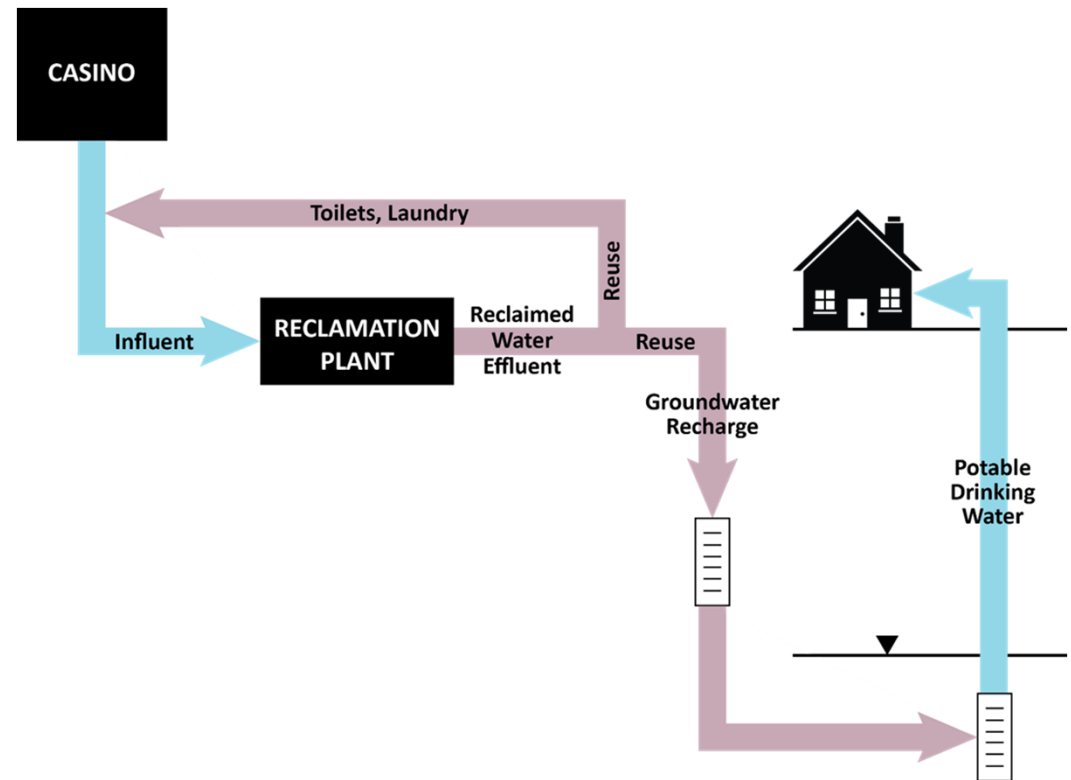
### STATE OF EMERGENCY DECLARED IN THE CITY OF NEWBURGH

As City Manager of the City of Newburgh, I, Michael G. Ciaravino, exercise the authority given me under Section 24 of the New York State Executive Law, to preserve the public safety and hereby render all required and available assistance vital to the security, well-being, and health of our citizens of the City of Newburgh.

A State of Emergency is hereby declared in the City of Newburgh effective immediately on May 2, 2016, until further notice and may be rescinded or amended by subsequent order. This State of Emergency has been declared due to the discovery of Perfluorooctane Sulfonate (PFOS) in Silver Stream and Washington Lake, posing a potential threat to public health and safety. PFOS has been identified by EPA as an emerging contaminant of concern. ([Click here for the PFOS & PFOA Factsheet](#)). Although the detected levels of PFOS, as sampled and analyzed by the New York State Department of Conservation (NYSDEC), are below the levels recommended in the provisional health advisory published by EPA in 2009, the NYSDEC and Department of Health (DOH) are recommending that steps be taken to reduce or eliminate the compound from our water system. It is expected that EPA will soon be reducing the recommended maximum levels of PFOS in drinking water to levels below those found in our water system.

