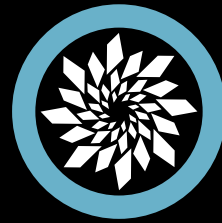


# Ice Pigging Advanced Pipe-Cleaning Technology

Paul Treloar



## ICE PIGGING

AMERICAN PIPELINE SOLUTIONS



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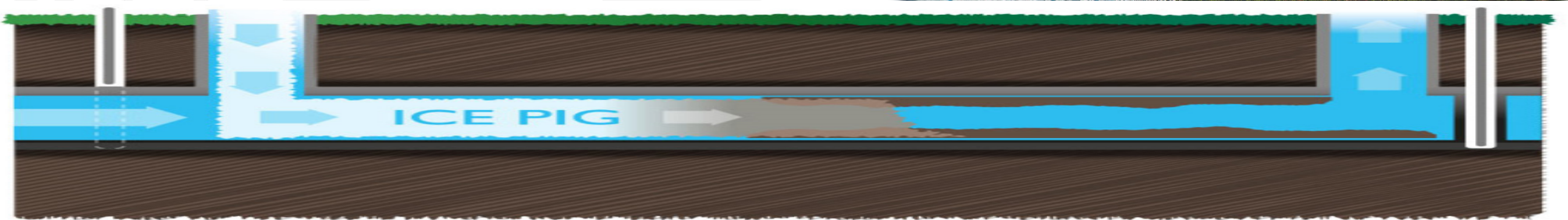
# What is Ice Pigging?

- ❖ Advanced pipe cleaning technology
- ❖ Award-winning, innovative, sustainable
- ❖ Improves water quality, aids asset management
- ❖ Developed by the University of Bristol, England



# How Does it Work?

- ❖ Characteristics of a semi-solid material
- ❖ Can be pumped like a liquid.....
- ❖ ...but behaves like a solid once the pig is formed in the pipe.



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# Controlling the Semi-Solid



- ❖ The correct consistency
- ❖ Freezing point depressant
- ❖ NSF Approved
- ❖ Food grade, fine table salt ( $\text{NaCl}$ )
- ❖ Brine Solution
- ❖ Freezing down to 24 degrees F
- ❖ Harmless to customers



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# The Benefits

## Flushing (UDF) vs Ice Pigging

### Flushing (UDF)

- 👎 Water gives low shear
- 👎 Large volumes of water wasted
- 👎 High velocity required
- 👎 Rarely removes all sediment



- ✓ Ice Pigging 1,000 times more shear
- ✓ 30%-50% less water required
- ✓ Normal operational flow & pressure
- ✓ Pipe is cleaned thoroughly

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# The Benefits

Over other Traditional Methods

Other Methods;  
Jetting & Air Scouring



👎 May be too aggressive

✓ Less aggressive yet still effective

👎 Restricted by hose length

✓ Only restricted by available ice quantities



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# The Benefits

- ✓ Tested, proven effectiveness
- ✓ Guaranteed not to get stuck
- ✓ Easy access via existing fittings
- ✓ Will pass through butterfly valves
- ✓ Very short downtime



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**DROUGHT FRIENDLY!!**

**50%**

**LESS WATER USAGE  
THAN STANDARD  
FLUSHING.**



## The Benefits

- ✓ Drought Friendly!
- ✓ Adapts to changing diameter
- ✓ Post clean disinfection not required
- ✓ Bacteriological samples not required



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# The Benefits

## Cleaning Capabilities

- ✓ Iron
- ✓ Manganese
- ✓ Sediments/grit
- ✓ Biofilms
- ✓ Fats, Oils, Greases (FOG)



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# Results following UDF



6-inch PVC Water Distribution Pipe

Confluence Engineering (Consultants) –  
Idaho Municipality - November 2021



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# The Limitations

- 👎 Tuberculation
- 👎 Calcified deposits
- 👎 Large diameter pipes



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# The Equipment

## 10T Ice Tanker



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# The Equipment Ice Generators



