“More Than Just Dirty”

Pathogen Exposures to Workers in the On-Site Industry

Purpose of the Grant and Outcomes

To study pathogen exposures to workers in the On-Site Industry

Numerous studies have been done on wastewater workers in “Treatment Plant” situations but never in the field work that we do.

An extensive literature review was completed in the first phase

Field observations and workplace sampling were conducted in the next phase

Purpose of the Grant and Outcomes

QUANTIFY THE ACTUAL EXPOSURES TO WORKERS ON THE OSS INDUSTRY.

IDENTIFY CURRENT RISK MITIGATION WITH COMMONLY USED TOOLS AND PPE (PERSONAL PROTECTIVE EQUIPMENT).

RAISE AWARENESS TO THE EXPOSURES THROUGH EDUCATION AND TRAINING

PROVIDE USEFUL TOOLS AND RECOMMENDATIONS TO IDENTIFY AND MANAGE PATHOGEN EXPOSURES IN THE WORKPLACE.

Sampling was done on:

- Offices, Shops, Storage areas, Equipment, Clothing, Cell phones, Smokers, Chew, Truck Cabs and more.
- Pumping, jetting, system repairs
- Wastewater in tanks
- Sewer lines
- Drainfield components

Laboratory Testing

- Fluid testing.
- Contact surface / swab testing.
- Aerosol / vapor testing
- Controls
- Testing laboratories:
  - Laboratories NW (MultiCare)
  - Water Management Lab
  - WSU Food Safety Lab

Fluid Testing

Contact Surface Testing

Aerosol Testing

What we found….

ALMOST EVERYTHING IS CONTAMINATED!

We also know that …

You are NOT SURPRISED!

Up until now … You know that it’s DIRTY!

Today, you will learn how it’s UNHEALTHY!

Laboratory Results

- Mixed Bacterial flora
- Bacillus
- Gram negative Rods
- Gram positive Cocci
- Aeronmonas Hydrophila
- Aeromona Caviae
- Streptococcus
- Fungus
- Yeasts
- Enteric type gram negative rods
- Staphylococcus, Coagulase Negative
- Gram positive Coryneform rods
- Aeromonas Sobria
- Escherichia Coli O157:H7
- Fecal Flora
- Spore forming gram positive rods
- Propionibacterium gram positive rods
- MRSA
- Diptheroieds
- Molds and Rare Molds

How Do We Compare to Other Work Settings

Where we Work……

- Residential systems
- Commercial/Schools
- Community systems
- Sewer jobs
- Digesters

What are you working in?

You JUST Don’t KNOW!!! BUT……

Public beaches are closed when E.Coli levels hit

> 126 /100 ml

Raw Sewage in our field sample studies were commonly

> 160,000 /100 ml

What should you do First?

If you're the <u>owner</u> of the business...

- Create a simple outline of your Accident Prevention Plan (APP)
- Use the KISS method when approaching this task…
- Involve your workers in workplace safety and health awareness and identification.
- Give new employees job safety orientation and provide the personal protective equipment they need.

The WOSSA W.A.C.

If you're the employee of the business….

Willingness …

To take personal responsibility for your safety, your family and the homeowner!

Awareness … To pay attention to the tasks at hand!

Common Sense …

If you figure it out ahead of time, its usually pretty easy to do it without increasing your exposure or getting sick!

Workplace Accidents and Illness’

- Your APP plan identifies them to the workplace
- Include them in your safety orientation with new employees
- Use them in your safety meetings:
  - Tailgate, Weeklies, Managers

Why Do Accidents/Illness' Happen?

1. Rushing

Not replacing compromised PPE

Eating on the go…

2. Eyes not on Path

Slips, trips and falls

Doing too many things at once

3. Eyes not on Task

Impact injuries in a contaminated environment

Pay attention to the task at hand

4. Line of Fire

Exposure to sewage by "splash back"

Less obvious is line of fire by "aerosols"

Why Do Accidents/ Illness' Happen?

How Does Illness OTJ Happen?

1. Unaware of exposures

Not replacing compromised PPE

Eating on the go…

2. Positive reinforcement for negative behaviors

3. Line of Fire

Exposure to sewage by “splash back”

Less obvious is line of fire by “aerosols”

Describe in your company “Culture” in two words……

- Needs improvement
- Pretty good
- Totally Comprehensive

If Safety “Management” is the Warehouse, Then “Safety Programs” are the Delivery Trucks.

- Programs are used to focus workers attention on specific issues…
  - Establishing the company “safety culture”
  - Team building / Training
  - Focus safety issue

How Does Safety Happen?

- **Administrative Controls:** Policy, Management Programs, Training, Vaccines
  - PS:…….Make sure you put these in writing!
- **Elimination/Substitution:** How can I do the work differently and still get it done?
- **Engineering Controls:** Equipment design, Operational Procedures

Making it part of your Culture

Compliance to use of appropriate PPE by task (pumping, jetting, cleaning, repairs) was an issue from field observations in this study.

- PPE used appropriately 100% the time – Never
- Compliance varied by job task…generally the more complicated or longer the job became, appropriate use of PPE declined and exposure increased.

What does this mean for you?

Personal Protective Equipment (PPE)

- What do I need?
- Is it Available?
- Is it user Friendly? (all work tasks)
- Is it “Fit for Use”?

When needed, will I use it 100% of the time?

PPE for sewage exposure refers to a variety of different types of barriers used alone or in combination depending on the task.

Barrier protection

Working “Clean to Dirty” techniques

Clean up steps afterwards

What is the appropriate level of PPE?

What are the Pathogen Exposures?

What are the Pathogen exposures?

Are they really different from what your exposed to everyday at home, with kids, pets….