# TDS and Secondary Drinking Water Standards

- Total Dissolved Solids = 500 mg/L
- Recognized threshold where excessive hardness, unappetizing taste, scaling and corrosion occurs
- Groundwater source will start with fairly high TDS (~130 mg/L)
- Reclamation Plant will not treat TDS
- Laundry, cooling and humidifiers further raise TDS
- Water conservation raises TDS
- Proposed Reclamation Plant will not reduce TDS but will actually concentrate it
- The UIC Project will likely exceed the secondary drinking water standard for TDS



## Discussion Topic 3: UIC Feasibility

- Clogging is not adequately accounted for in the design
- Effluent conditions will promote clogging
- Soil conditions are not amenable to long-term injection
- The design basis for the number of UIC wells is flawed
- The property may not be large enough to accommodate the injection system

# The UIC Project is Susceptible to Clogging

- 1) Cowlitz Feasibility Study recognizes that clogging is an issue
- 2) Cowlitz Feasibility Study recognizes that wells will have to be replaced
- 3) Cowlitz Feasibility Study cites the City of Scottsdale as the basis of their design safety factor

Feasibility analyses are based on projections of flow rates to effectively infinite time to the extent that these can be estimated from the BIT. The flow rates calculated by projecting  $1/\sqrt{\text{time}}$  to 0 are used to represent those long-term equilibrium flow rates (Table 3 reports those values for the BIT). Clogging of vadose zone injection wells (reduction of K near the borehole) is a separate phenomenon that reduces infiltration rates over longer time frames. Some accommodation for clogging is factored into the feasibility analysis using a safety factor; however, the City of Scottsdale Arizona has operated such wells since 1999 and found that vadose wells must eventually be replaced because they clog and cannot be rehabilitated (Gastelum, Lluria and Small, undated). Reductions reported for that project did not exceed a factor of 2.

Source: Casino Reclamation Plant Final Feasibility Study June 2015



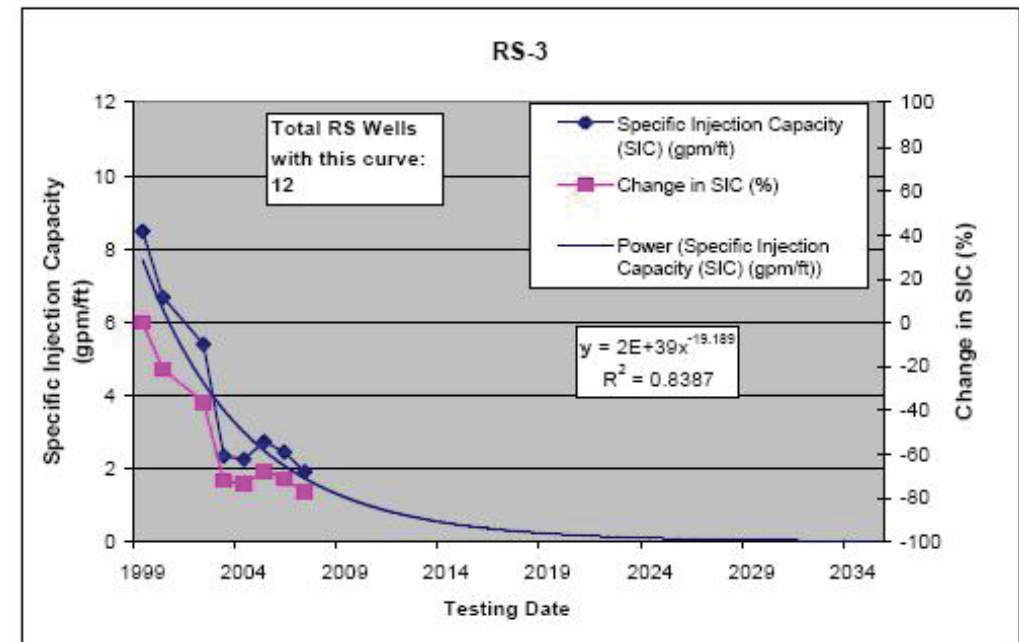
# UIC Project Well Design Basis

1) Injection design based on City of Scottsdale, AZ UIC Project

2) Scottsdale

- a) Uses Reverse Osmosis (i.e, better effluent quality)
- b) Has much more permeable soil conditions (wells designed for 840 gpm vs 50 gpm)
- c) Not an appropriate design basis for the Cowlitz UIC Project

