



## Advanced Pipe Cleaning Technology

Suez Advanced Solutions



Paul Treloar  
November, 2019



## Our History: The SUEZ Canal Company

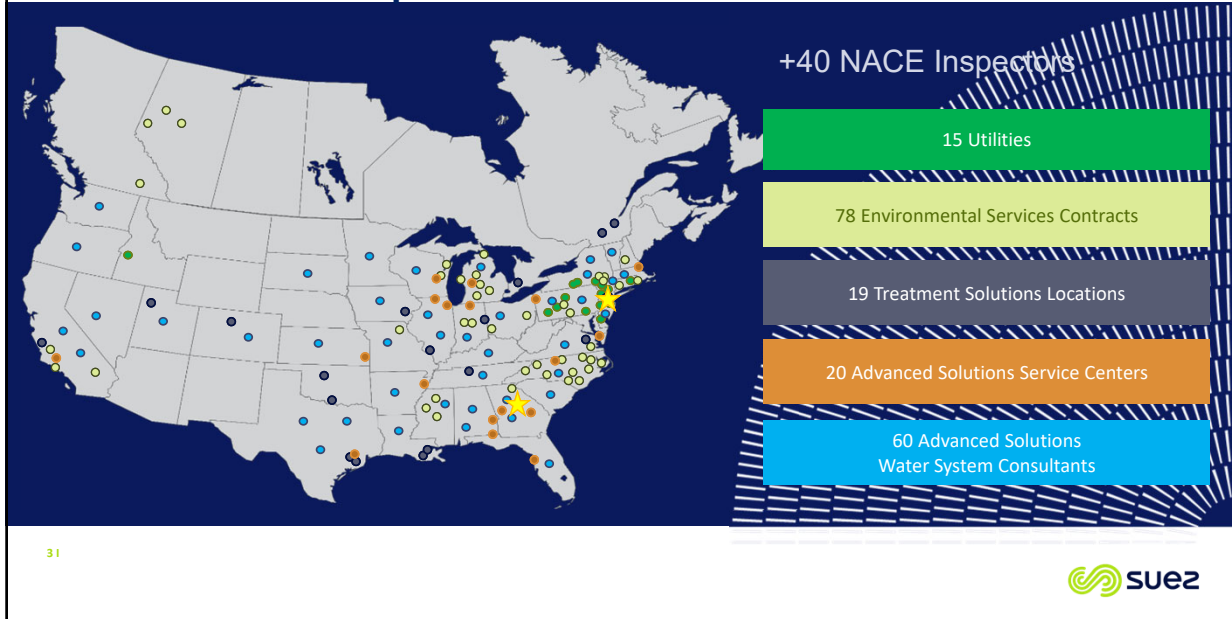


- **SUEZ Canal Company** formed in 1858
- Used **innovative coal and steam-powered technology** to build canal. First Public-Private Partnership
- **SUEZ Canal** opened in 1869



## SUEZ: Global Leader in Water and Waste Water Industry

### North America Footprint – 4 Divisions



ED1

## Suez Water Advanced Solutions Offerings

Water Wells	Water Quality	Steel Water Tanks	Concrete Structures	Network assets & Meters
				
<ul style="list-style-type: none"> <li>• Condition assessment</li> <li>• Maintenance program</li> <li>• Pumps services</li> <li>• Rehabilitation</li> </ul>	<ul style="list-style-type: none"> <li>• Asset chemical cleaning</li> <li>• Mixers</li> <li>• THM removal</li> <li>• Ice Pigging</li> <li>• Filter media replacement</li> <li>• SIPP</li> <li>• RCS</li> </ul>	<ul style="list-style-type: none"> <li>• Condition assessment</li> <li>• Maintenance program</li> <li>• Rehabilitation</li> <li>• Drone inspections</li> <li>• Washouts</li> <li>• Chemical Clean</li> <li>• Washouts</li> <li>• Repairs – safety/compliance</li> </ul>	<ul style="list-style-type: none"> <li>• Condition assessment</li> <li>• Maintenance program</li> <li>• Rehabilitation</li> <li>• <b>Water, wastewater</b> and storm water assets</li> <li>• Specialty Coatings</li> <li>• Plant Rehabilitations</li> </ul>	<ul style="list-style-type: none"> <li>• Maintenance program with AML</li> <li>• Advanced Network management (Aquadvanced)</li> </ul>

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## Slide 4

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**ED1** Eisenberg, Daniel, 6/17/2019

