

15 Years of 2PAD at the Airport Parkway Wastewater Treatment Facility South Burlington, VT

The Northeast Residuals and Biosolids Conference
Burlington, Vermont
October 25-27, 2017

Presenter
John Reilly, PE

Presentation Outline

► Background

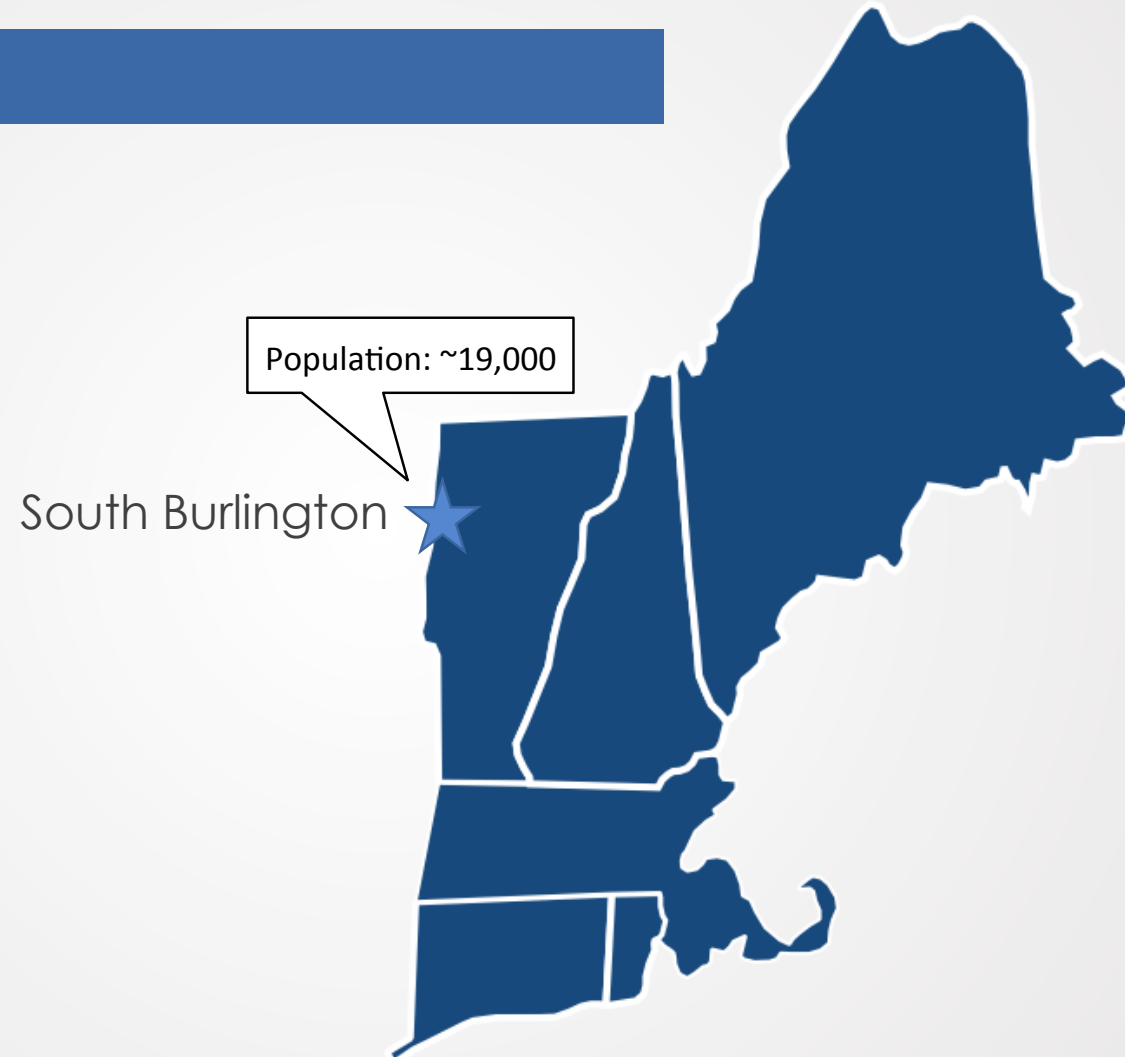
- Biosolids Management in Chittenden County, VT
- Biosolids handling at Airport Parkway WWTF

