



Cross-Connection Control for Wastewater Treatment Plants

PNWS-AWWA Conference

April 26, 2018

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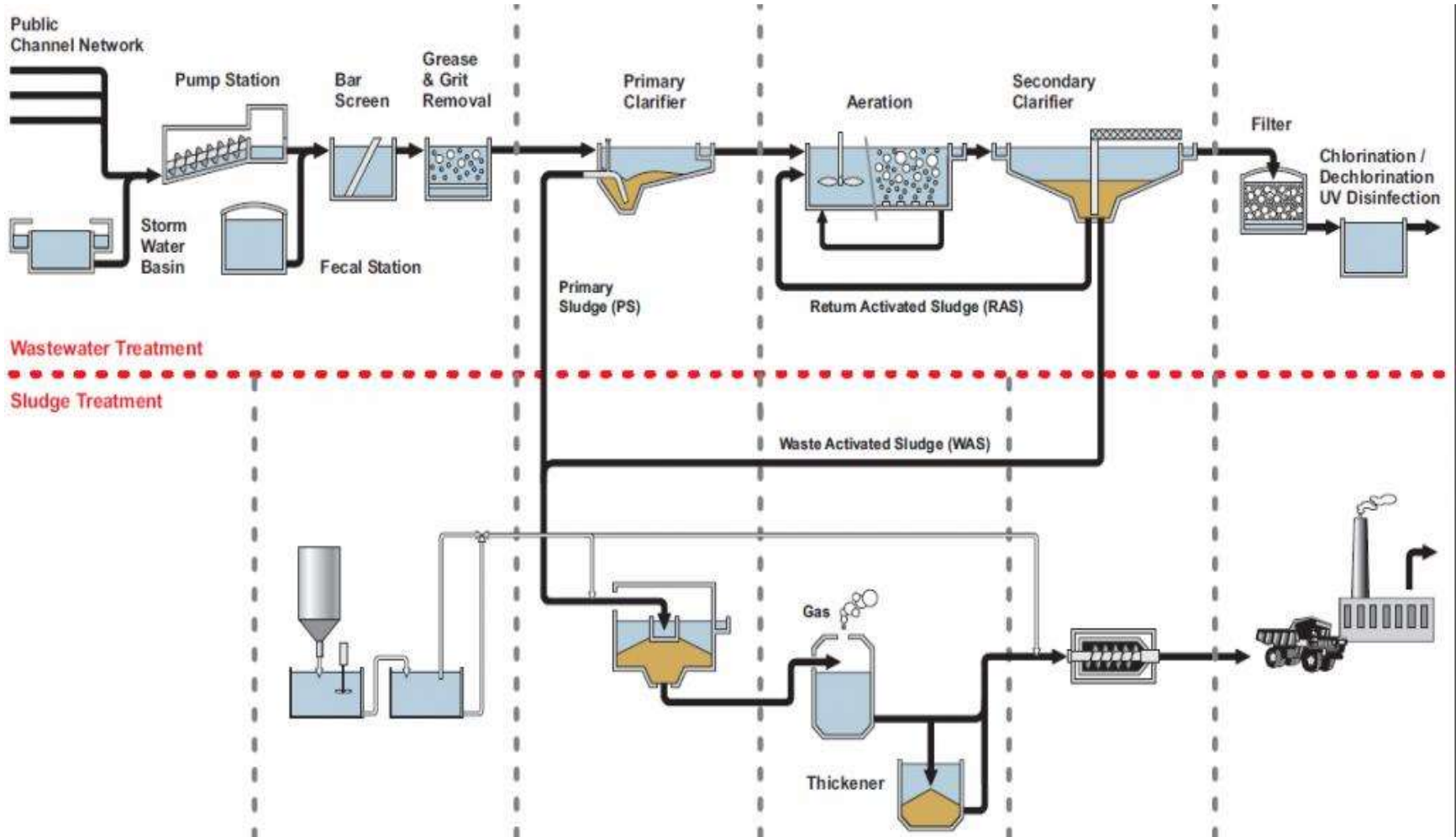