# What is Ice Pigging?

- An award winning, innovative, sustainable, advanced pipe cleaning technology to improve water quality and asset management
- Developed by the University of Bristol, England
- Suez is sole rights holder



Ice Pigging - Award Winning Technology for Cleaning Water Mains



## How Does It Work?



- Ice Pigging harnesses the characteristics of a semi-solid material
- An ice pig is a semi-solid material that 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

To maintain the correct consistency,  
a freezing point depressant is used



- Brine solution
- Food grade, fine table salt (NaCl)
- Freezing down to 24°F
- Harmless to Customer
- Ineffective on hard substances

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## The Benefits

### Traditional Techniques

#### Conventional Pigging

- × Risk of getting stuck or lost
- × Expensive engineering to launch and retrieve
- × Only suitable for constant diameter
- × Long interruptions of service
- × Unable to pass butterfly valves



Ice Pigging - Award Winning Technology for



- ✓ Guaranteed not to get stuck
- ✓ Easy access via existing fittings
- ✓ Adapts to changing diameter
- ✓ Very short downtime
- ✓ Will pass through butterfly valves





# The Benefits

## Traditional Techniques

### Flushing (UDF)

- × Water Gives low shear
- × Large volumes of water wasted
- × High Velocity required
- × Rarely removes all sediment

### Other Methods (Jetting, Air Scouring)

- × May be too aggressive
- × Restricted by hose length

## ICE PIGGING

- ✓ Ice Pigging 1,000 times more shear
  - ✓ 30-50% less water required
  - ✓ Normal operational flow and pressure used to push pig
  - ✓ Pipe is cleaned thoroughly
- 
- ✓ Ice Pigging less aggressive yet still effective
  - ✓ Only restricted by available ice quantities

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# ICE PIGGING Cleaning Capabilities

- Iron
- Manganese
- Sediments
- Biofilms
- Fats, Oils, Greases (FOG)
- Grit



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## Cast Iron & Tuberculation?

### Before

### After



Tuberculation untouched but biofilm and sediment removed

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## Benefits of Cleaning My Pipes:

- ✓ Remove iron and manganese build up
- ✓ Reduce discolored water complaints
- ✓ Reduce biofilm development
- ✓ Reduce THM production
- ✓ Improve Water quality compliance
- ✓ Improve Pumping Efficiency
- **Asset management**
  - Preventative maintenance extends the life of pipes
- **Reduce residual demand**
  - Dirty pipes require more disinfectant
- **Reduce pumping costs**
  - Particularly on force mains & raw water mains

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## The Equipment

### 10T Ice Delivery Rig



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## The Equipment

### Ice Generators



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# Ice Production

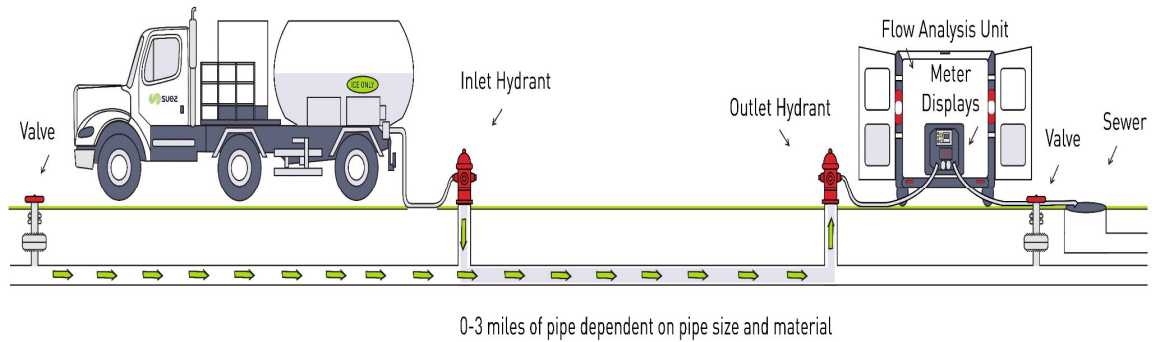
**Ice Production – 10T (2,700 gallons)**



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## Ice Pigging Site Schematic Potable Water Main



