Collection System Protection Through an Effective Pretreatment Program

Thursday, May 10, 2018

1:00 – 3:00 PM ET

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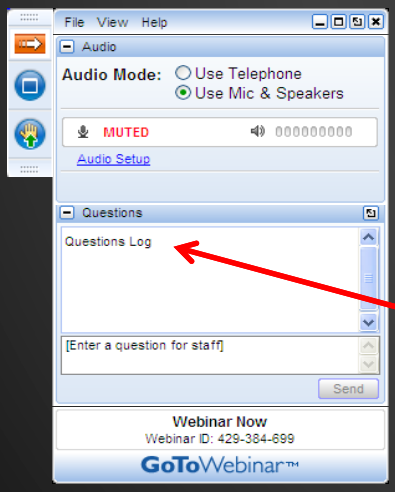
How to Participate Today



- **Audio Modes**
  - Listen using Mic & Speakers
  - Or, select "Use Telephone" and dial the conference (please remember long distance phone charges apply).
- **Submit your questions using the Questions pane.**
- **A recording will be available for replay shortly after this webcast.**

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Today's Moderator

Erik White, PE

President

UEG CONSULTING·LLC
Engineering • Permitting • Compliance

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Today's Speakers

- Ali Ling
  - H_2S Corrosion
- Mike Harmer
  - Introduction to Pretreatment Programs
- Hamid 'Ed' Abbasi
  - Construction Dewatering Pretreatment

Our Next Speaker

Ali Ling, PhD, PE

Environmental Engineer

BARR

H_2S Corrosion – How it works and what you can do about it

Ali Ling, PhD, PE
Barr Engineering

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Financial impacts

- Over 70% of wastewater utilities in the USA experience this form of corrosion
- ASCE estimates $298B needed in next 20 years

Photo courtesy of PAR, Denver Metro

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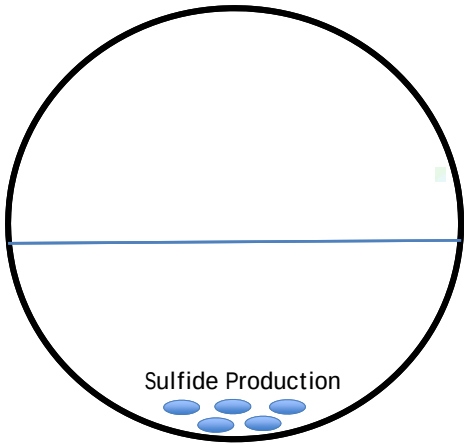
How Corrosion Happens

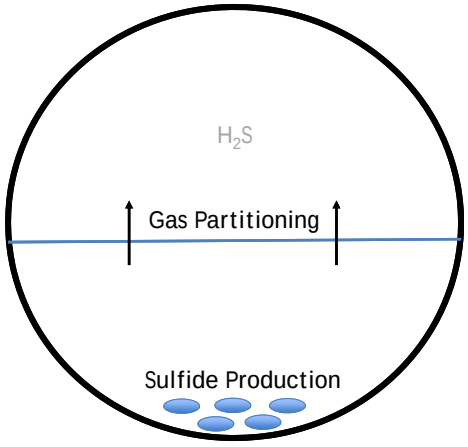


Sulfide production

Organics + SO_4^{2-}

S^{2-}

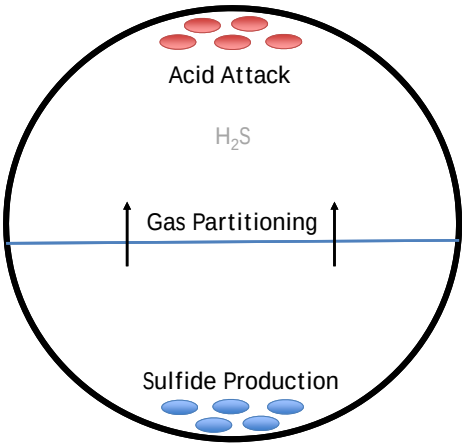
How Corrosion Happens



Gas Partitioning

$S^{2-} \rightleftarrows HS^- \rightleftarrows H_2S$ Gas

How Corrosion Happens



Acid Production

$H_2S + O_2$

Sulfuric Acid

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Corrosion Stages

	Stage 1
Surface pH	12 to 8
Microbial Activity/ Degree of Corrosion	Limited

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Corrosion Stages

	Stage 1	Stage 2
Surface pH	12 to 8	8 to 4
Microbial Activity/ Degree of Corrosion	Limited	Moderate