Short answer:
Yes…….No…….Maybe

You just don’t know what pathogens will present from one job to the next.

It Won’t Happen to Me!

- TAMPA (CBSMiami) -

- Two Tampa Bay Buccaneers players are being treated for methicillin-resistant staphylococcus aureus (MRSA) infections and neither the team nor the players know where they contracted the disease.

It Won't Happen to Me!

- MRSA

- **Methicillin resistant** ***Staphylococcus aureus*** (**MRSA**) is a bacterium responsible for several difficult-to-treat infections in people

LABORATORIES Northwest
Tacoma, WA 98415

NAME: **BUCKLEY SER,AADVANCED**
MR#: WOSSA-8221302 AGE: 6D 08/22/2013 Reprinted Report
PHONE#: SEX: U LOC: WOSSA

---------- FLDS, WOUNDS, MISC SPECIMENS ----------

08/22/13 MRSA Culture Screen
Coll Time ACC. NO.: H70791 Final 08/23/2013
\+ 1145 Specimen Description: Fluid
Special Requests: sewage study

Culture Results: 1. MRSA isolated
2. MultiCare Infection Control notified

08/22/13 Enterovirus Culture
Coll Time ACC. NO.: H70792 Final 08/26/2013
\+ 1145 Specimen Description: Fluid
Special Requests: sewage study

Culture Results: 1. No Enterovirus including: Coxsackie A & B, Echovirus, Poliovirus or Enterovirus isolated in cell culture.

08/22/13 Giardia/Cryptospor
Coll Time ACC. NO.: H70793 Final 08/22/2013
\+ 1145 Specimen Description: Fluid
Special Requests: sewage study

Direct Ag Test: 1. Negative for Cryptosporidium and Giardia lamblia antigens by EIA

MRSA Infection in the Eye

It Won’t Happen to Me!

- MRSA

- **Methicillin resistant** ***Staphylococcus aureus*** (**MRSA**) is a bacterium responsible for several difficult-to-treat infections in people

It Won’t Happen to Me!

Exposure Vectors?

- Direct (examples?)
- Indirect (examples?)