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# Potable Water

Ice Insertion



Discharge



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# Potable Water



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## Potable Water

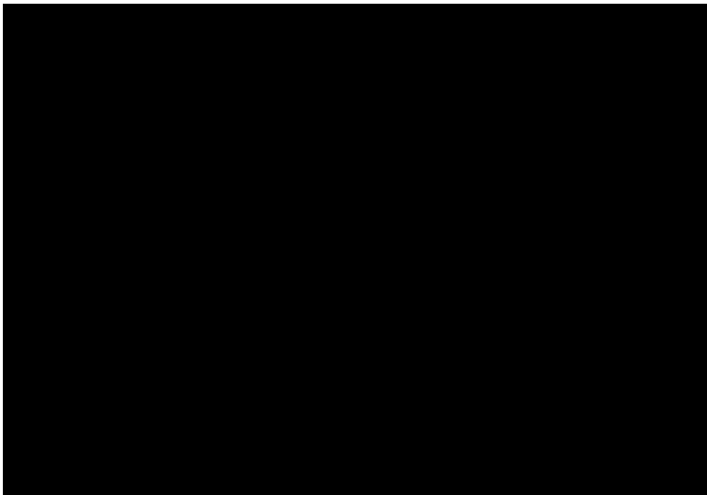


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## The Results?

Discharge



Collecting Samples



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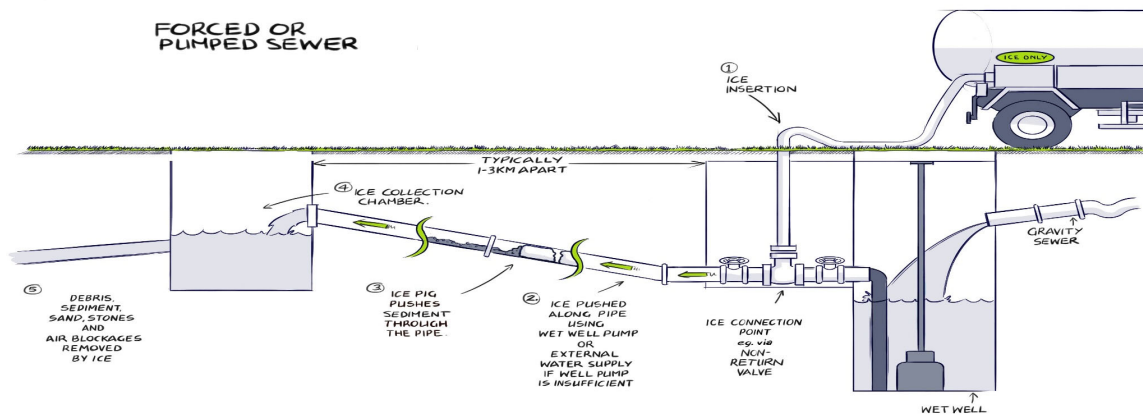


- ① • Sample from front of pig
- ② • Sample from middle of pig as it carries the sediment
- ③ • Sample at end of pig where ice (and main) are clean

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## Ice Pigging Site Schematic Sewer Force (Pumped) Main



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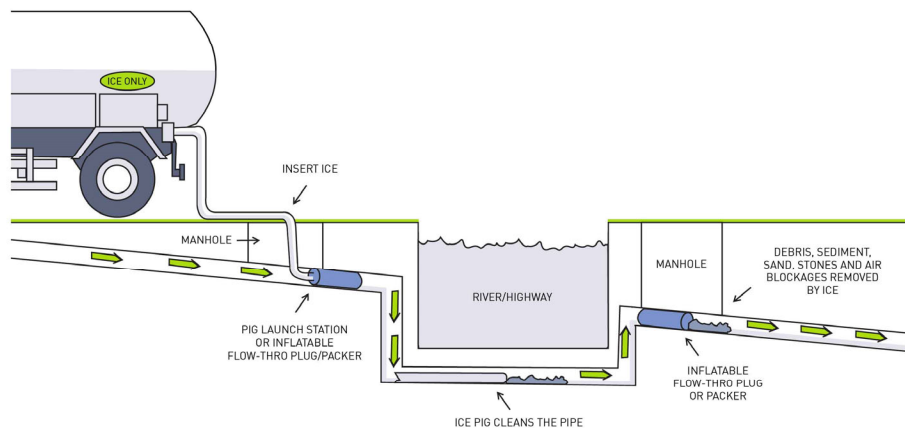
## Ice Pigging Site Schematic Sewer Force (Pumped) Main



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## Ice Pigging Site Schematic Sewer Siphon



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## Ice Pigging Site Schematic Sewer Siphon



Insertion

Inflatable flow-through packer



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## Case Study – Danbury NC

### Problem:

- Water system 30 years old
- Build up of Manganese and iron
- Discolored water complaints
- Heavy sediment build up
- Insufficient water storage for other cleaning techniques
- Flushing not an option



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## Case Study – Danbury NC

Before      Results      After



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## Case Study – Danbury NC



“One major advantage of Ice Pigging over other water main cleaning methods was the limited disruption to water supply. The Town of Danbury is the County seat and is host to a hospital and the county jail. These facilities could not operate without water for an extended period. Ice Pigging was also very successful in getting rid of the iron and manganese deposits in our PVC pipe.”