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Corrosion Stages

	Stage 1	Stage 2	Stage 3
Surface pH	12 to 8	8 to 4	4 to 0
Microbial Activity/ Degree of Corrosion	Limited	Moderate	Very Active

pH of 0.1 is equivalent to 20% sulfuric acid

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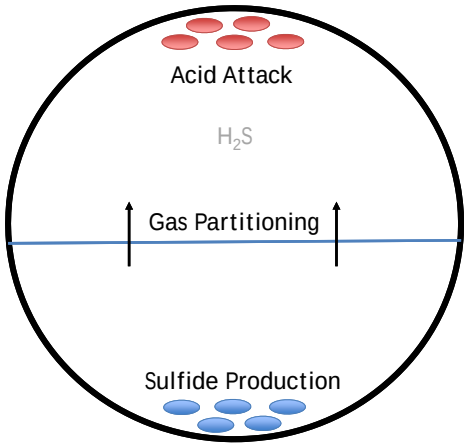
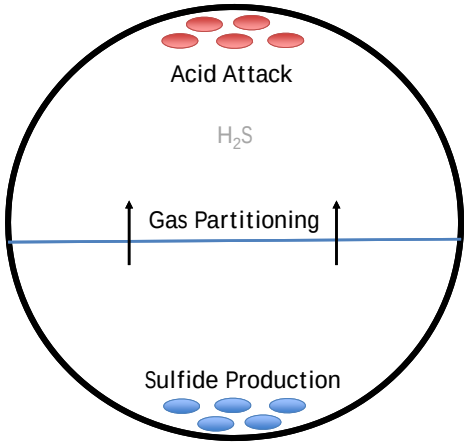
Contributing Factors



H_2S is often cited as the cause of corrosion, but there isn't much you can do once it's made.

What causes H_2S?

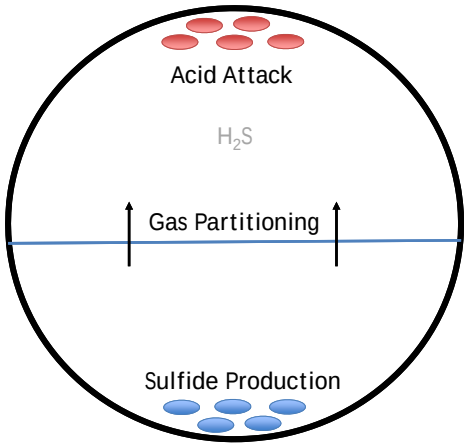
Contributing Factors



What contributes to H_2S formation?

- Long retention times
- High sulfate and organic content

Contributing Factors



What contributes to H_2S formation?

- Mixing, low pH
- Long retention times
- High sulfate and organic content

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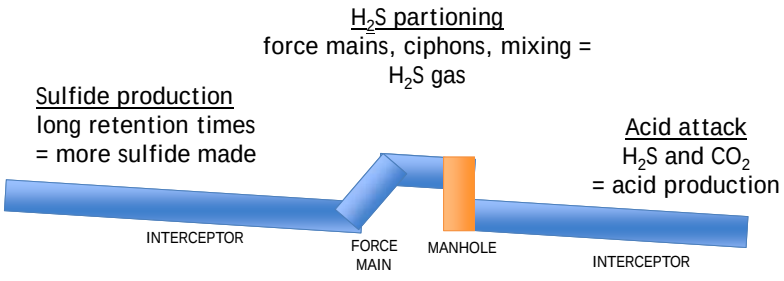
Contributing Factors



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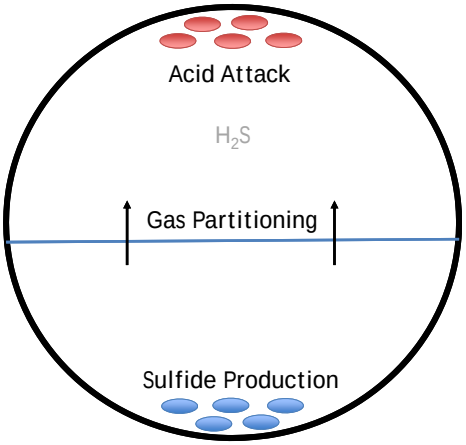
Key Indicators of Corrosion Risk