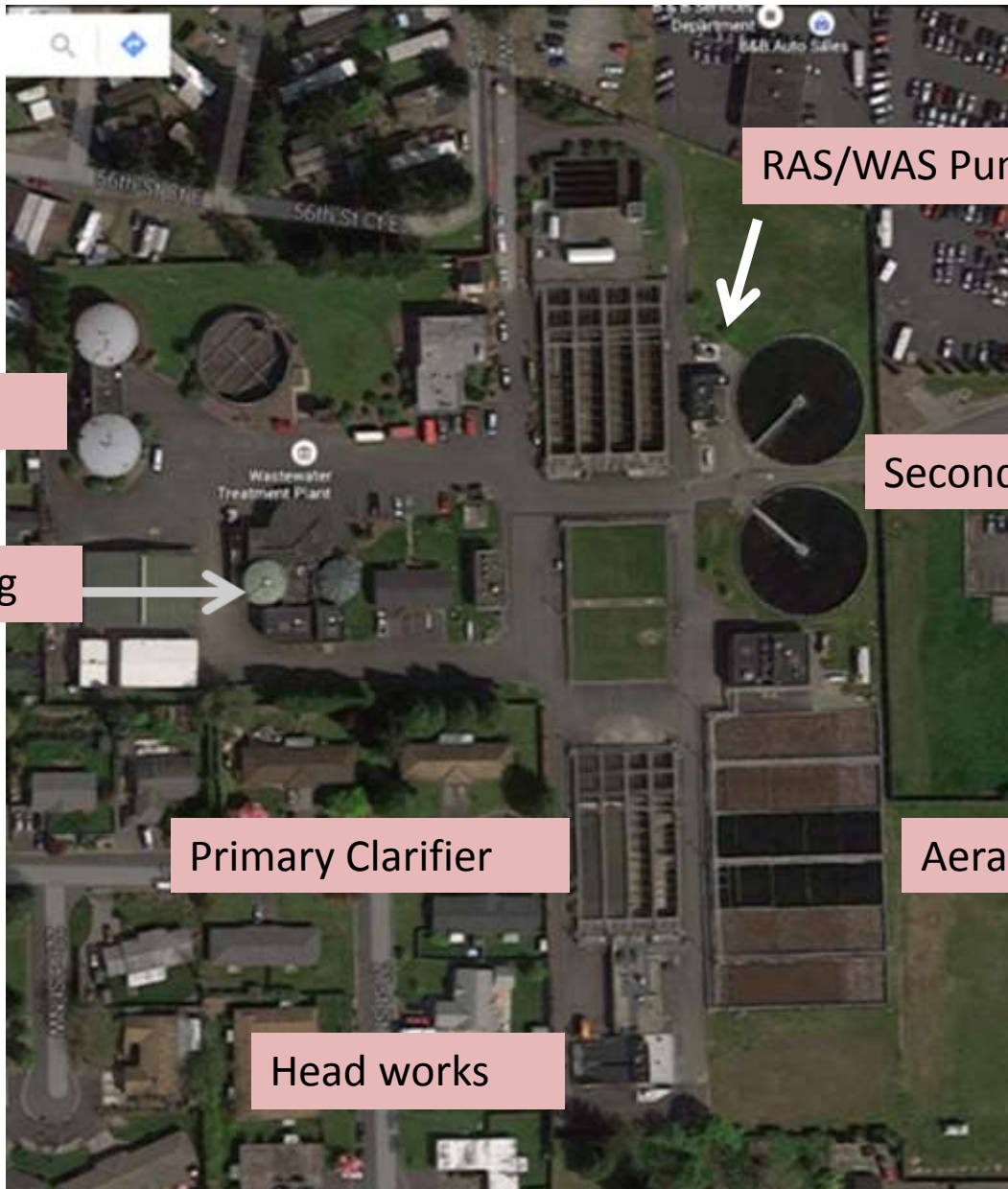
Office of Drinking Water Mission

We work with others to protect the health of the people of Washington State by ensuring safe and reliable drinking water.



Wastewater Plant Schematic





RAS/WAS Pumps

Digesters

Secondary Clarifier

Solids Handling

Primary Clarifier

Aeration Basin

Head works



Backflow at a Wastewater Treatment Plant

- In December 1983, effluent from a wastewater treatment plant in San Antonio, Texas, backflowed into the plant's potable water system as a result of maintenance activities. Eight employees reportedly suffered gastrointestinal problems.
- Fortunately, a reduced-pressure principle backflow-prevention assembly (RPBA) was in place at the water service connection to the plant. This assembly contained contamination within the plant site.