**Mark Delehant**  
Director of Public Works  
Stokes County, North Carolina

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## Case Study - Middlebury, VT

- 12,000' of 18" PVC Sewer Force Main - 9 runs



“traditional pigging proved to carry too many potential issues of catastrophic failure which we were not willing to gamble with”

“Flows returned to design spec –  
An increase of 445 gallons per minute”

Robert Wells, Town of Middlebury Wastewater Superintendent

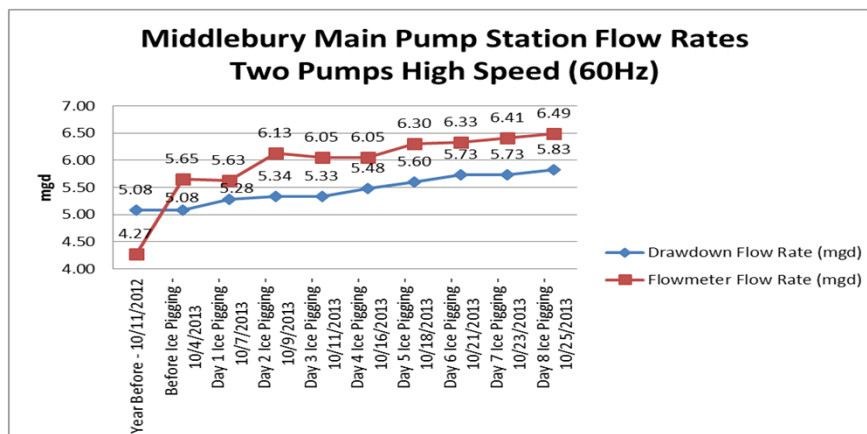


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## Case Study - Middlebury, VT

- 11% Increase in flow rates
- Returned pipe to original design capacity
- 2014 ACEC/Vermont Grand Award Winner



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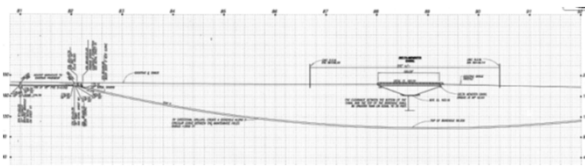


# Case Study - Western Hills, CA

## Statistics

**Delta Mendota Aqueduct**  
 Type of Main: Gravity sewer siphon  
 Length of main: 2 x 1,400Ft  
 Diameter and material: 12" & 14" HDPE

**California Aqueduct**  
 Type of Main: Gravity sewer siphon  
 Length of main: 2 x 3,151 Ft



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"We have been consistently flushing these lines but it was having little to no effect.

The ice pigging technology was quick, efficient and very effectively cleaned out the siphons. We now have a flow rate consistent with the design spec."

I consider ice pigging to be a superior, exceptionally low risk method to clean sewer mains that otherwise could not be cleaned without risk of major disruption to the system

We are now looking towards a regular cleaning program using ice pigging to ensure we do not suffer large sludge build-ups in the future"

*Jerry Phillips – Western Hills Water District Manager*



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## Achievements to date – CA References

+35 projects, +1,000 Tons of ice and counting...

**Sonoma County Water Agency**

**City of Dixon**

**West Basin**

**Maxwell PUD**

**City of Winters**

**Sacramento County**

**Lemoore NAS**

**Redwood City**

**Contra Costa County**

**East Bay MUD**

**Western Hills**

...



## Other Sewer Case Studies

- **Emmett Township, MI**
  - **66% reduction in pump run time**
  - *Reduced energy costs*
  - *Reduced pump wear*
  - *Reduced odors*
- **Sonoma Water, CA**
  - **12% increase in flows in system 1**
  - **15% increase in system 2**
  - *No more overflows despite prolonged heavy rain*
  - *Eliminated fines from regulatory body*
- **Ocala, FL**
  - *Pre - 165 gpm with 2 pumps running*
  - *Post – 325 gpm with one pump running*
  - **96% increase in flow!**

Ice  
Pigging -





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## Summary

- **Simple, effective method of pipe cleaning**
- **Offers real cost savings**
- **Rapid, environmentally friendly, efficient solution**
- **Effective on Gas & Oil**
- **Simple solution for “unpiggable pipes”**
- **Exceptionally low risk.**

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# Any Questions?

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