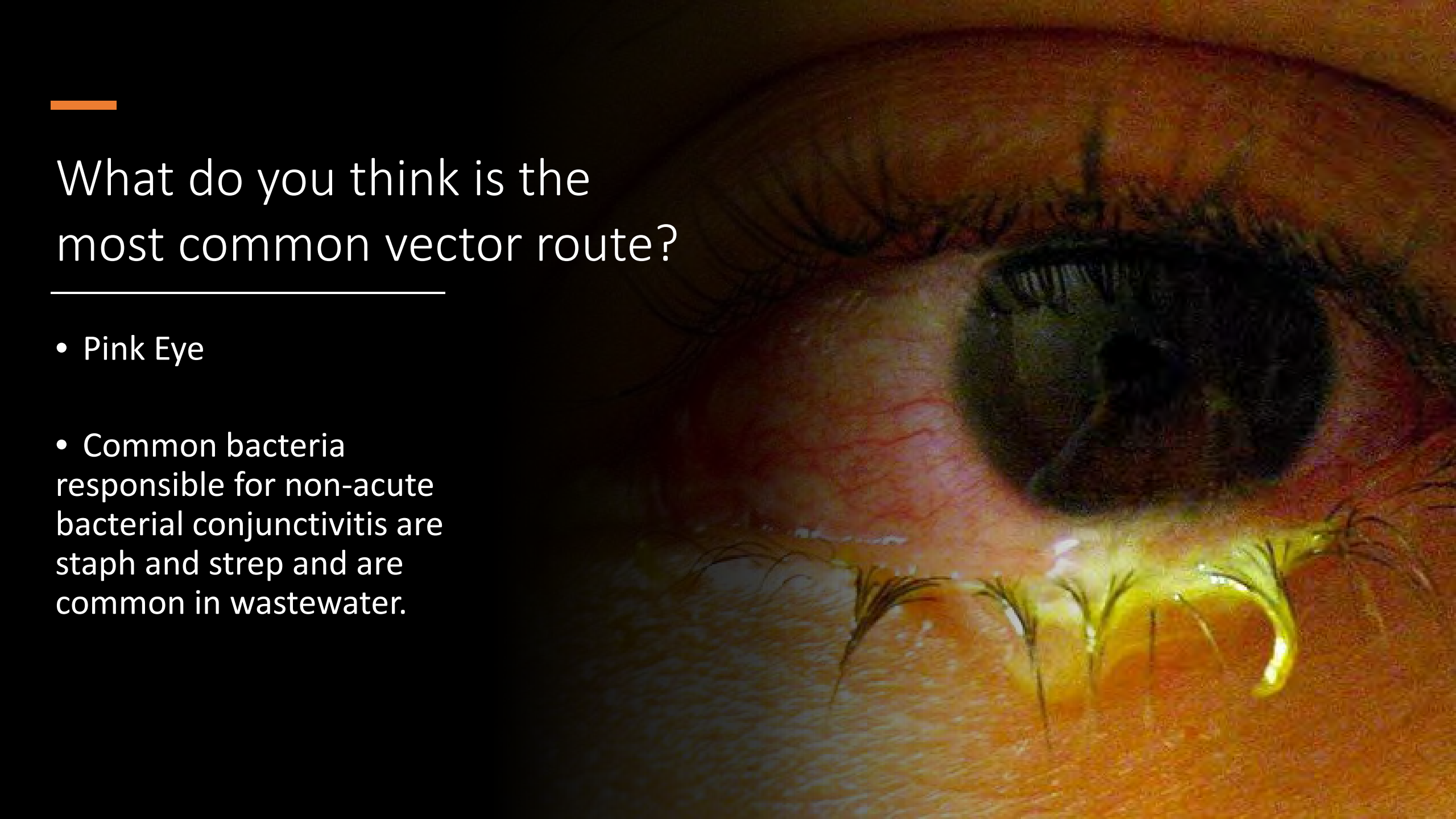
PPE Choices

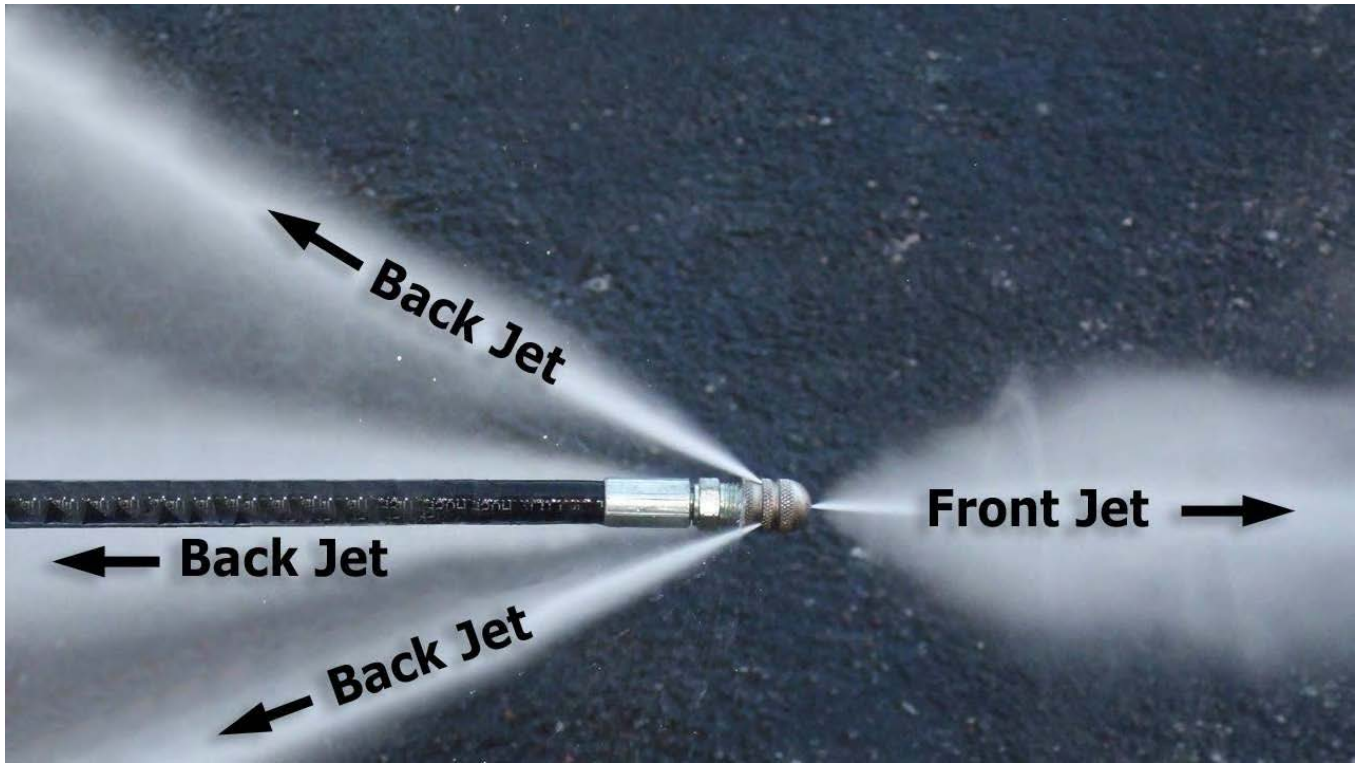
- Sunglasses ?
- Splash shield?
- Goggles?
- N-95 mask?
- Exam Grade Nitrile Gloves
- Double gloves?
- Anti-Bacterial lotion

What do you think is the most common vector route?

- Pink Eye

- Common bacteria responsible for non-acute bacterial conjunctivitis are staph and strep and are common in wastewater.





Most likely cause….

- Splash back
- Aerosols
- Hand to face
- Sweating into eyes

Sty — also called a hordeolum appears as a red, sore lump near the edge of the eyelid.

- It is usually caused by a bacterial infection.

- A sty will develop at the base of an eyelash if the eyelash follicle (root) is infected.

Exposure Vectors?
Direct (examples?)
Indirect (examples?)

PPE Choices

- Sunglasses ?
- Safety glasses with side shields?
- Splash shield?
- Goggles?

Microbiology of Sewage

Bacteria

- Extremely common in sewage
- Found naturally in human intestinal tract, sewage, soil, lakes, streams & ponds
- Three groups: aerobic, anaerobic, facultative
- Responsible for much of treatment of sewage
- Some are pathogenic – indicator organisms

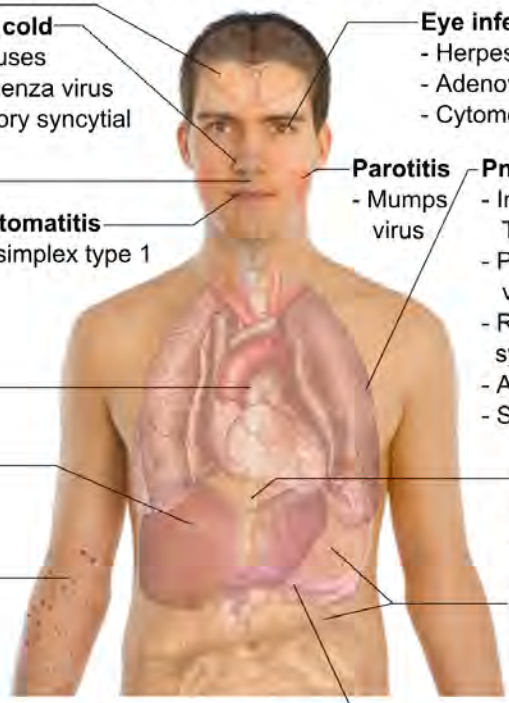
Microbiology of Sewage

Virus

- Extremely small infective agents – electron microscope is needed to see them.
- Depend on living host cell to supply needs
- More than 100 types found in sewage
- Must be removed or may cause illness