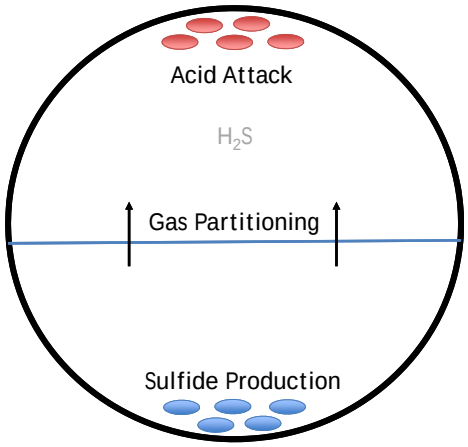
- Hydraulics: Long retention times and immediately downstream of mixing
- Gas measurements:
  - H_2S > 5 ppm
  - CO_2 > 10,000 ppm
- Surface pH: pH <7 indicates risk

Methods to Limit Corrosion



- Limit sulfide production (biological)
  - Add nitrate salts
  - Add iron salts
  - Add oxidants

Methods to Limit Corrosion



- Limit gas partitioning (chemical/physical)
  - Raise pH
  - Limit mixing
- Limit sulfide production (biological)
  - Add nitrate
  - Add iron salts
  - Add disinfectant

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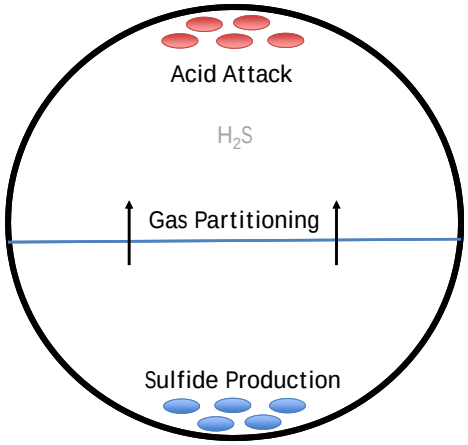
Methods to Limit Corrosion



- Limit effect of acid
  - Alternative materials
- Limit gas partitioning (chemical)
  - Raise pH
  - Limit mixing
- Limit sulfide production (biological)
  - Add nitrate
  - Add iron salts
  - Add disinfectant

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Methods to Limit Corrosion

Alternate materials

- epoxy and other coatings
- cured-in-place pipe (CIPP)
- fiberglass

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Materials Selection Implications

- Alternate materials
  - pH of 0.1 equivalent to 20% sulfuric acid
  - Coatings need to be completely gas-tight

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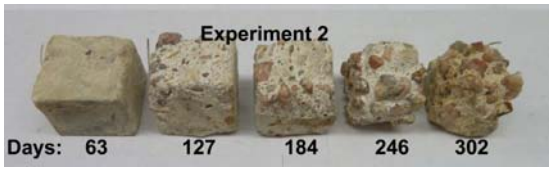
Materials Testing

- Evaluate materials compatibility
- Concrete or other materials



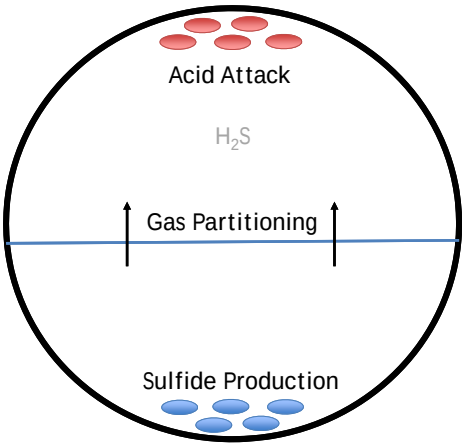
New corrosion control product

<u>ThioBan is a simple cement additive</u>:

- **Charcoal or PAC with metal recycled from Cu & Co plating baths**
  - Replace portion of fine aggregate mass
  - Inhibits bacteria that produce acid at Stage 2

Patented, working on licensing and distribution

Summary



- Complex, multi-stage process
- Limit H_2S formation, where possible
- H_2S and CO_2 both indicators of risk

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Contact Info

Ali Ling

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Our Next Speaker

Mike Harmer

Regulatory Services Division Manager

Washington Suburban Sanitary Commission

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Introduction to Pretreatment Programs

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What is the Pretreatment Program?