CCC at Sewage Facilities

Cross-connection control (CCC) has three functions at sewage facilities:

- Protecting the public potable water system from contamination.
- Protecting the onsite domestic potable water system from contamination.
- Protecting reclaimed water from lower quality water.

Basis

Three concepts form the basis for cross-connection control at sewage facilities.

1. Public water supply is protected by premise isolation air gaps or RPBA's and in-plant air gaps.
2. On-site domestic potable water is protected by RPBA's and in-plant air gaps.
3. Actual or potential connections to sewage, process water or toxic chemicals are downstream of an air gap.

WAC 246-290-490 (4)(b)

(ii) For service connections to premises posing a severe health cross-connection hazard including wastewater treatment plants, radioactive material processing plants, and nuclear reactors, the purveyor shall ensure that either an:

(A) Approved air gap is installed for premises isolation; or

(B) Approved RPBA or RPDA is installed for premises isolation in combination with an in-plant approved air gap.

'Ideal' Situation

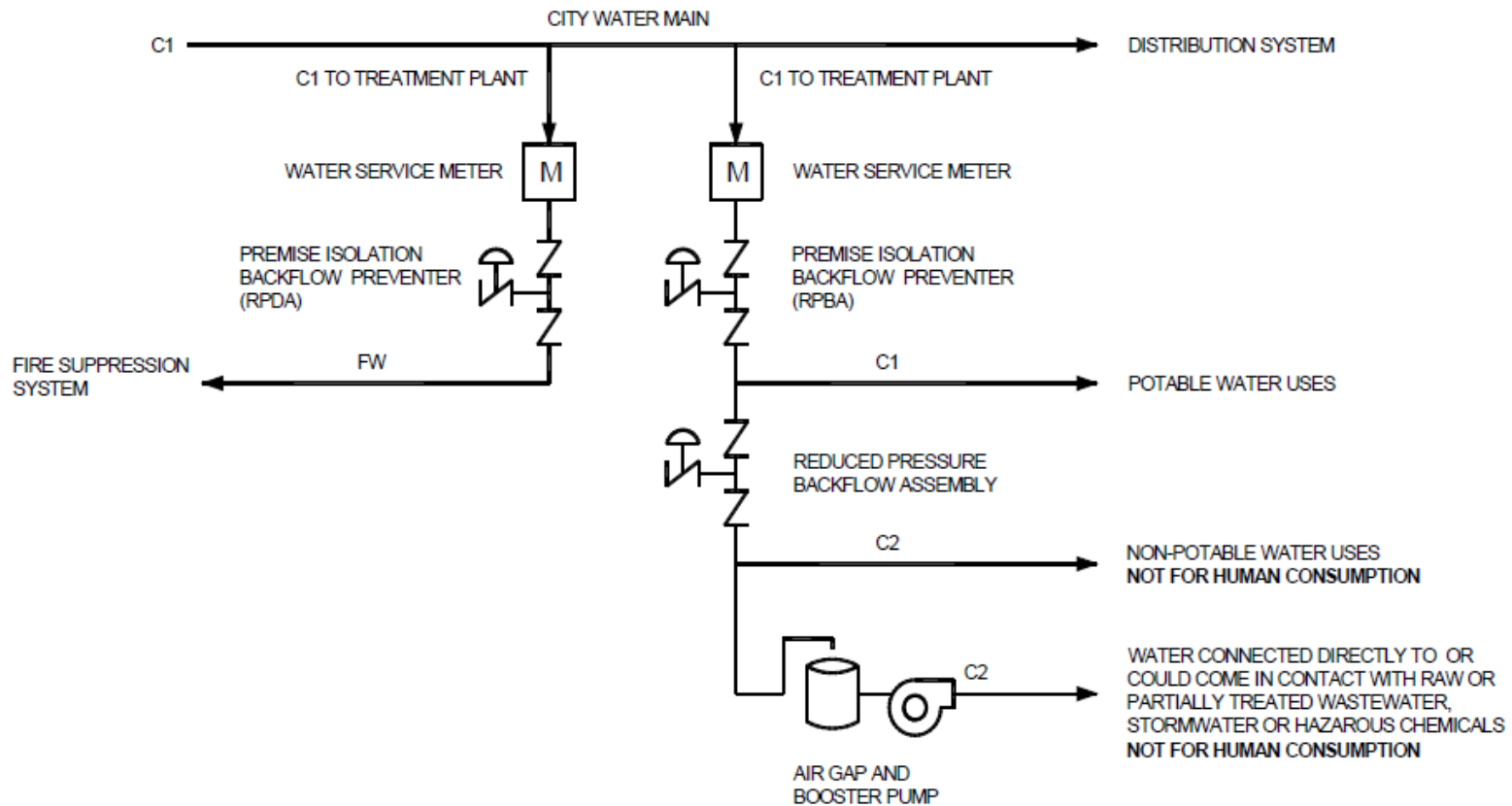
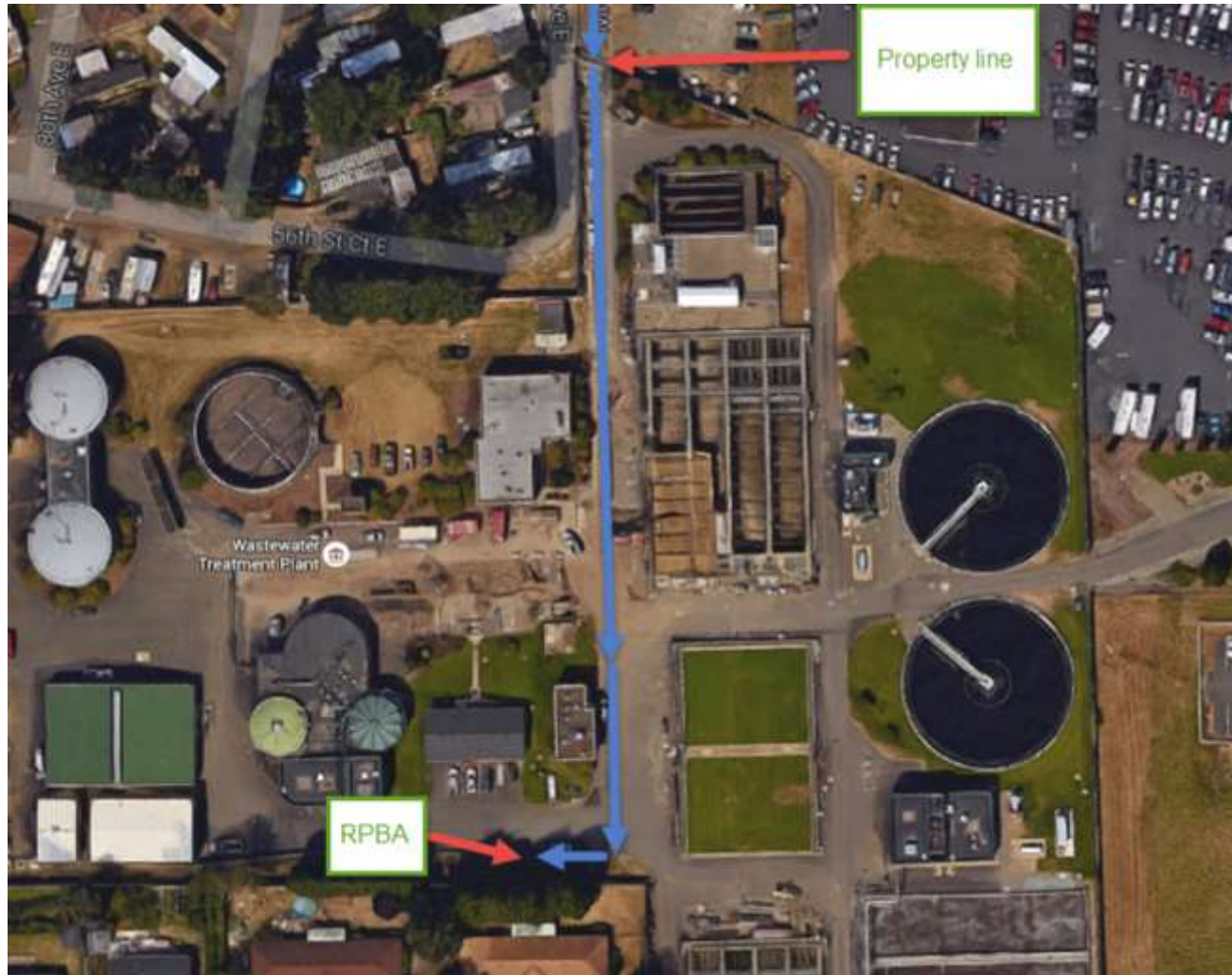