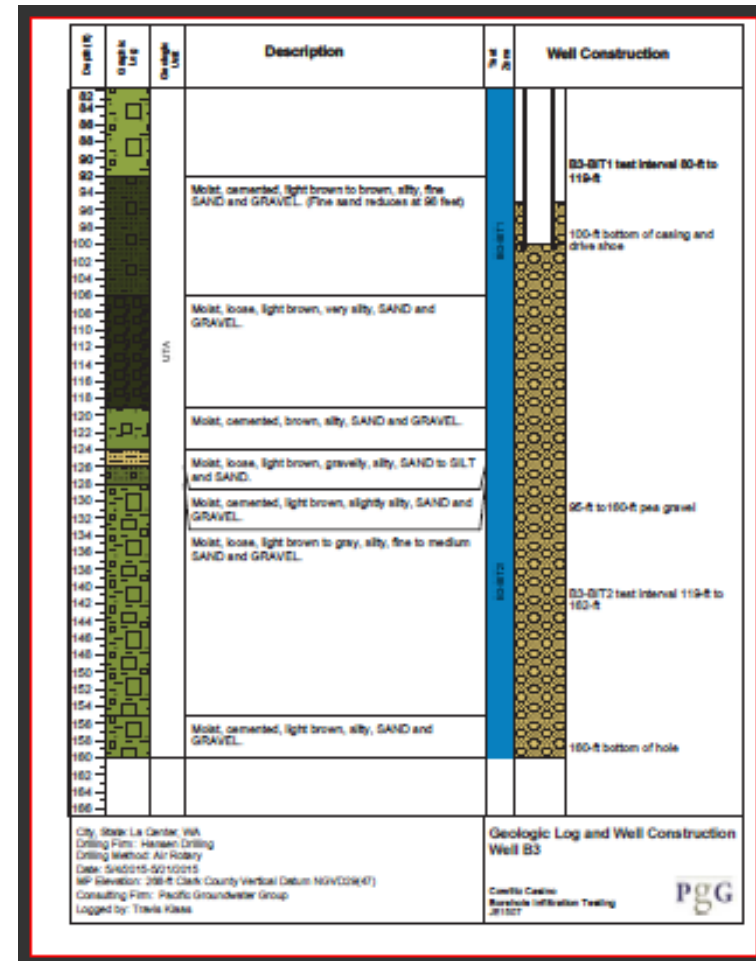
## Scottsdale 8-year study of clogging



Source: Gastelum et al., undated

# Soil Conditions

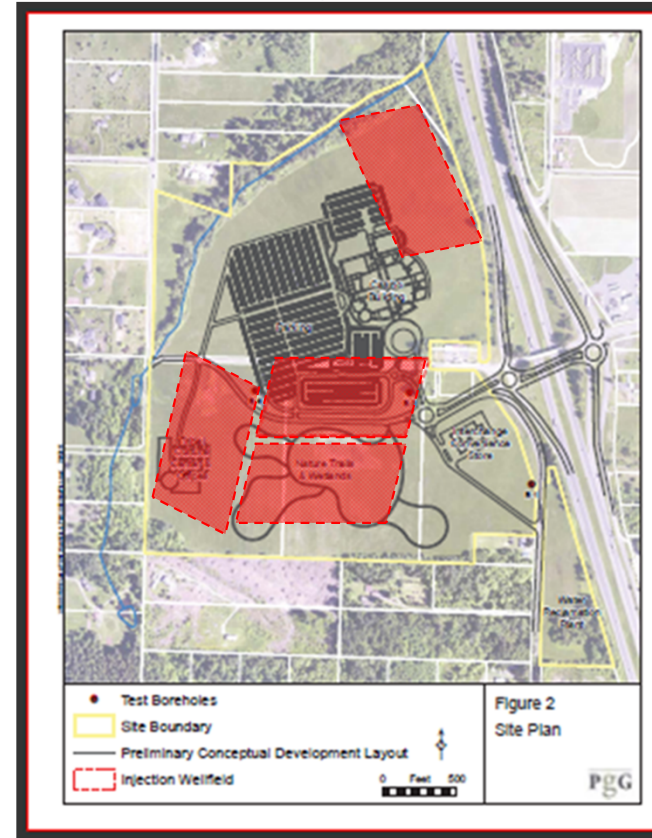
- 1) Three soil borings – none drilled in proposed injection area
- 2) Soil heterogeneous and anisotropic
- 3) Susceptible to perched water conditions that will reduce injection capacity
- 4) Low permeability that is susceptible to clogging