- Pretreatment = Pollutant control requirements for nondomestic sources discharging wastewater to sewer systems that are connected to publicly owned treatment works
- National program
- Implemented through EPA Regions', States' and local program

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Purpose of the Pretreatment Program

- To prevent the introduction of pollutant into POTWs which will:
  - Interfere
  - Pass through and/or
  - Be incompatible
- To improve opportunities to recycle and reclaim wastewaters and sludges
- To protect POTW workers

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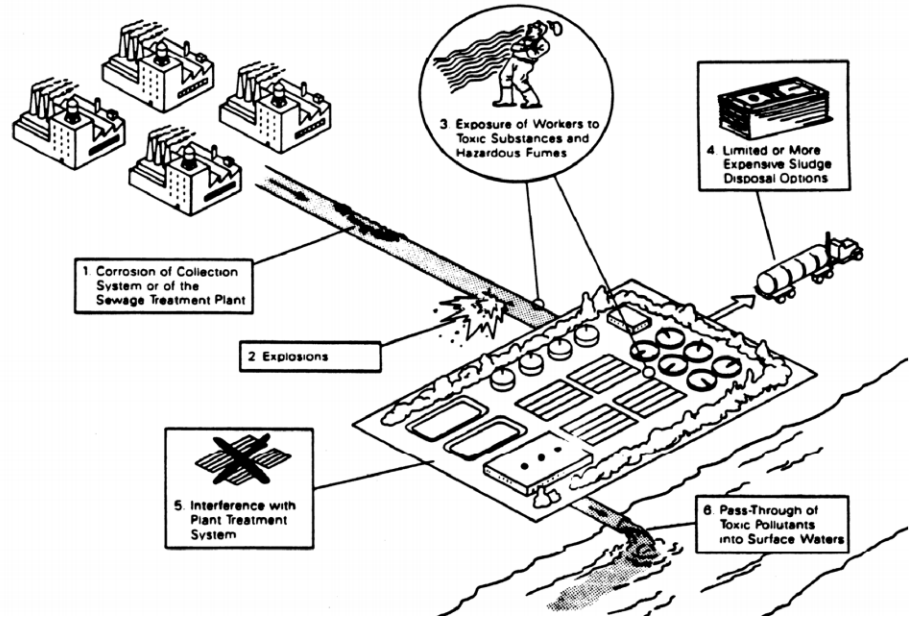

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Pretreatment Prohibitions Related To Collection System Protection

- Pollutants which create a fire or explosion hazard
- Pollutants that cause toxic vapor and gases

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WSSC's Current vs Proposed Limits For Metals

Pollutant	Current Limit (mg/L)	Proposed Limit (mg/L)
Arsenic	No Limit	0.28
Cadmium	0.17	0.10
Chromium	7.0	7.0
Copper	2.0	2.0
Cyanide	1.0	0.40
Lead	0.4	0.35
Mercury	0.001	0.03
Molybdenum	No Limit	0.35
Nickel	3.4	3.4
Selenium	No Limit	0.4
Silver	1.2	0.50
Zinc	4.2	4.2

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Current vs Proposed Limits For Other Pollutants

Pollutant	Current Limit (mg/L)	Proposed Limit (mg/L)
TTO	2.13	No Limit
Tetrachloroethylene	No Limit	0.945
Trichloroethylene	No Limit	0.026
TDS	1,500	5,000
TSS	400	3,000
Total Solids	1,900	8,000
BOD	300	3,000
COD	500	No Limit
Total Phosphorous	No Limit	5
PCBs	No Limit	<0.001
Fats, oil and grease	100	200
Oil and grease (Nonpolar)	No Limit	250
pH	6.0 – 10.0 s.u.	6.0 – 10.0 s.u.
Temperature	140 F	140 F
Ammonia	No Limit	190

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Louisville, Kentucky

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Pretreatment Prohibitions Related To Collection System Protection

Solid or viscous pollutants in amounts which will obstruct flow

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Secaucus Municipal Utilities Authority

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Baltimore, Maryland

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Rogersville, Tennessee

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How a Pretreatment Program Can Help These Issues