Overview of

Viral infections



Encephalitis/ meningitis
- JC virus
- Measles
- LCM virus
- Arbovirus
- Rabies

Common cold
- Rhinoviruses
- Parainfluenza virus
- Respiratory syncytial virus

Eye infections
- Herpes simplex virus
- Adenovirus
- Cytomegalovirus

Parotitis
- Mumps virus

Pneumonia
- Influenza virus, Types A and B
- Parainfluenza virus
- Respiratory syncytial virus
- Adenovirus
- SARS coronavirus

Pharyngitis
- Adenovirus
- Epstein-Barr virus
- Cytomegalovirus

Gingivostomatitis
- Herpes simplex type 1

Cardiovascular
- Coxsackie B virus

Hepatitis
- Hepatitis virus types A, B, C, D, E

Myelitis
- Poliovirus
- HTLV-I

Skin infections
- Varicella zoster virus
- Human herpesvirus 6
- Smallpox
- Molluscum contagiosum
- Human papillomavirus
- Parvovirus B19
- Rubella
- Measles
- Coxsackie A virus

Gastroenteritis
- Adenovirus
- Rotavirus
- Norovirus
- Astrovirus
- Coronavirus

Sexually transmitted diseases
- Herpes simplex type 2
- Human papillomavirus
- HIV

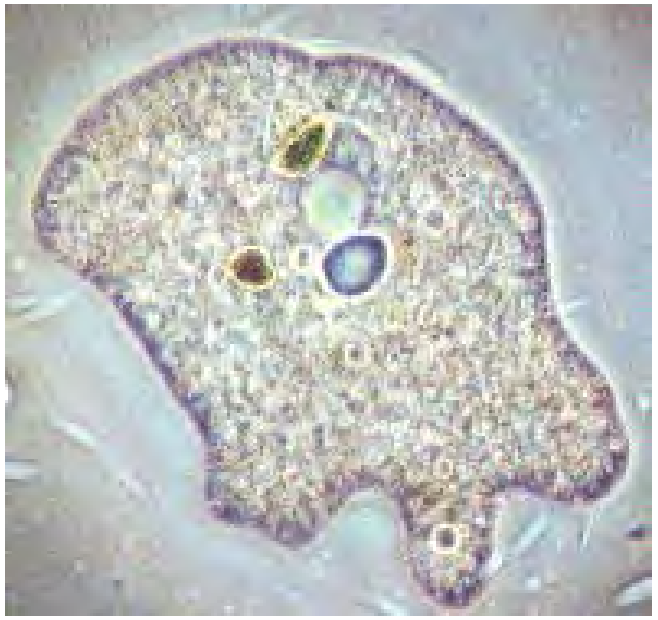
Pancreatitis
- Coxsackie B virus

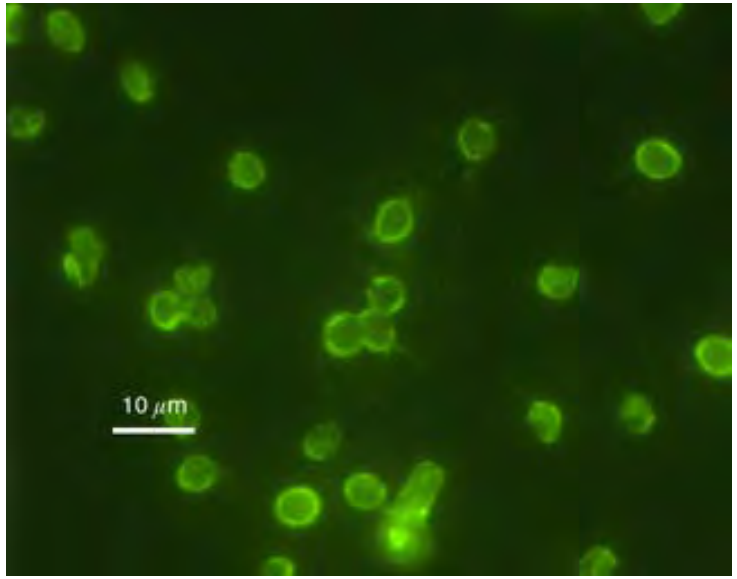
Microbiology of Sewage

Protozoans

- About 50 times bigger than a bacterium, single cell
- Organisms should not survive passage through system, problem with cysts and eggs.
- More than 100 types found in sewage
- Must be removed or may cause illness

Protozoans





Other Organisms

- Worms
- Rotifers & other micro-organisms
- Other macro-organisms

Not so “Invisible Hazards”

Exposure risks you recognize in the field?

Objective Hazards: What are they?

Pumping

Dumping

Jetting

OSS Component Repair/ Maintenance

Personal Actions (smoking, chew, eating)

Others? (External conditions – weather: heat/cold)

Not so “Invisible Hazards”

Most Common Exposures - In the Field

Objective Hazards (Hazard)

Direct Contact

Aerosols

Splash back

Inhalation

Immersion

Secondary (smoking, chew, sweating, clothing)

How Do I Protect Myself?

Determining what Personal Protective Equipment is “Fit for Use”

Consideration of PPE includes understanding why we use it in the first place…..