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# The Equipment

## Ice Production



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## Flow Analysis System

- ✓ Flow
- ✓ Pressure
- ✓ Conductivity
- ✓ Water Temperature
- ✓ Turbidity

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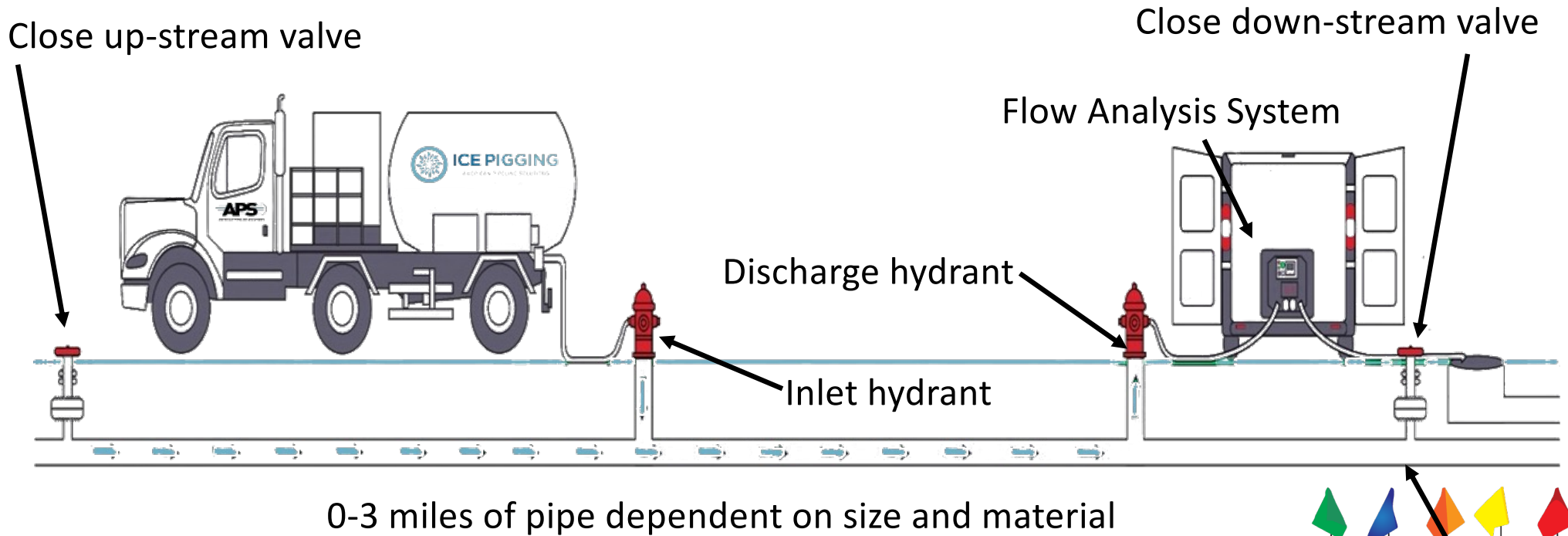
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# How it Works