- Identify
- Educate and Communicate
- Permit and Regulate

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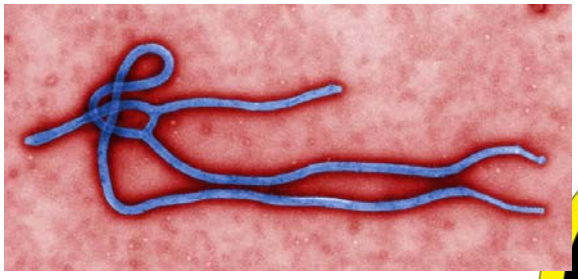
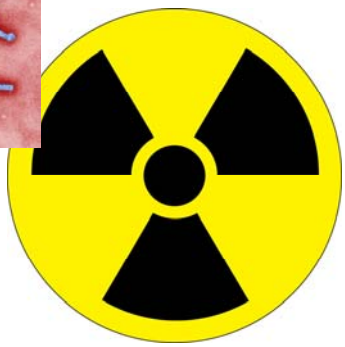
Other Collection System Issues – Worker Health and Safety





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Ebola at NIH

- Ebola patients at NIH in 2014
- NIH = Permitted as a SIU

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Lessons Learned from the Ebola Incident

Communications is KEY

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Other Collection System Issues – Capacity and SSOs

Prevention and Minimization of SSOs via a Pretreatment Program

Blockages

- Implementing a FOG Program
- Regulating problematic facilities
- Education and Outreach

Prevention and Minimization of SSOs via a Pretreatment Program

Line Breaks

- Regulating nondomestic users
- Education and Outreach

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Prevention and Minimization of SSOs via a Pretreatment Program

Stormwater Discharges

- Prohibiting stormwater to be discharge to POTW
- Reviewing plans

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Prevention and Minimization of SSOs via a Pretreatment Program

Collection System Capacity

- Reviewing Plans
- Communicating with nondomestic users
- Communicating with Collection System staff

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Conclusion…

- If your POTW has a Pretreatment Program… talk to them and open a channel of communications
- If your POTW does not have a Pretreatment Program… is it time to see if by having one might help you with your collection system issues?

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Our Next Speaker

Ed Abbasi, PE

Senior Industrial Waste Engineer

King County

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Construction Dewatering Pretreatment Program

BMP Based General Pretreatment Permit

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Construction Dewatering Pretreatment Program

BMP Based General Pretreatment Permit

LEAN Approach

(To create more **Value** for customers with fewer resources)

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What we do?

Since 1969, the Industrial Waste Program has administered regulations affecting businesses that discharge wastewater into King County's sewage system.

We work cooperatively with more than 650 Industrial users

- **We regulate** industrial wastewater discharges to the county sewer system by issuing and monitoring wastewater discharge approvals
- **We provide** technical assistance for industrial users of the county sewer system
- **We equitably recover** treatment and program costs from industrial users of the sewer system, and
- **We protect** biosolids and water quality.

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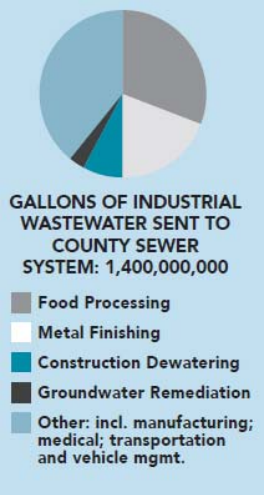
Working with many types of industries

- Metal finishing / Electroplating
- Pharmaceutical manufacturers
- Can makers
- Iron manufacturing
- Centralized waste treatment
- Food processors
- Contaminated stormwater
- Construction dewatering



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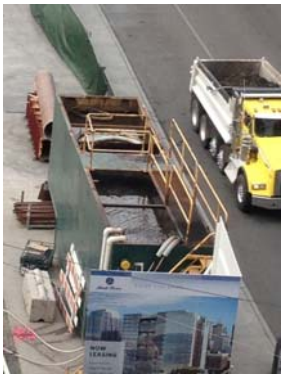
We had a problem -- too much effort for too little value

- During construction, workers pump groundwater, process wastewater and contaminated stormwater away from the site.
- Sometimes they can send this to King County sewers.
- King County was spending too much time managing permits and authorizations for this water.



