



# Water Transmission: Polyethylene Failures

Jason Jaskowiak, PE  
Chief Engineer  
American Samoa Power Authority



## Polyethylene Piping

- A variety of polyethylene (PE) pipes are marketed for water distribution and plumbing systems including.
- Manufacturers claim product lifetimes of 50 to 100 years.
- Municipal use of PE pipes have resulted in failures in much shorter time frames than anticipated.



## Polyethylene Piping

- Polyethylene products are susceptible to oxidation degradation.
- The degradation of PE results in a brittle pipe material which is susceptible to cracks and failure.
- Pipe failures result in water losses and low system pressures.



Some failures may be obvious, but...



...most are difficult to identify.



## Polyethylene Piping

- United Facilities and AWWA reference the following document for determining the longevity of HDPE pipes under oxidizing conditions:
  - Long Term Resistance of AWWA C906 Polyethylene Pipe to Potable Water Disinfectants
- The estimates in this publication are not reflected in the field. Discrepancies may be a result of un-simulated physical parameters or the synergetic effects of multiple factors.



### Polyethylene Piping

- Degradation is accelerated by warm temperatures and disinfectants.
- The disinfectant type and concentration play a role in the speed of degradation.
  - Chlorine Dioxide > Chlorine > Chloramines
- ASPA is seeing pipe failures in as soon as 5 years.
  - Degradation
  - Improper Installation



### How are we responding?

- ASPA is using manual leak detection to identify failing HDPE service lines in our system.
- PVC-O is currently being utilized to replace the HDPE.
  - UV Exposure
  - Improper Installation
- Cast Iron Considerations– Durable, high tensile strength, corrosive, higher cost

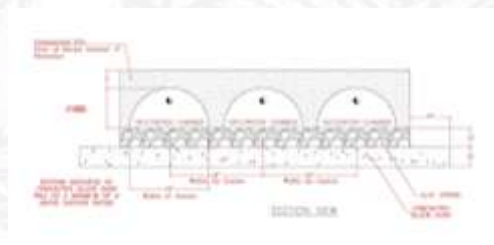


### Onsite Treatment: Modified Leachfield Designs

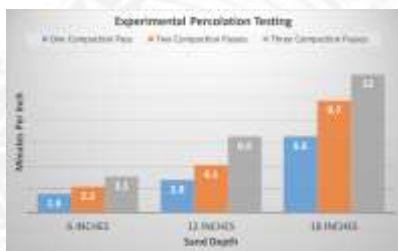
- Volcanic soils commonly have very high conductivity and short cutting pathways for potential contaminants to enter groundwater aquifers.
- High percolation rates do not facilitate the treatment of wastewater effluent from septic tanks.
- Constructing a barrier beneath the leach field allows the retention of wastewater to be improved.



### Modified Design



### Design Testing



### Implementation





### Implementation



### Future Studies

- Analytical comparison of a standard and modified system:
  - Biofilm
  - BOD removal
  - E.coli removal
  - Nitrogen removal