► 15 Years of 2PAD at Airport Parkway WWTF

- Planning
- Design
- Construction
- Operation

► Reflections on 15 Years of 2PAD

Background



Background:

CSWD manages biosolids in Chittenden County, VT

- ▶ Final disposition of biosolids managed by Chittenden Solid Waste District (CSWD)
- ▶ 18 Member Communities
- ▶ 9 Chittenden County WWTF's
- ▶ Coordinates with state regulators and commercial partners
- ▶ Ensures federal and state disposal requirements are met

Background:

City of South Burlington Airport Parkway WWTF Basis of Design

Main Flow	
Average Daily Flow	3.3 MGD
Peak Hourly Flow	7.92 MGD
Solids Treatment	
Anaerobic Digestion	Thermophilic –mesophilic (2PAD)
Total Mass Loading	9,450 lb/day
Capacity	25,332 gpd
CHP	65 KW microturbine
Dewatering	Centrifuge



New Thermophilic Digester





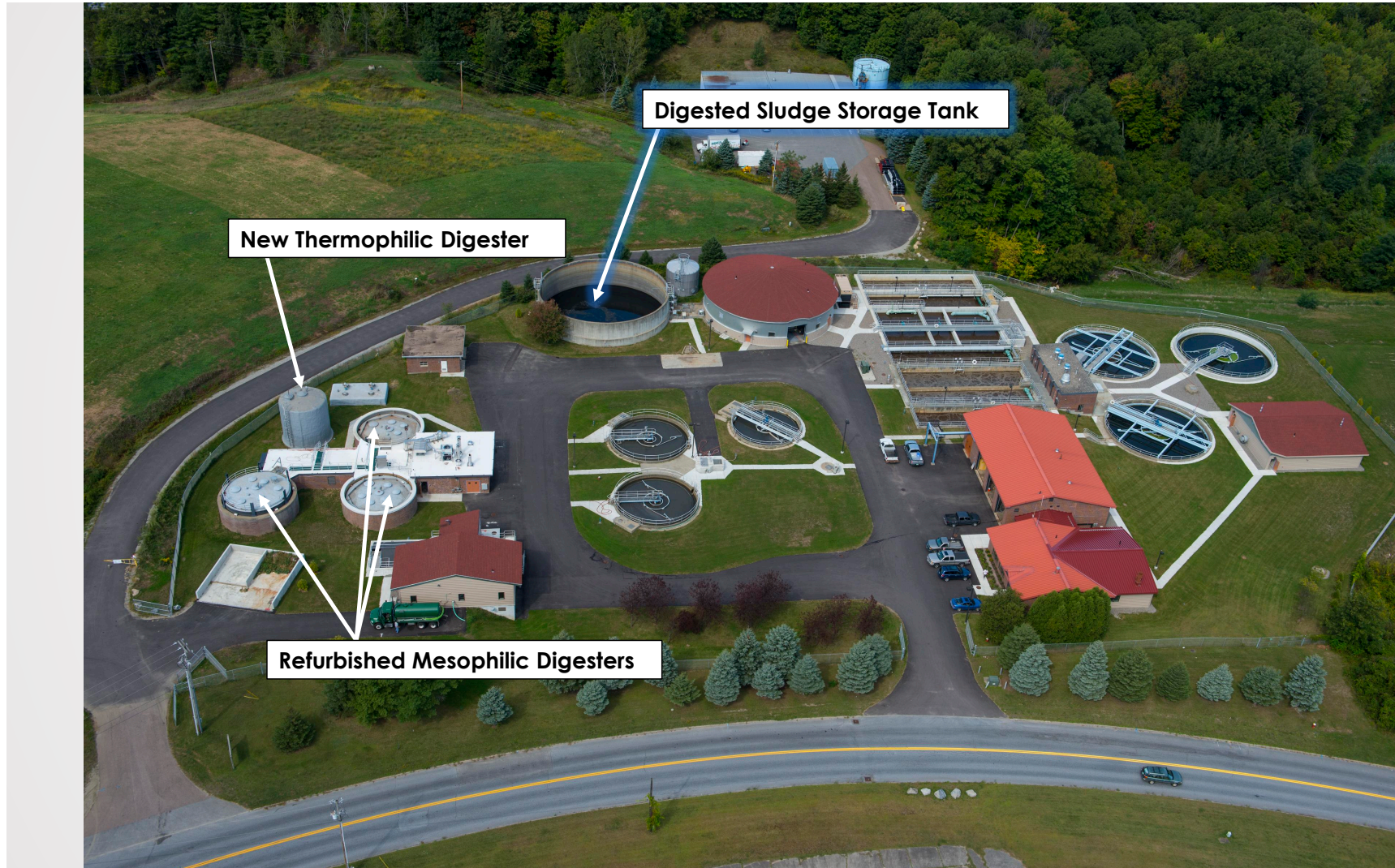
New Thermophilic Digester

Refurbished Mesophilic Digesters

Digested Sludge Storage Tank

New Thermophilic Digester

Refurbished Mesophilic Digesters

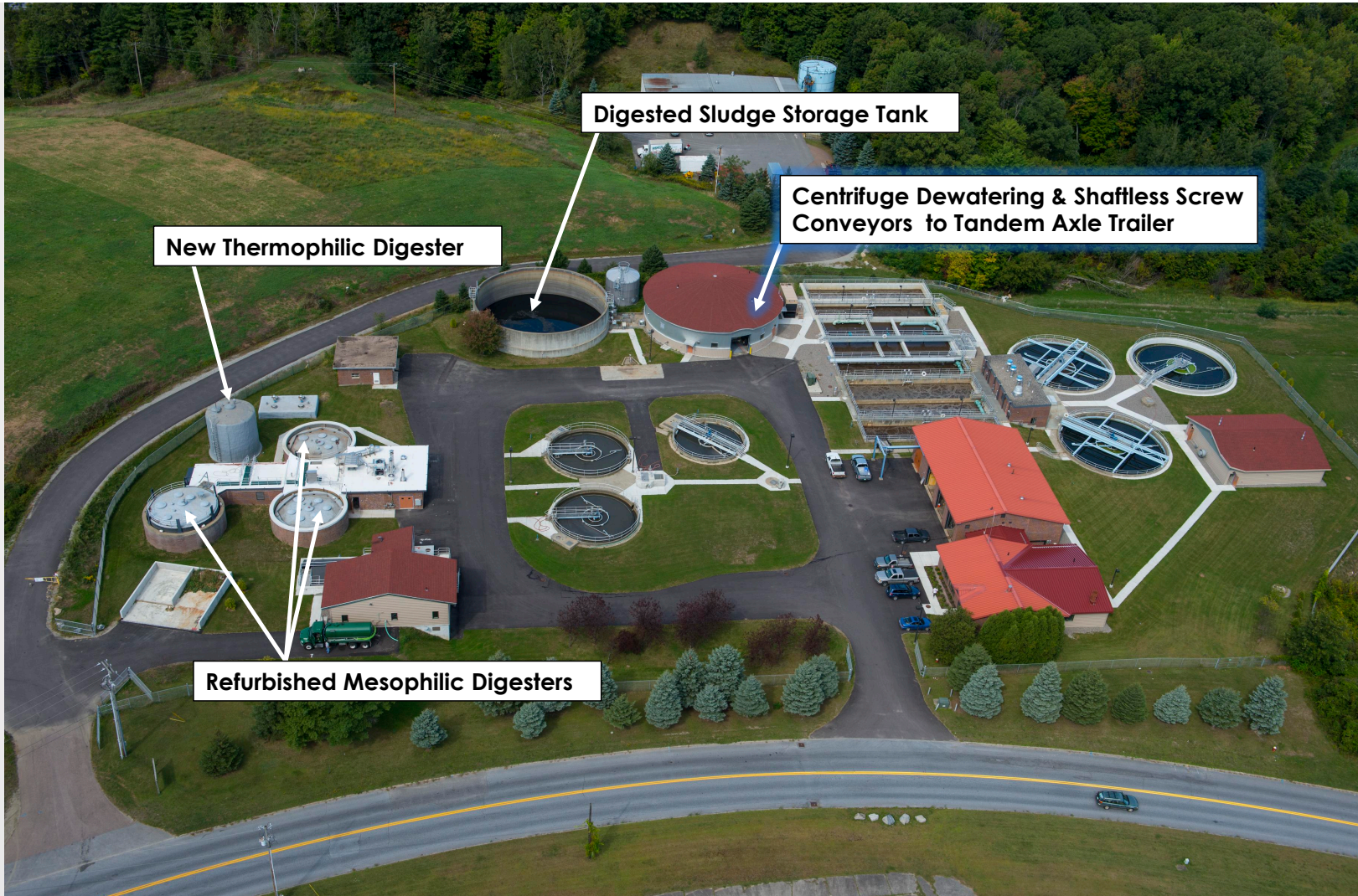


Digested Sludge Storage Tank

**Centrifuge Dewatering & Shaftless Screw
Conveyors to Tandem Axle Trailer**