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King County Wastewater Treatment Division

- 34 local sewer agencies (cities & sewer districts)
- 420 square miles
- 1.5 million people
- 3 Regional plants (West & South Plants, Brightwater)
- 2 local plants (Carnation & Vashon Island)
- 42 Pump Stations
- 389 miles of conveyance lines
- 38 Combined Sewer Overflows (CSO's) and 4 CSO treatment facilities
- Average 175 million gallons per day (MGD) treated wastewater

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King County and the local sewer agency must approve construction dewatering to the sewer

- **King County** can only **accepts** construction wastewater when sewer connections is **approved** by the local sewer authority (LSA).
- LSA **sets conditions** for:
  - ✓ **Discharge point(s)**
  - ✓ **Maximum** discharge rate (gpm)
  - ✓ **Reporting procedures** to determine sewer fees.

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King County had four types of Construction Dewatering Authorizations

- **Letter of Authorization**
  Small uncontaminated flows, **monitoring and reporting not required**, KCIW does not perform preoperative inspection
- **Minor Authorization**
  Small uncontaminated flows, **monitoring required but reporting not required**, results shall be kept on site, KCIW does perform preoperative inspection
- **Major Authorization**
  Larger flows with **some contamination**, monitoring and reporting required, KCIW does perform preoperative inspection
- **Permit**
  Larger flows with **significant amount of contaminations**, monitoring and reporting required, KCIW does perform preoperative inspection and sampling

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Problem: Lots of work for little benefit, impact, or potential risk

- **Long issuance process (1-3 months)**
- **Inconsistency and confusion over too many types of authorizations**
- **Incomplete applications**
- **Many players**
- **Other issues**

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How to Streamline?

- **Interviewed** KCIW investigators
- **Interviewed** stakeholders and customers
  - ✓ Internal agencies within King County
  - ✓ Large and small contractors
  - ✓ WS-DOT
  - ✓ Seattle-DOT
- **Reviewed** many types of active authorizations for construction activities

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Streamlining Analysis

Historically

- **About 40%** of construction projects are from sites that are:
- <1 acre
- Discharging < 25,000 gpd
- <1 year duration
- Relatively clean, no chemical contaminants

- **The other 60%** of are from sites that are:
  - >1 acre Discharge
  - Discharging > 25,000 gpd
- 1-5 years duration
- Chemical contaminants present

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The Goal of the Pretreatment Program as Described by EPA

Protect POTW and the environment from the adverse impacts that may occur when **"Hazardous or Toxic Wastes" are discharged into sewer system.**

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The Goal of the Pretreatment Program…

Prevent adverse impact to:

- ✓ Sewer System
- ✓ Water Quality
- ✓ Biosolid Quality
- ✓ Health and Safety of Workers of POTW and Sewer System
- ✓ POTW NPDES Permit Compliance
- ✓ POTW Operations

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The Goal of the Pretreatment Program….

This protection is achieved by:

Regulating nondomestic users of POTWs that discharge to POTW:

- ✓**Toxic wastes, or**
- ✓**Unusually strong conventional wastes**

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The project **MUST NOT** impact:

- ✓Sewer system
- ✓Water quality
- ✓Biosolids quality
- ✓Workers' health and safety
- ✓NPDES permit compliance, and
- ✓POTW operations

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Streamlining

Is it possible to offer a BMP based general construction pretreatment permit, that mimics the Construction Stormwater General NPDES Permit?

Answer:

<u>Yes, it is, but not without any caveats!</u>

Streamlining……

Set the basic requirements to qualify a small site for a BMP based General Permit:

- ✓The discharge <25,000 gpd
- ✓Less than <1 acre
- ✓Site must be relatively clean, and
- ✓Pre-approved BMPs as specified by KCIW present on site

BMP Based/ Presumptive Approach?

- As a **Delegated Pretreatment Program**, this approach is consistent with:
  - ✓ 40 CFR 122.44(k)(3),
  - ✓ 40 CFR 403.5(c)(4) and
  - ✓ 40 CFR 403.8(f)(1)(iii)(A)(1)

It relies on **proven BMPs** prescribed by approving authority

Presumptive Approach?