- **PPE Means:**

- "Specialized clothing or equipment worn by an employee for protection against infectious materials" (OSHA)

Consideration of PPE includes understanding why we use it in the first place…..and is it “Fit for Use”

- Uniforms – protect skin and/or clothing
- Gloves – protect hands
- Masks– protect mouth/nose
- Respirators – protect respiratory tract from airborne infectious agents
- Goggles – protect your eye

Exposure: Contact/Immersion/Barrier Protection

Glove Grades

Surgical Gloves: Good

As the name suggests, surgical gloves are designed primarily for use in healthcare procedures posing the highest risk for the spread of blood borne pathogens

Exposure: Contact/Immersion/Barrier Protection

Glove Grades

Examination / Medical Gloves (min. 4-6ml):

Better

Examination grade gloves, also sometimes referred to as medical gloves, were originally designed for non-surgical medical procedures, but are also used in a variety of other applications. Exam gloves are sold both sterile and non-sterile.

Exposure: Contact/Immersion/Barrier Protection

Glove Grades

Food Service Gloves: Minimal to Poor

Food Service gloves, often referred to as multipurpose gloves, are designed for short-term use and frequent glove changes. No government regulations or inspection program exists for food service gloves.

Instead, the USDA requires that all glove components comply with the provisions of the FDA and Cosmetic Act.

Exposure: Contact/Immersion/Barrier Protection

Glove Grades

Mechanics/Industrial Gloves: Poor

Offering greater protection than nothing, nitrile gloves provide resistance to most finishes, solvents, and chemicals. Nitrile material is also *resistant* to punctures, cuts, and snags. Gloves are pre-powdered and contain no natural rubber latex. **Common in our industry but unsuitable for the exposures that we face in Sewage.**

Mechanics/Industrial Gloves: Poor

Mechanics/Industrial Gloves: Poor

Exposure: Contact/Immersion/Barrier Protection

Glove Grades

Double Exam / Medical Gloves: Best

Offering greatest protection used along with, over gloves to provide barrier protection. Nitril material is also *resistant* to punctures, cuts, and snags more so than latex and provides better durability for many tasks.

Eye Protection

Exposure: Splash, Suspended Aerosol's

- Eye protection chosen for specific works depends on the task, potential exposure and personal vision needs
- **Personal eyeglasses and/or contact lenses are not considered adequate eye protection**

Exposure: Splash, Suspended Aerosol's

Good - but task specific

Better - all around choice


DRAIN
CLEANING
ERICKSON
CAUTION
NO TANK ENTRY
WARNING
B43531

Inhalation Protection

Exposure: Splash, Suspended Aerosol's

Surgical Mask:

- known as a **procedure mask**, is intended to be worn by health care professionals during surgery and at other times to catch the bacteria shed in liquid droplets and aerosols from the wearer's mouth and nose…

Inhalation Protection

Exposure: Splash, Suspended Aerosol's

N-95 Mask: **Best**

- It provides the greatest protection from airborne particles to the face for our work tasks.

Working in the Field

"Best Practice" minimizing potential pathogen exposures in the field

Best Practice - Personal Behaviors

Best Practice - Personal Behaviors

Best Practice - Personal Behaviors

Best Practice - Personal Behaviors

Why does accident / illnesses Happen:

1. Rushing
2. Eyes Not On Path
3. Eyes Not On Task
4. Line Of Fire

Best Practice - Personal Behaviors

Best Practice

Exposure:
Splash
Aerosol's
Line of Fire

PPE Used:
Waterproof Boots

Additional PPE:
Double Gloves
Safety Glasses
N-95 Mask
Coveralls

Best Practice

Exposure:
Splash
Aerosol's
Line of Fire

PPE Used:
Double Gloves
Waterproof Boots

Additional PPE:
Safety Glasses
N-95 Mask
Coveralls

Best Practice

Exposure:
Splash
Aerosol's
Line of Fire

PPE Used:
Double Gloves
Waterproof Boots
Glasses*
Coveralls

Additional PPE:
N-95 Mask

Best Practice – Aerosol

Best Practice – Aerosol

LABORATORIES Northwest
Tacoma, WA 98415

NAME: HERITAGE BANK,COMMERCIAL
MR#: WOSSA-808132 AGE: 48Y 01/01/1965 Interim Report
SEX: M LOC: WOSSA

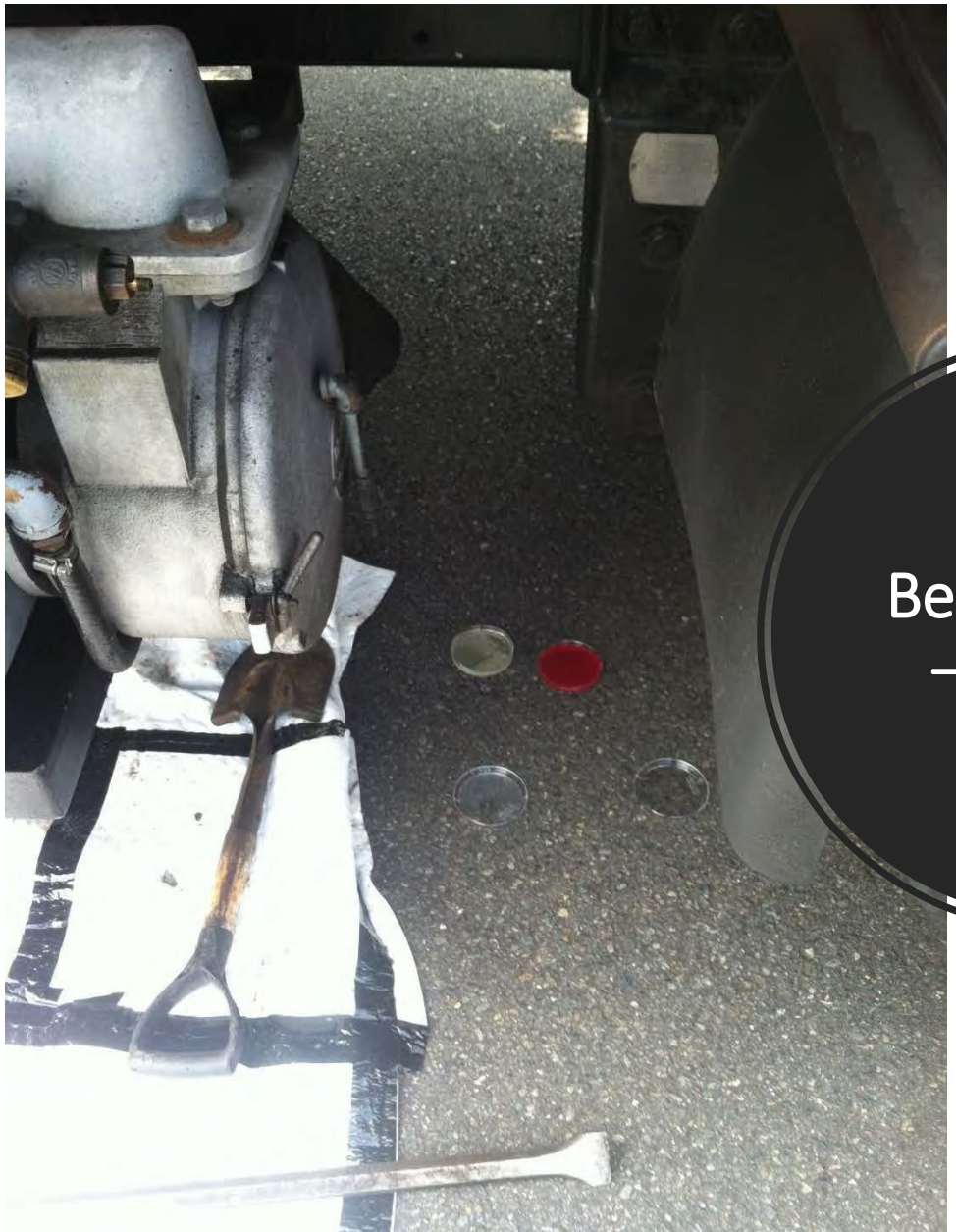
H56631 COLL: 08/08/2013 15:00 REC: 08/08/2013 18:28 PHYS: Miscellaneous MD

Culture/Gram Stain
SETUP: 08/08/2013 2056

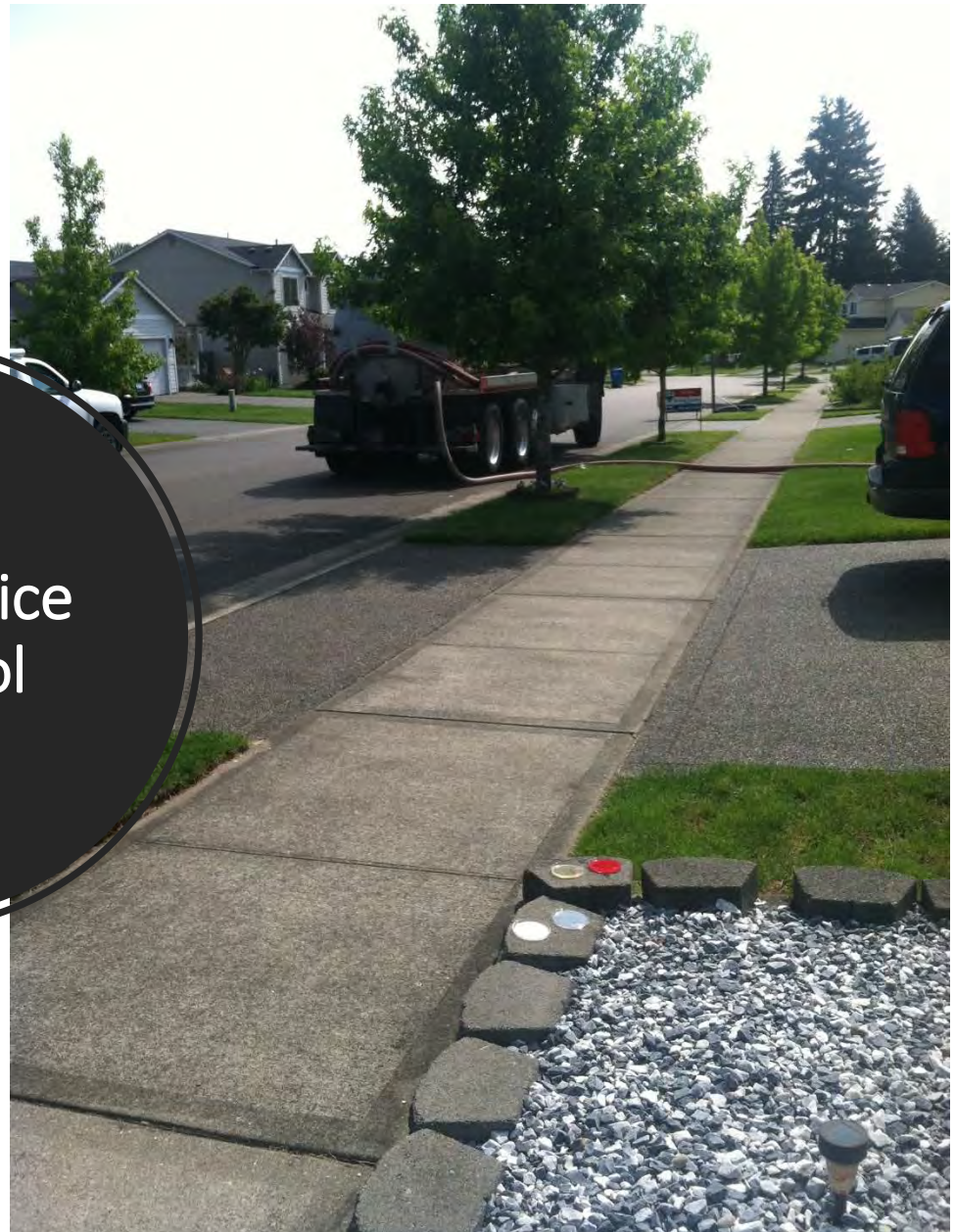
Specimen Description	Fluid
Special Requests	sewage study, fx 253.770.0896. r/o MRSA.
Culture Results	Many mixed organisms including few mixed types of coliforms, mixed coagulase negative staph, diptheroids, Bacillus species, and rare mold.
Report Status	Final 08/12/2013