New Thermophilic Digester

Refurbished Mesophilic Digesters



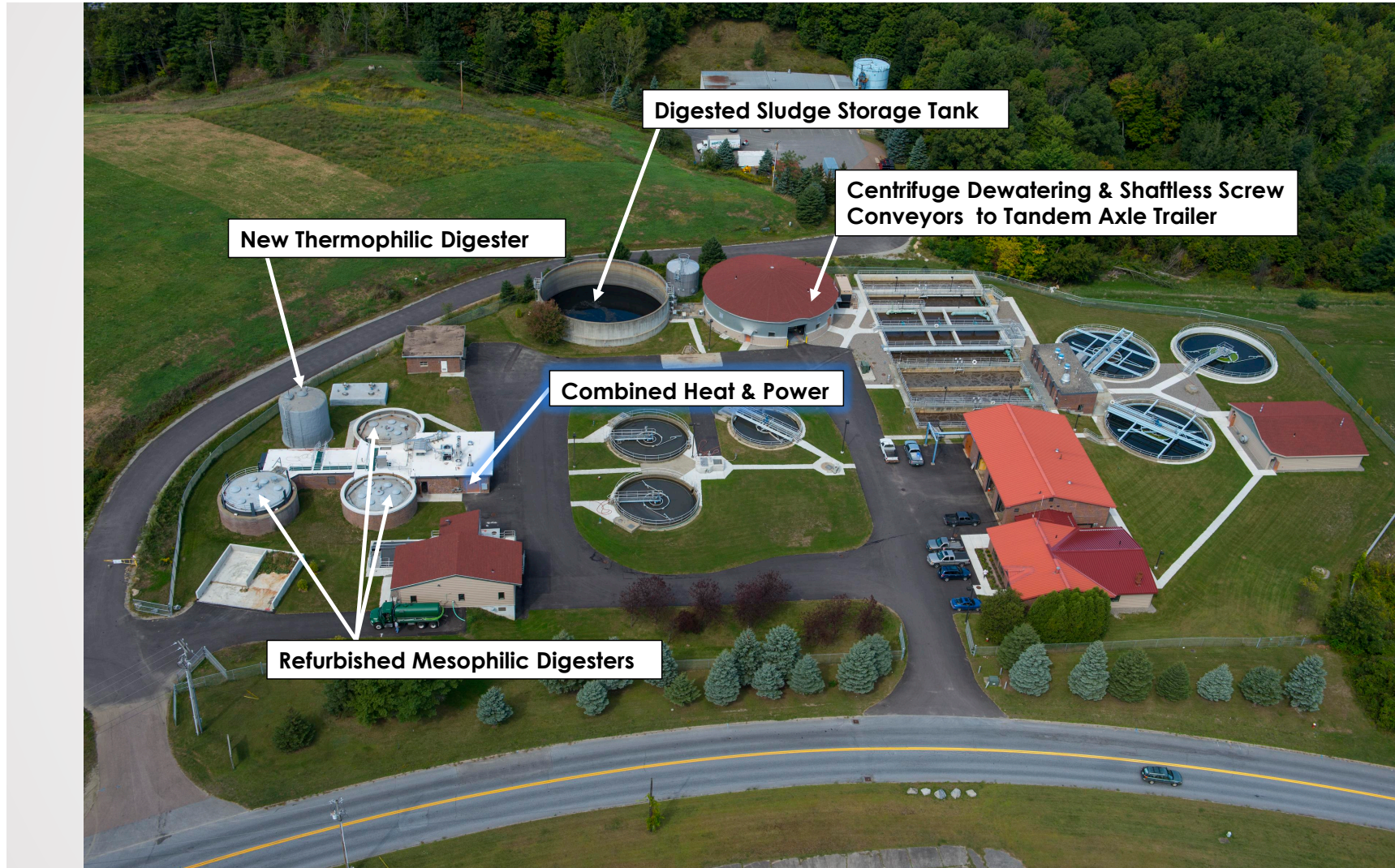
Digested Sludge Storage Tank

**Centrifuge Dewatering & Shaftless Screw
Conveyors to Tandem Axle Trailer**

New Thermophilic Digester

Combined Heat & Power

Refurbished Mesophilic Digesters

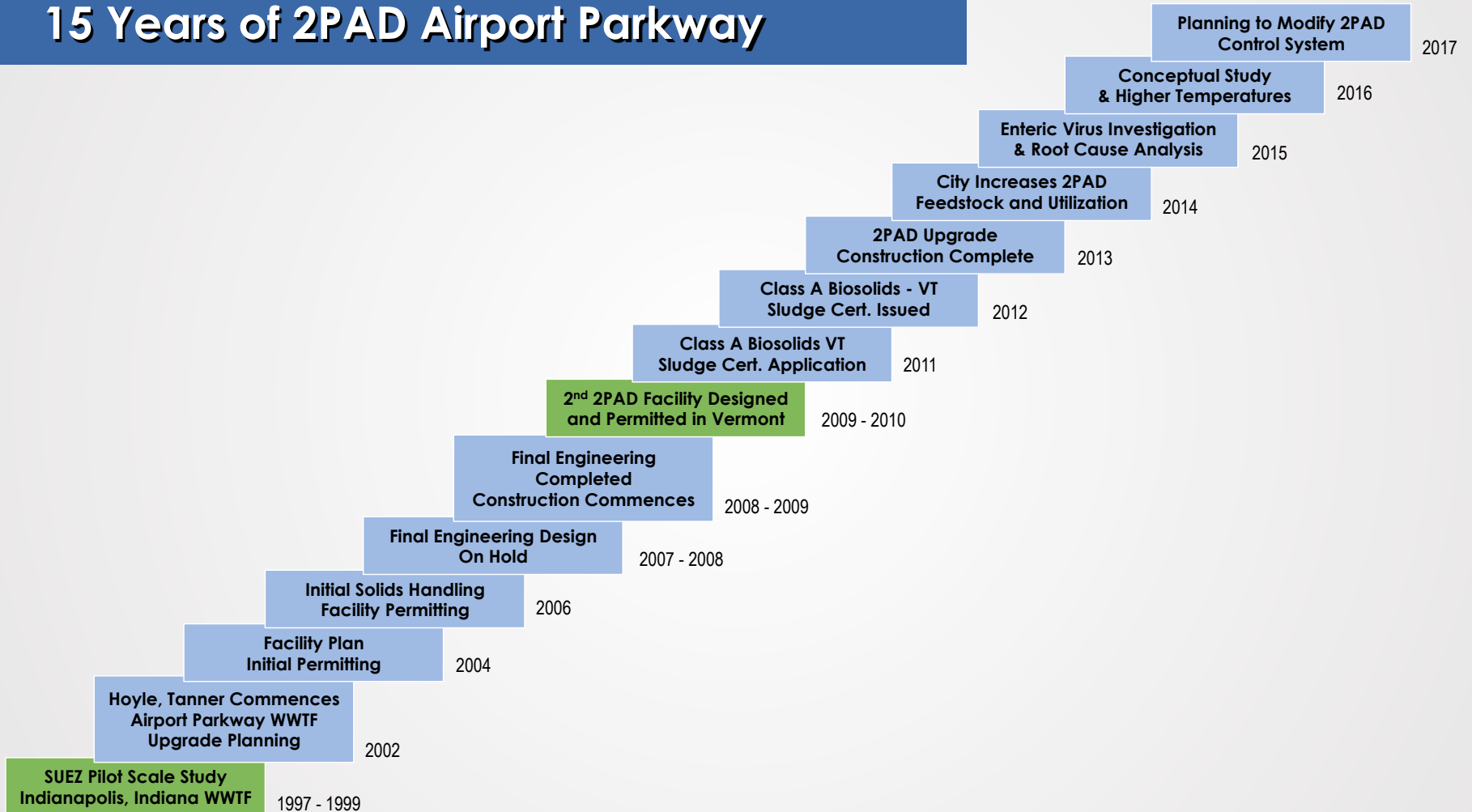


Background:

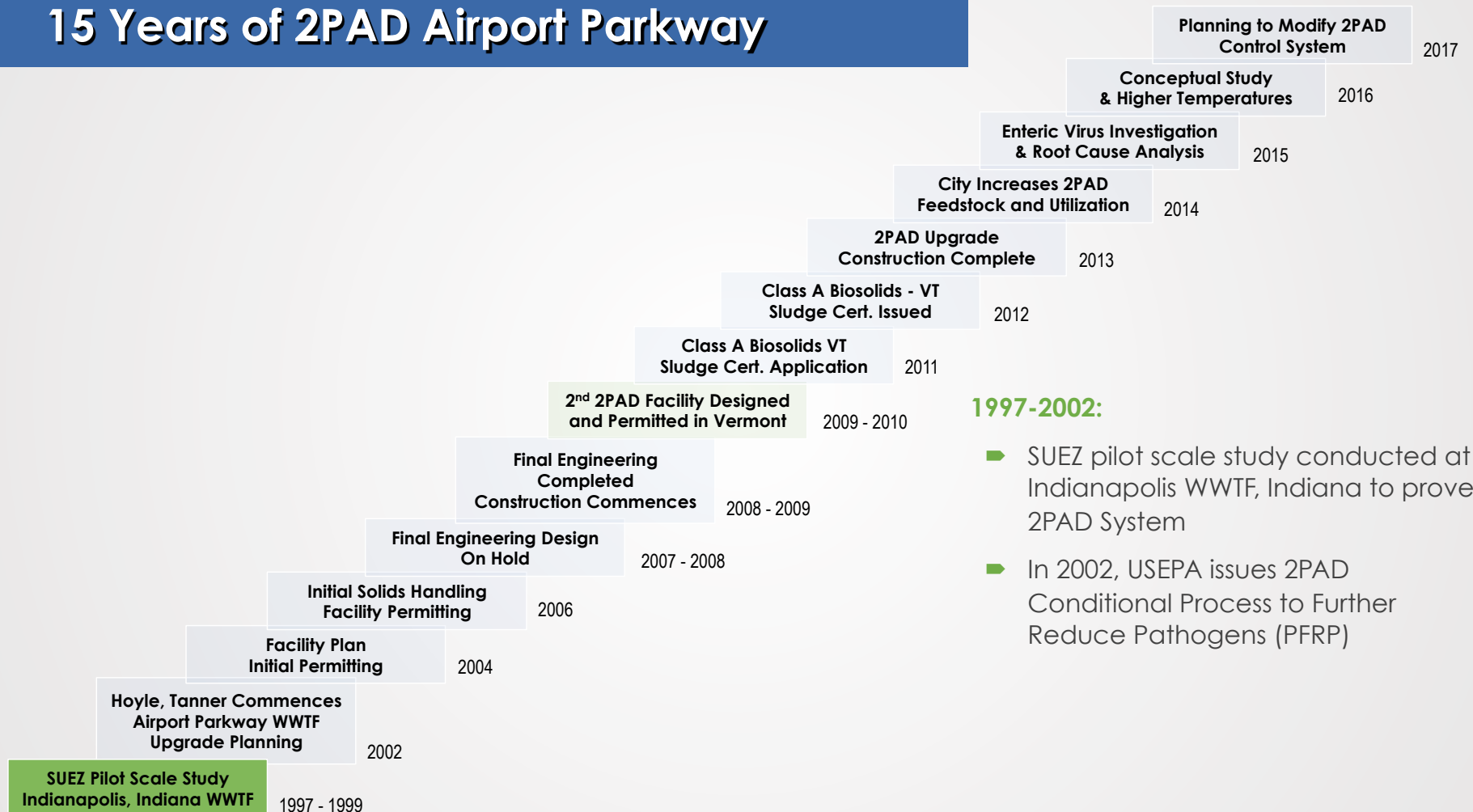
Airport Parkway WWTF 2PAD Basis of Design

Thermophillic Digester	
Operating Temperature	55°C (131°F)
Hydraulic Retention Time	2.1 Days
Mesophillic Digesters (3)	
Operating Temperature	35°C (95°F)
Hydraulic Retention Time	10.5 Days
Digested sludge storage	1,000,000 Gallons
CHP	65 KW microturbine
Dewatering	Centrifuge