Guidelines, instruction, graphics and design basic for an appropriate treatment system

https://www.kingcounty.gov/services/environment/wastewater/industrial-waste.aspx

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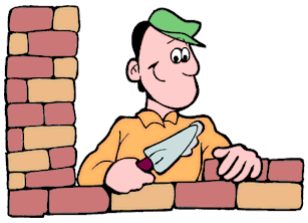
Presumptive Approach led to General Letter of Authorization (GLA)

- **Developed** a Simple and objective application for small sites
- **Developed** specific template (pre-written authorization)
- **Built a New** Webpage
- **Created** FAQs



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The Benefits…

- ✓ **Shorter** and simpler application for small projects
- ✓ **Quicker** turn-around time (a day or two)
- ✓ **Improved communication among players**
- ✓ **No reporting** requirements (monitoring data kept on site)
- ✓ **Protects** water quality and biosolids
- ✓ **Saves time & Lowers the costs**
- ✓ **Supports** the regional economy
- ✓ **Superior** customer service

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Steps to Receive a GLA

- ✓**Confirm** with LSA first
- ✓**Download** the GLA application from KCIW

https://www.kingcounty.gov/services/environment/wastewater/industrial-waste/business/construction.aspx

- ✓**Contact** LSA for discharge point(s) and other requirements.
- ✓**Submit** the GLA application to KCIW
- ✓**Receive** authorization from KCIW.

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Results……

- **Issued more than 130 since March 2016**
- **Issued within a day or two**
- **Conducted random inspections**
- **Generally good compliance**
- **Positive feedbacks from customers**

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Type of Authorizations

Before Streamlining

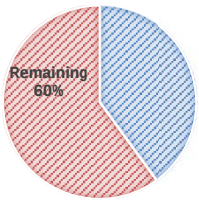
- Letter of Authorization
- Minor Authorization
- Major Authorization
- Permit

After Streamlining

- ✓ General Letter of Authorization (GLA), Site<1 Acre,
- Discharge Authorization Site>1 Acre, Discharges>25,000 gpd
- Permit

Streamlining the other 60%

Is streamlining and general permit for the other 60% possible?



That is when:

- Site is > 1 Acre,
- Discharges > 25,000 gpd,
- Is mildly to highly contaminated

Answer: Streamlining is likely, but general permitting approach unlikely **due to many unknowns**.

Streamlining the other 60%

Points to Consider:

- Maximum flow from the site

  Could it be significant?

- POTW design criteria and what is considered hydraulically **Significant** at each POTW?
- Level of contamination present
- Extent of soil disturbance,
- Many more…….

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Significant Industrial User

Is this a SIU?

Any **NCIU** that discharges **an average of 25,000 gpd** or more of **process wastewater** to the POTW; contributes a process waste stream that makes **up 5% or more** of the POTW ADWF, hydraulic or organic capacity of the POTW; or is designated as such by the POTW on the basis that the IU has a reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement [in accordance with 40 CFR 403.8(f)(6)].

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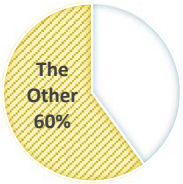
POTW Design Flow

West Points, Renton Sewage Treatment Plant	Renton Sewage Treatment Plant	Brightwater Treatment Plant
AWWF = 133 mgd ADWF = 110 mgd MMAF=215 mgd Instantaneous maximum = 440 mgd	AWWF = 115 mgd ADWF = 96 mgd MMAF = 144 mgd Instantaneous maximum = 325 mgd	AWWF = 30 mgd ADWF = 25.2 mgd MMAF = 41 mgd Instantaneous maximum = 100 mgd
Significant > 0.25 mgd (<0.23% of ADWF)	**Significant > 0.20 mgd (<0.21% of ADWF)**	**Significant > 0.05 mgd (<0.20% of ADWF)**

Pollutants of Concern?

Level of Contamination Present

- **General Pollutants**: Settleable Solids, pH, Oil & Grease, and Sulfides
- **Site Specific Pollutants**: Organic Compounds
  - ✓ Dry cleaning based
  - ✓ Petroleum based
  - ✓ Other compounds



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Ranking Criteria

- ✓**Duration** of Discharge
- ✓**Simultaneous** Point of Discharge
- ✓**Presence** of chemical contaminants,
- ✓**Presence** of PCB
- ✓**Maximum** daily discharge volume gpd
- ✓**Presence** of Combined Sewer System

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Construction Dewatering DA / Permit Ranking Criteria