Figure G2- 1 Cross Connection Control Overview

RPBA Not at Property Line



Complicated Situation

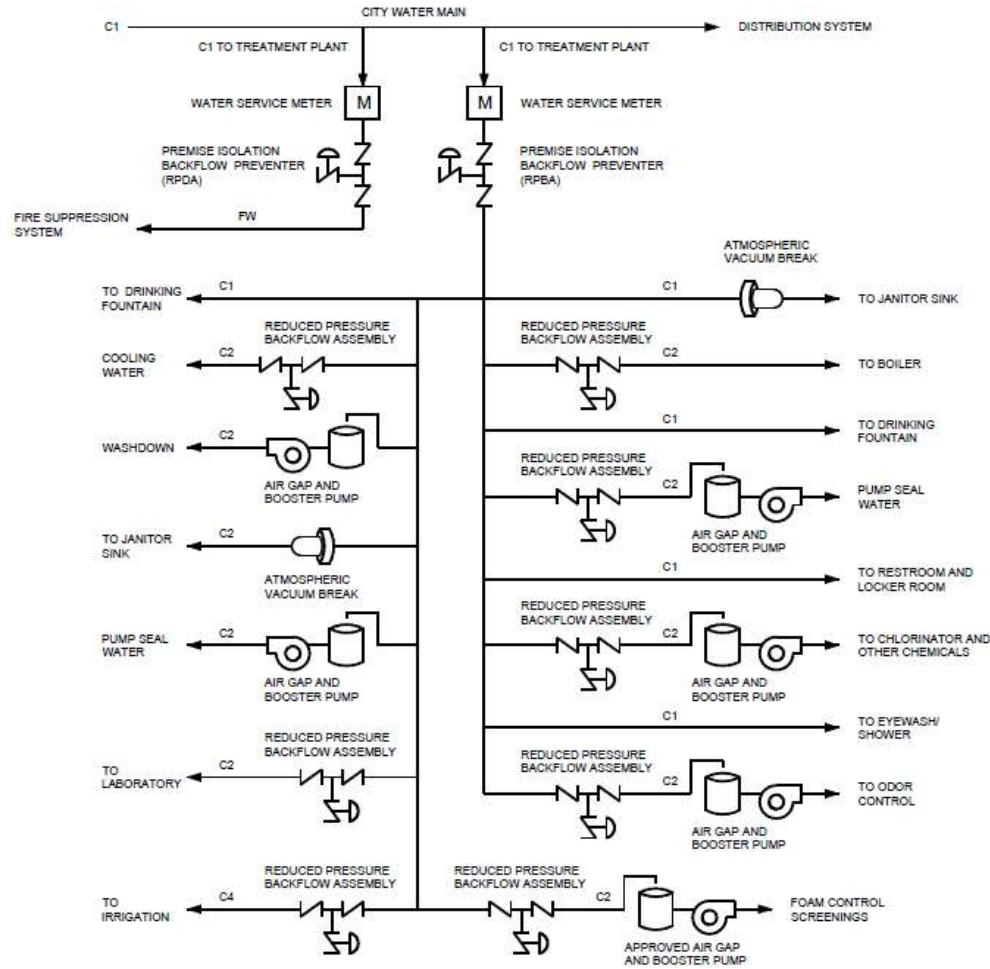


Figure G2- 4 Complex Cross-connection Control Overview

Criteria for Sewage Works Design

- Must locate air gaps and RPBA's above ground level.
- Must locate premise isolation backflow preventers adjacent to meter or property line.
- Supply all hose bibs, wall hydrants, and yard hydrants, whether above or below ground, interior or exterior, through an air gap,

Potable Water

- Recommended that designers locate all potable water piping at ground level or above to prevent future inadvertent cross connection.
- Do not route city water/potable water piping through wet well areas to prevent future inadvertent cross-connection.

Emergency Washing

- Designers should try not to locate emergency washing facilities (eye wash stations/showers) below ground level.
- If designers cannot avoid locating emergency wash stations below-ground, they must prove the installation will protect potable water supplies from accidental contamination.

Chemicals and Substances

Proper equipment includes supplementary air gaps and backflow prevention devices appropriate to the degree of hazard that would result if those chemicals were to backflow into the facility piping systems

Others

- Odor control involves sewage aerosols and particulates. Water supplied to odor control equipment or to hose bibs in odor control area is considered to be in direct contact with sewage and equipment must utilize an air gap.
- Fire Protection and Irrigation must be downstream of an RPBA or use reclaimed water.