15 Years of 2PAD Airport Parkway



15 Years of 2PAD Airport Parkway



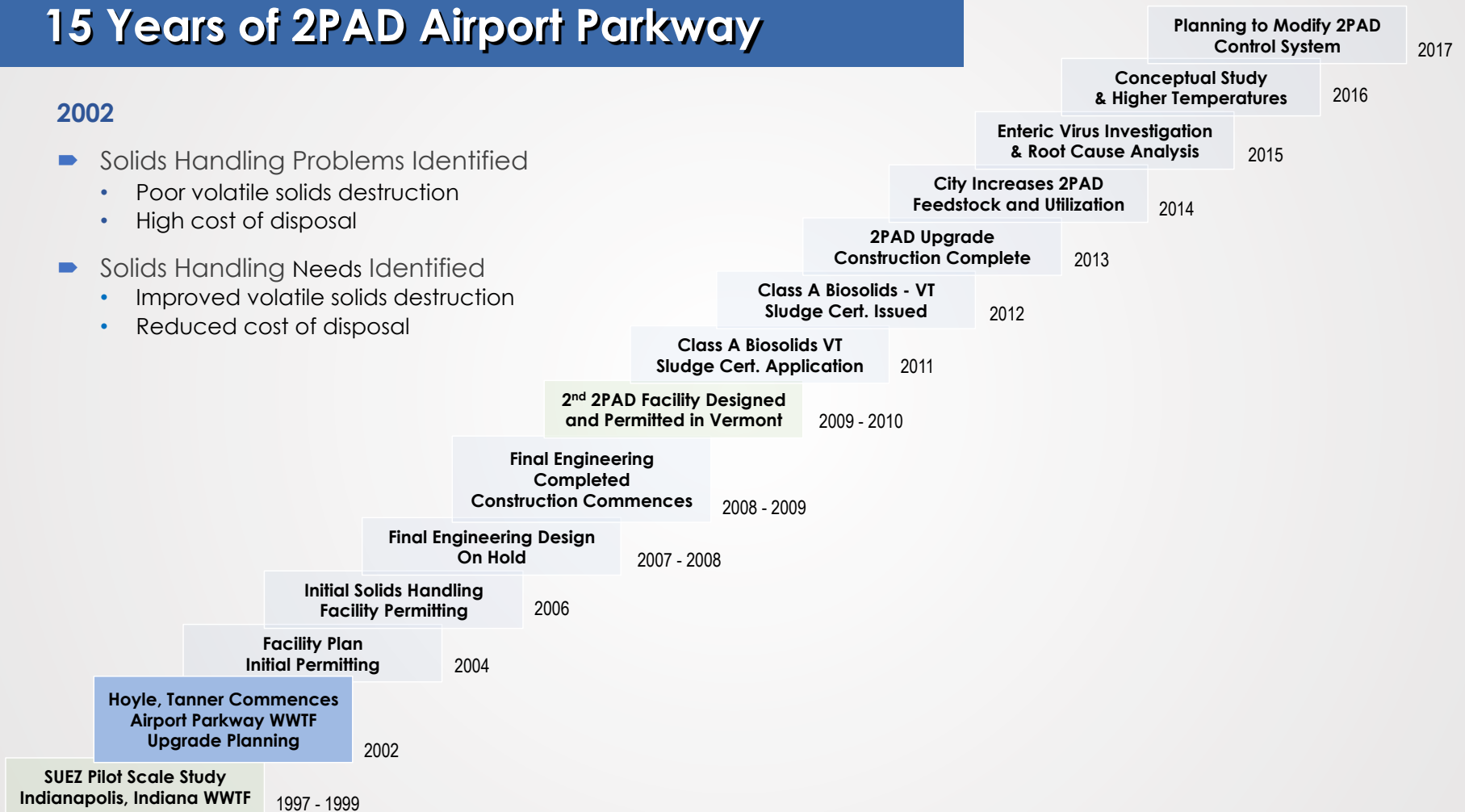
1997-2002:

- SUEZ pilot scale study conducted at Indianapolis WWTF, Indiana to prove 2PAD System
- In 2002, USEPA issues 2PAD Conditional Process to Further Reduce Pathogens (PFRP)

15 Years of 2PAD Airport Parkway

2002

- ▀ Solids Handling Problems Identified
 - Poor volatile solids destruction
 - High cost of disposal
- ▀ Solids Handling Needs Identified
 - Improved volatile solids destruction
 - Reduced cost of disposal