Best Practice – Aerosol

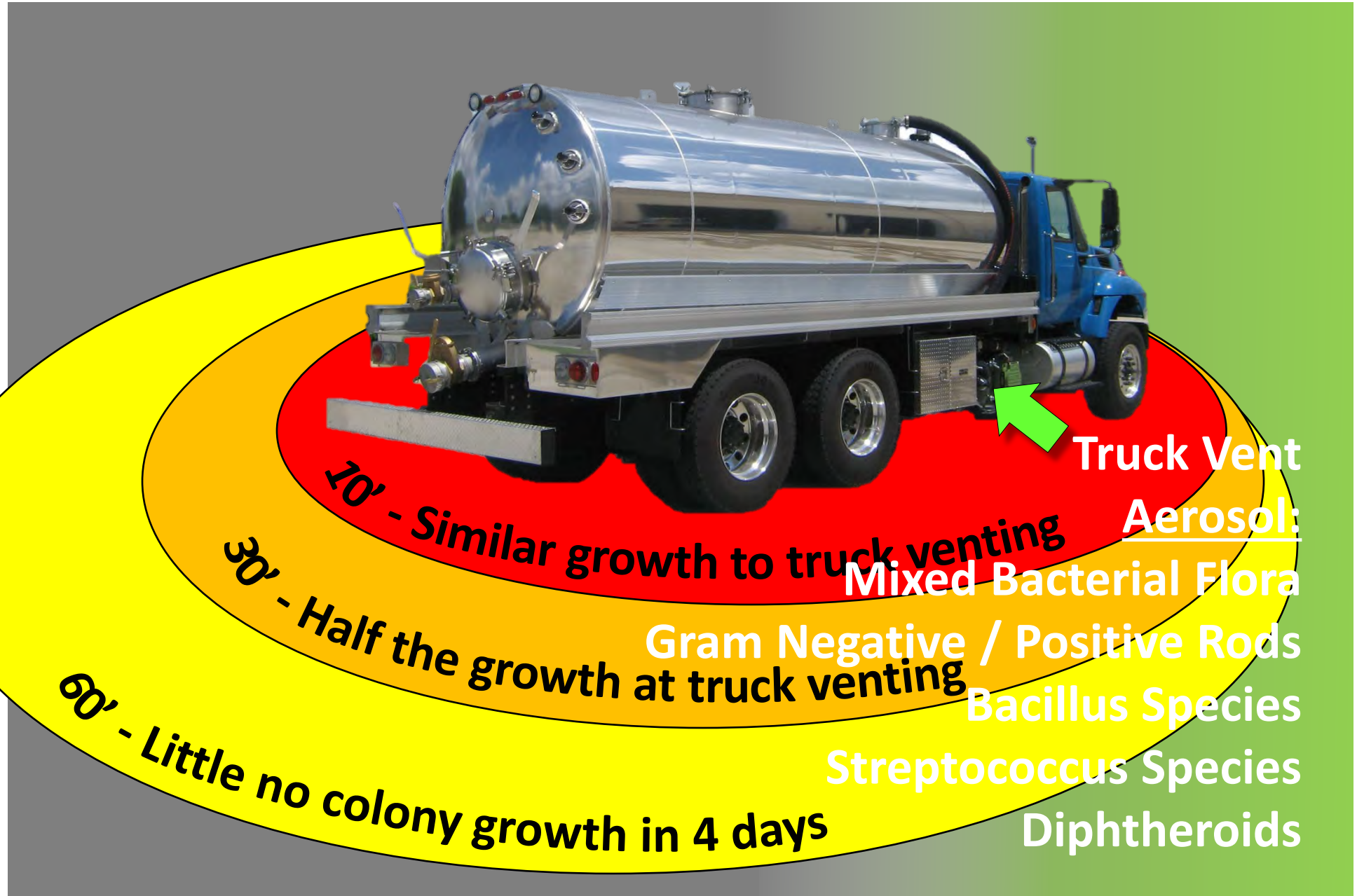
Best Practice – Aerosol



Best Practice
– Aerosol



Best Practice – Aerosol



Best Practice – Aerosol

Best Practice – Aerosol

Exposure:

Splash

Aerosol's

Line of Fire

Lab Results:

Enteric Gram Negative Rods

Gram Positive Cocobacillus

Fungus

Gram Positive Rods

Bacillus

Best Practice – Aerosol

Exposure:

Splash

Aerosol's

Line of Fire

Lab Results:

> 100 Colony Forming Units

Mixed Bacterial Flora

Bacillus

Streptococcus

Gram Negative Rods

Best Practice – Direct Contact

Best Practice – Direct Contact

Best Practice – Direct Contact

---------- FLDS, WOUNDS, MISC SPECIMENS ----------

08/16/13 Culture/Gram Stain
Coll Time ACC. NO.: F36544 Final 08/18/2013
0100 Specimen Description: Fluid
Special Requests: SEWAGE STUDY FX 253 297 0896 OR 253 770 0896