Source: Casino Reclamation Plant Final Feasibility Study June 2015

# Site Does Not Appear to be Large Enough to Accommodate Full Build Out of UIC Project

- 1) The UIC project only designed for Phase I
- 2) Phase I is about a 12 acre area
- 3) Total build out would take 48 acres
- 4) If wells clogged in 5 years they would run out of room
- 5) Risk is compounded by
  - a) Poor evaluation of clogging potential
  - b) No safety factor for weekend flows



Source: Casino Reclamation Plant Final Feasibility Study June 2015

# Discussion Topic 4: Documentation and Oversight

## No Formal Review Procedure (Comment and Response)

- 185 Page Feasibility Study and Draft Plan Set
- Only seven comments from EPA; Two Comments from IHS
- No comments on the hydrogeology
- No comments on the UIC feasibility (injection rates, well spacing, clogging)
- No comments on affected population or groundwater protection area
- No formal response from the Tribe to EPA and IHS

## A Lack of Rigorous Oversight – Example: EPA Comments on the Feasibility Study

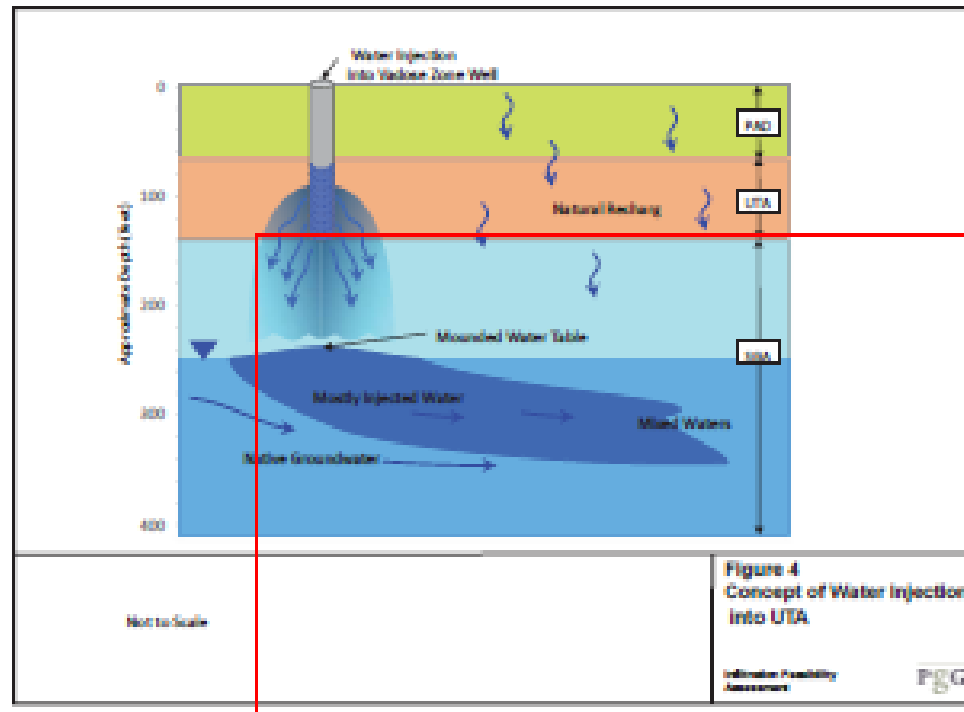
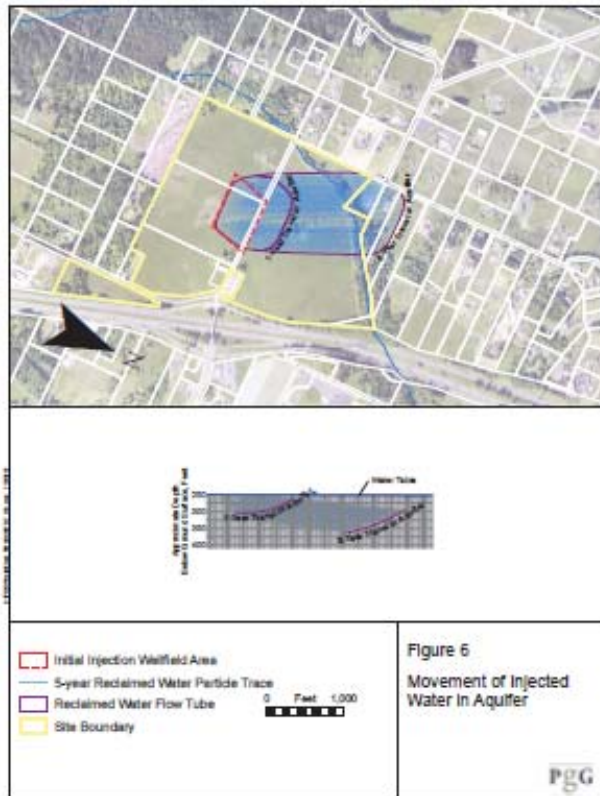
- Two of the comments were trivial
- One of the comments requested that they not use chlorine (they are still using chlorine)
- One comment encourages the use of reverse osmosis (they are not using reverse osmosis)
- One comments suggests that they not discharge “off-spec” water into the injection wells
- One comment requests a sampling and analysis plan (we have not seen this plan)
- One comment requests a revised groundwater monitoring plan (we have not seen this plan)