Criteria for Construction Dewatering Discharge Authorization (DA) or Permit			Points
1. Duration of discharge (months)			
Less than 24 months			**0**
Longer than 24 months			**1**
2. Simultaneous Points of Discharge			
1 Discharge point			**0**
2 Discharge Points			**1**
More than 2 discharge points			**2**
3. Maximum daily discharge volume (gallons per day)			
West Point	South Plant	Brightwater	
Less than 250,000 gpd	Less than 200,000 gpd	Less than 50,000 gpd	**0**
More than 250,000 gpd	More than 200,000 gpd	More than 50,000 gpd	**1**
4. Combined Sewer			
No			**0**
Yes (West Point only)			**1**
5. Wastewater Quality/Pretreatment system			
No known contamination – gravity solids separation only			**0**
Presence of low level soil/groundwater contamination or process wastewater			**1**
Presence of soil/groundwater contamination and/or process wastewater that will require the installation of additional treatment units – these approvals typically do not require review by the KCIW Engineer			**2**
Presence of soil/groundwater contamination such as PCB and organics contaminants and/or waste streams that will require installation of more complex treatment systems and consultation with KCIW Engineer to review the proposed treatment system and/or development of specific discharge limits			**3**
Total Points:			
Discharge approval type			
Discharge Authorization	☐ **Less than 5 points**		
Waste Discharge Permit	☐ **Equal or greater than 5 points**		

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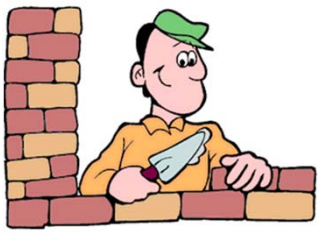
Forms updated



- **New** individual application
- **New** inspection form
- **New** template with,
  - ✓**Consistent** Language
  - ✓**Pre-defined** sampling and monitoring frequency, and reporting requirements
  - ✓**Pre-defined** limits and screening level criteria

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Predefined Sampling Frequency Criteria for Metals

Parameter	*Daily Average (mg / L)*	*Instantaneous Maximum (mg / L)*	*West Point /South Plant*			*Brightwater*		
			<100,000 gpd	**100,000 - 250,000 gpd**	**>250,000 gpd**	**< 25,000 gpd**	**>25,000 <50,000 gpd**	**>50,000 gpd**
Heavy Metals	LL	LL	1/Quarter	1/Month	Case by Case	1/Quarter	1/Month	Case by Case

Predefined Sampling Frequency for Organic Compounds

Organic Compounds Identified as Present	**Screening Level Criteria (µg/L)**	*West Point / South Plant*			**Brightwater**		
		< 100,000 gpd	**100,000-250,000 gpd**	**>250,000 gpd**	**< 25,000 gpd**	**25,000 - 50,000 gpd**	**>50,000 gpd**
Organic Compounds	KC limits for Organics	1/Quarter	1/Month	Case by Case	1/Quarter	1/Month	Case by Case

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Expected Outcome

- ✓ **Greater Standardization & Consistency**
- ✓ **Quicker Turnaround**
- ✓ **Superior Customer Service**
  - **GLA** (in a day or two) **already proven .**
  - **DA** (in weeks - to be launched in mid 2018)
  - **Permit** (improved quality and faster issuance)
- ✓ **Fewer authorization types**

Quicker Turnaround Time → Time Saving for KC

→ Customers' Savings

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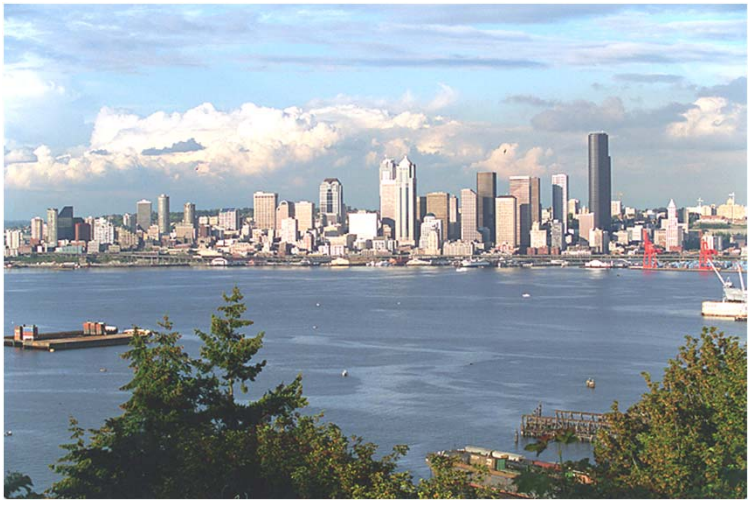
Thank You. Any Questions?



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Questions?

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