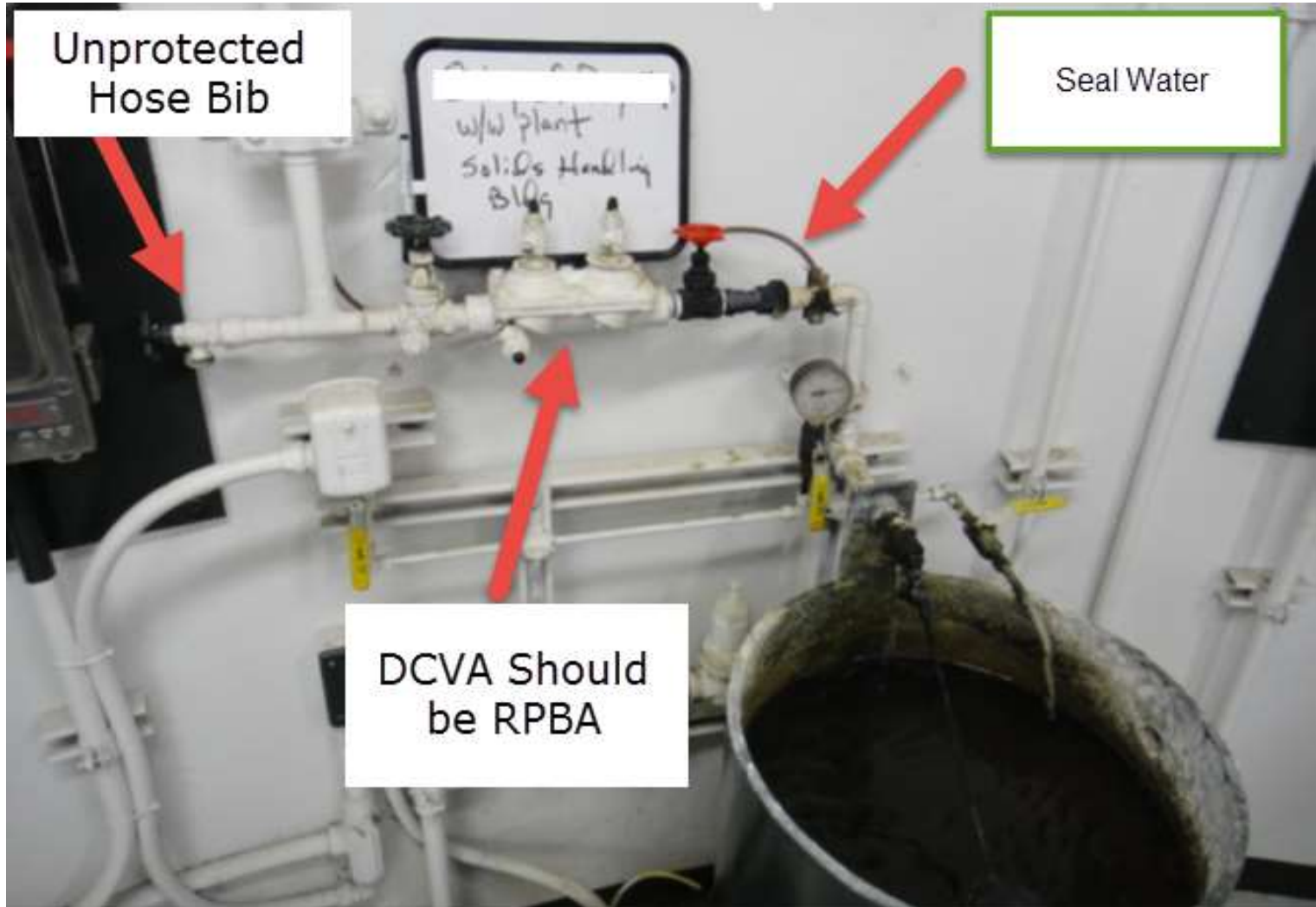
Spool Piece



Direct Connection to Sewer Line



Improper Assembly



Improper Assembly



Direct Cross Connections



What a Proper Air Gap Looks Like



Air Gap Below Flood Rim



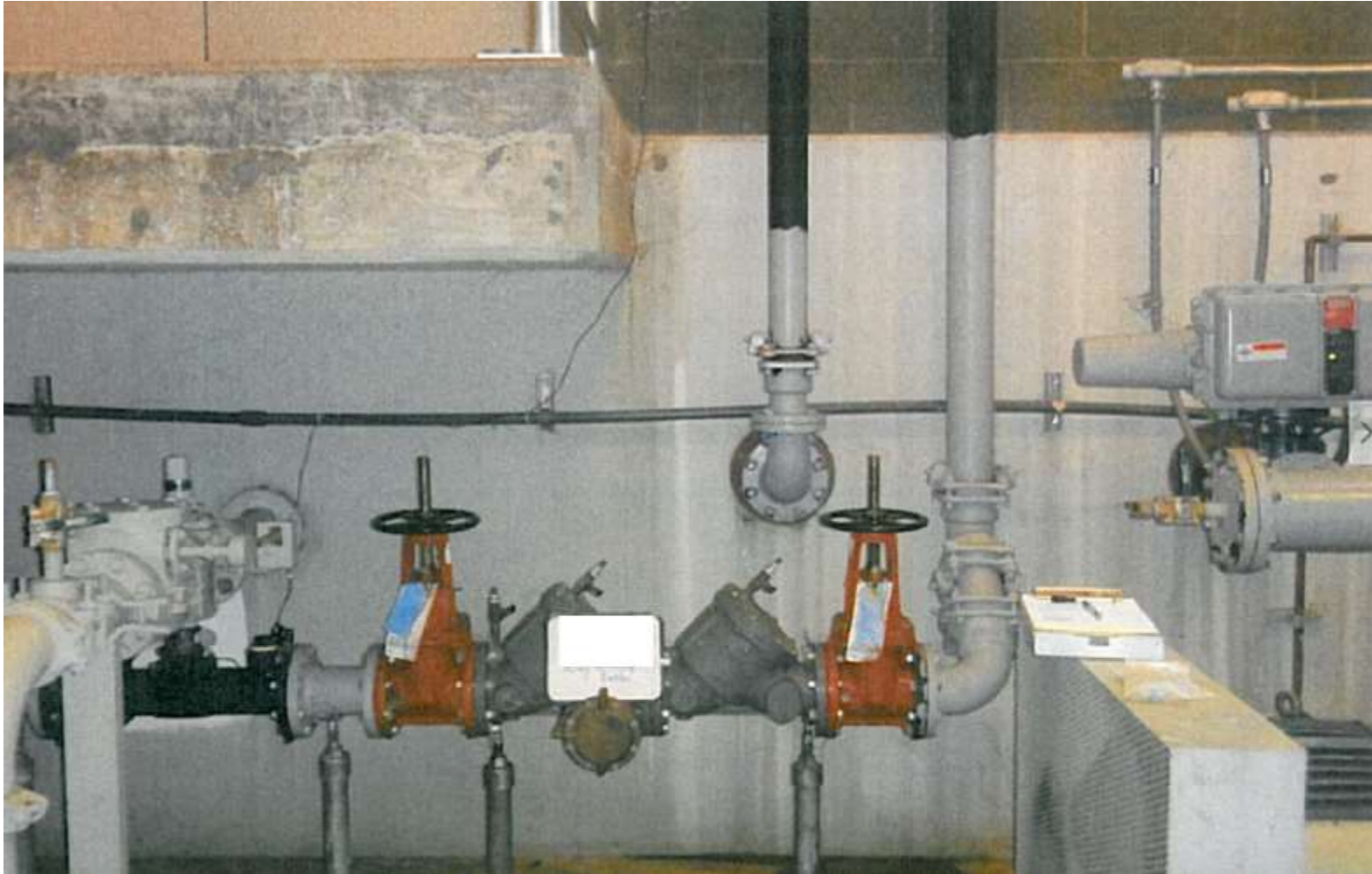
Air Gap Defeated



Air Gap Below Ground



RPBA Located Below Ground



Improper Protection for Chemical Injection



Pump Seal Water



Eye Wash Stations



Corroded Assembly



Access To Assemblies



Unable to Maintain



Shut Off Valve Moved



Bypass



References

- Department of Ecology, Criteria for Sewage Works Design
- Washington Administrative Code
- Washington Department of Health/Office of Drinking Water Guidance
- Uniform Plumbing Code Amended for Washington State
- Manual of Cross Connection Control (University of Southern California)
- AWWA (American Water Works Association) Yellow Book

Contact Information

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Questions?