Lack of Transparency

No Public Involvement Process

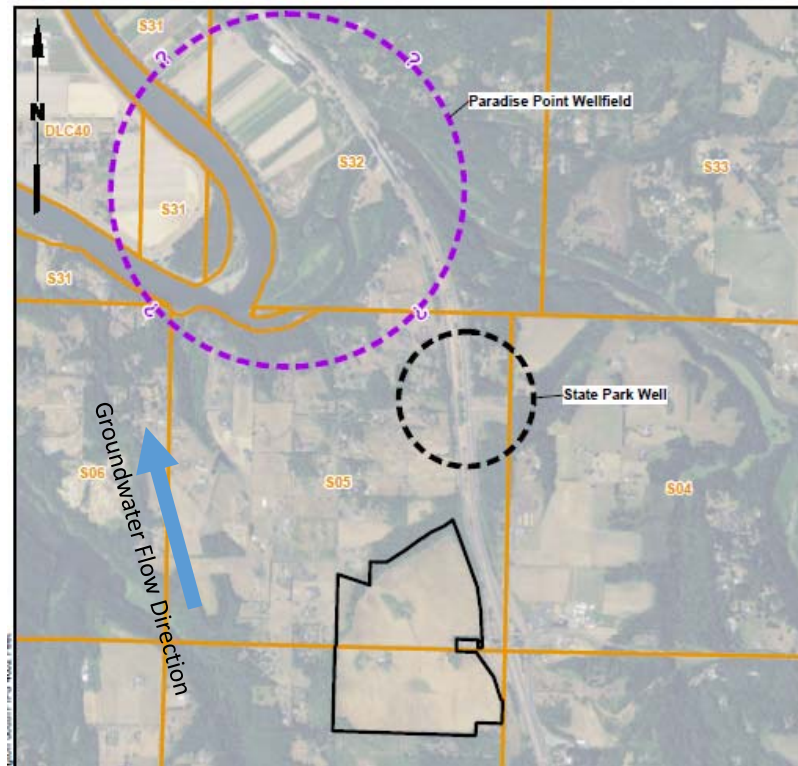
Essentially No Oversight

# Discussion Topic 5: Affected Population



Source: Casino Reclamation Plant Final Feasibility Study June 2015

# Affected Population: Water Supply Wells



- 1) The UIC Project is in a County Category 2 Critical Aquifer Recharge Zone
- 2) The UIC Project may eventually be in a Category 1 Critical Aquifer Recharge Zone

# Conclusions

- The UIC Project is a big, risky project on a small piece of land
- Ignores State standards, County standards and Federal guidelines
- Long-term feasibility/reliability of the project has not been demonstrated
- No effective regulatory oversight
- The project will discharge inadequately treated effluent into the Sole Source Troutdale Aquifer
- People **will** be drinking the inadequately treated effluent