Culture Results:
1. Bacillus species, 3 colony types.
2. Gram negative rods , 2 colony types

Best Practice – Direct Contact

Best Practice – Direct Contact

LABORATORIES Northwest
Tacoma, WA 98415

NAME: **WOODINVILLE,DF REPAIR**
MR#: WOSSA-816135 AGE: 48Y 01/01/1965 Final Report
PHONE#: SEX: M LOC: WOSSA

---------- FLDS, WOUNDS, MISC SPECIMENS ----------

08/16/13 Culture/Gram Stain
Coll Time ACC. NO.: F36525 Final 08/18/2013
R1800 Specimen Description: Fluid
Special Requests: SEWAGE STUDY FX 253 770 0896

Culture Results:
1. Bacillus species
2. 3 colony types.

Best Practice

Lab Test Results:

At Tank - 100 Colony Forming Units Mixed Flora, Bacillus, Gram Negative Rods

At Truck Vent – 10 Colony Forming Units

At 60’ - No Growth In 4 days

Best Practice

Exposure:

Splash

Aerosol's

Line of Fire

PPE Used:

Double Gloves

Waterproof Boots

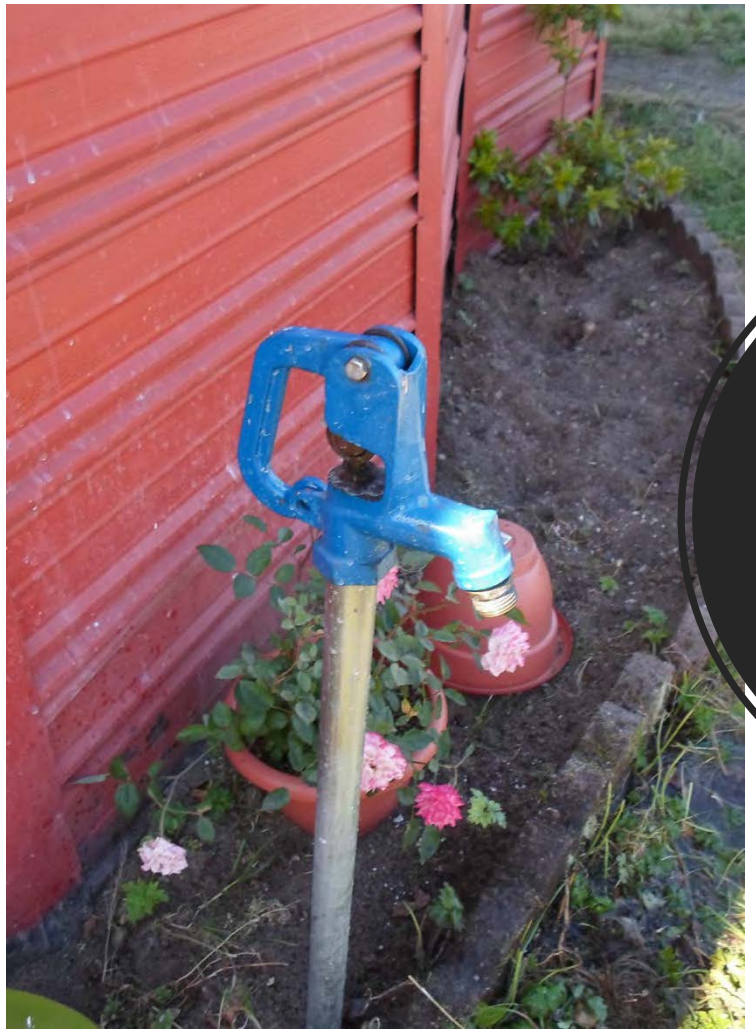
Glasses

N-95 Mask

Additional PPE:

Coveralls

Best Practice – Protecting the Public



Best Practice – Protecting the Public

Best Practice – Protecting the Public

Best Practice – Protecting the Public

Summary

Pathogen Exposures to Workers
in The OSS Industry

Basic Hygiene Practices for On-Site Workers

Best Practice – Protecting Yourself

Basic Hygiene Practices for On-Site Workers

- Wash hands with soap and water immediately after handling human waste or sewage.
- Avoid touching face, mouth, eyes, nose, or open sores and cuts while handling human waste or sewage.
- After handling human waste or sewage, wash your hands with soap and water *before* eating or drinking.
- Before eating, remove soiled work clothes and eat away from human waste and sewage-handling activities.
- Do **not** smoke or chew tobacco or gum while handling human waste or sewage.
- Carry at least a gallon of fresh water in the truck for emergency eye wash.

Basic Hygiene Practices for On-Site Workers

- Keep open sores, cuts, and wounds covered with clean, dry bandages.
- Gently flush eyes with safe water if human waste or sewage contacts eyes.
- Use Exam/Medical gloves to prevent cuts and contact with human waste or sewage.
- Wear rubber boots at the worksite and during transport of human waste or sewage.
- Remove rubber boots and work clothes before leaving worksite.
- Clean contaminated work clothing daily with 0.05% chlorine solution (1 part household bleach to 100 parts water).

How to Immediately Reduce Your Exposure

Stop	1.) Stop touching your face!
Double up	2.) Double up on your gloves = Exam grade Nitril w/ Outer Glove
Wear	3.) Wear proper eye protection to protect from Splashback and Aerosols
Use	4.) Use N-95 rated mask for tasks that create Aerosols
Wash	5.) Wash with disinfectant % of alcohol is at least 67% or higher

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This concludes the education portion of this session.