## Site Schematic for Potable Water



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# Potable Water

## Ice Insertion

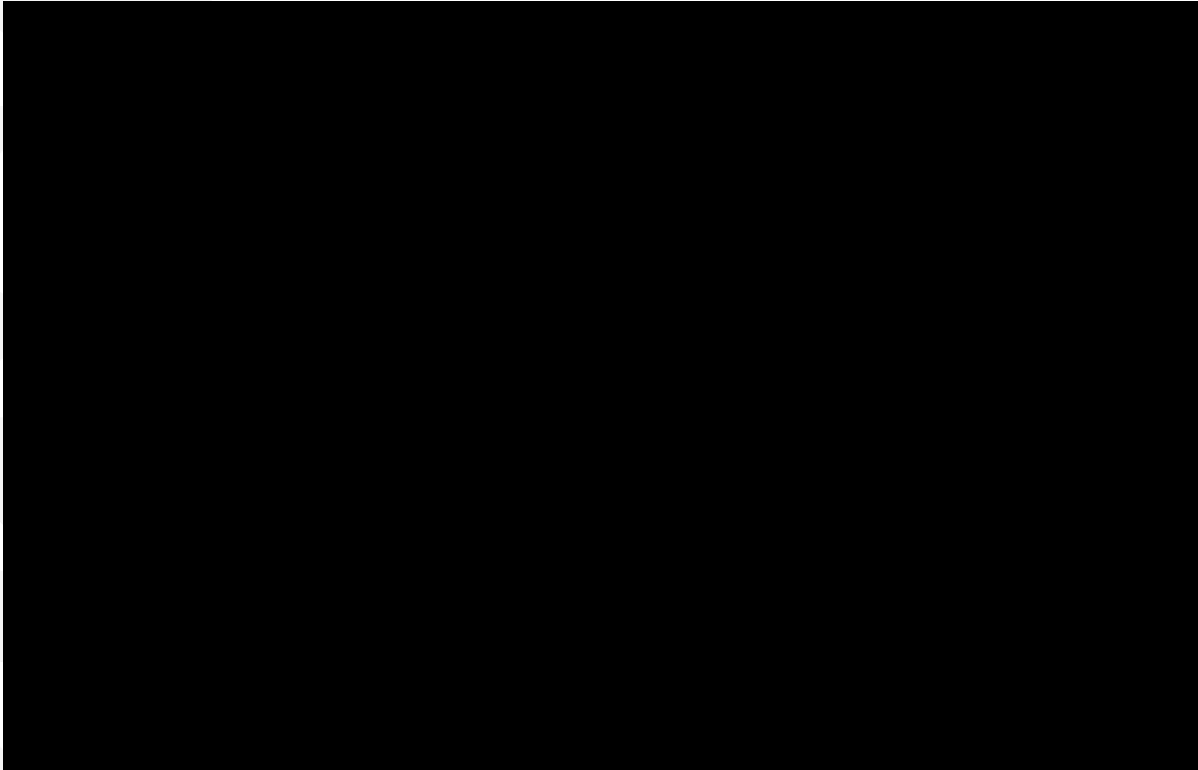


## Discharge



# The Results

## Discharge of the Ice Pig



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# The Results

## Taking Samples



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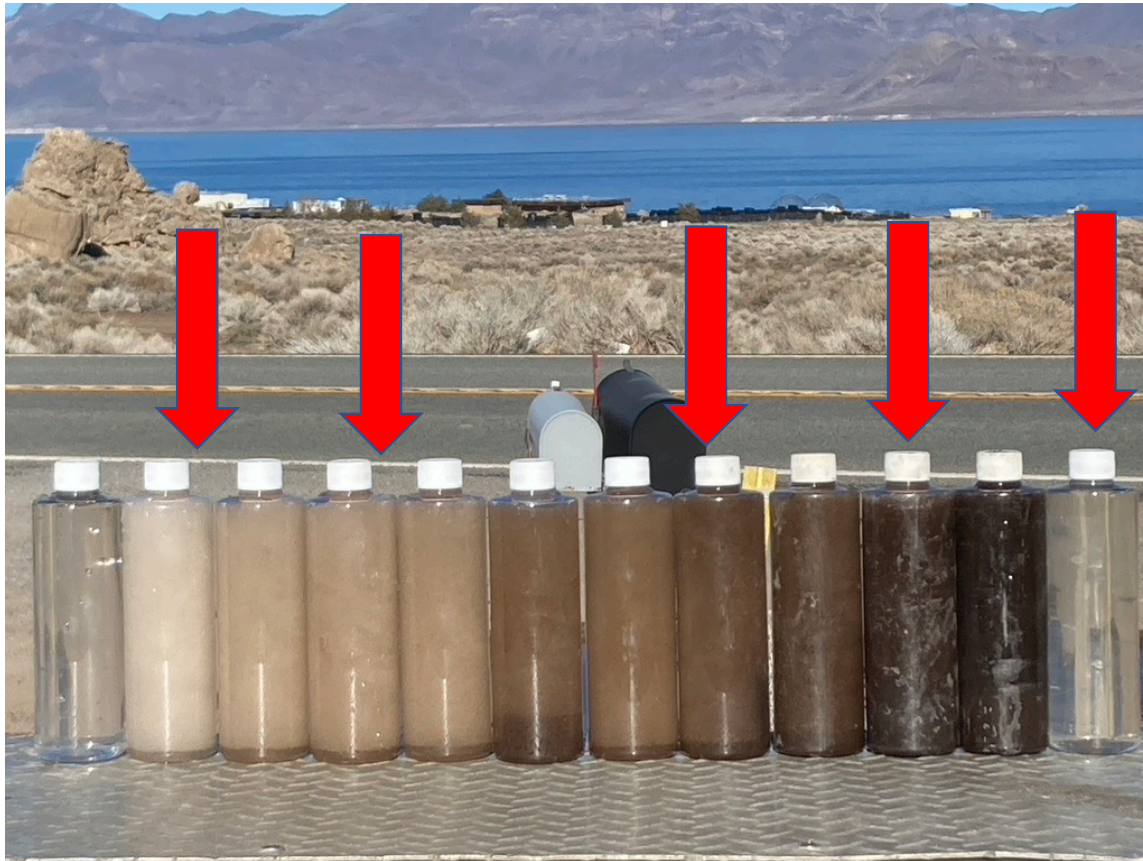
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## The Results

1. Sample from front of pig
2. Samples from middle of pig as it carries the sediment
3. Samples at end of pig where ice (and main) are clean



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# The Results

## Project Report

### Analysis

- ❖ Chemical
- ❖ Mechanical
- ❖ Biological



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# Current Status

## Ice Pigging Milestones

- ✓ 500+ Completed projects in the U.S.
- ✓ 1,100 miles of pipeline cleaned across 44 states.
- ✓ Maximum length of 2.3 miles cleaned with one load.
- ✓ 2"– 42" Diameter pipe cleaned.
- ✓ Technique also developed for sewer force mains and siphons.



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# Summary

World Renown – Proven to be Effective on;

- ✓ Sewers – (Force Mains & Siphons)
- ✓ Potable Water
- ✓ Food & Beverage
- ✓ Cooling Towers
- ✓ Produced Water



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# Summary

World Renown – Tested & Proven

- ✓ Simple, effective method of pipe cleaning
- ✓ Offers real cost savings
- ✓ Rapid, Environmentally friendly, Efficient solution
- ✓ Effective on Gas and Oil
- ✓ Simple Solution for “Unpiggable” pipes
- ✓ 50% Less water usage over standard flushing
- ✓ Exceptionally low risk



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# Tested & Proven

## Flushing vs Ice Pigging



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# Any Questions?

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