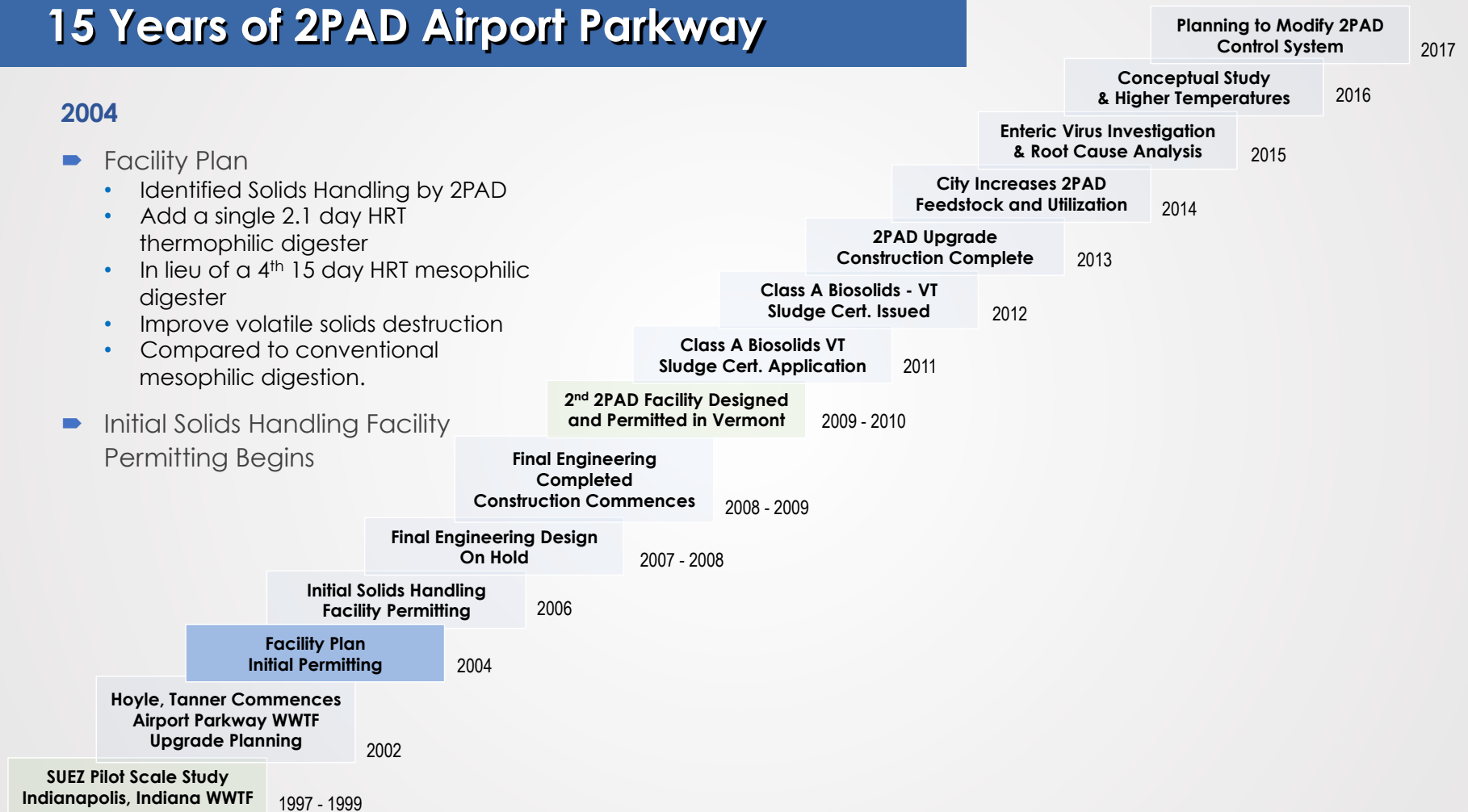
15 Years of 2PAD Airport Parkway

2004

Facility Plan

- Identified Solids Handling by 2PAD
- Add a single 2.1 day HRT thermophilic digester
- In lieu of a 4th 15 day HRT mesophilic digester
- Improve volatile solids destruction
- Compared to conventional mesophilic digestion.

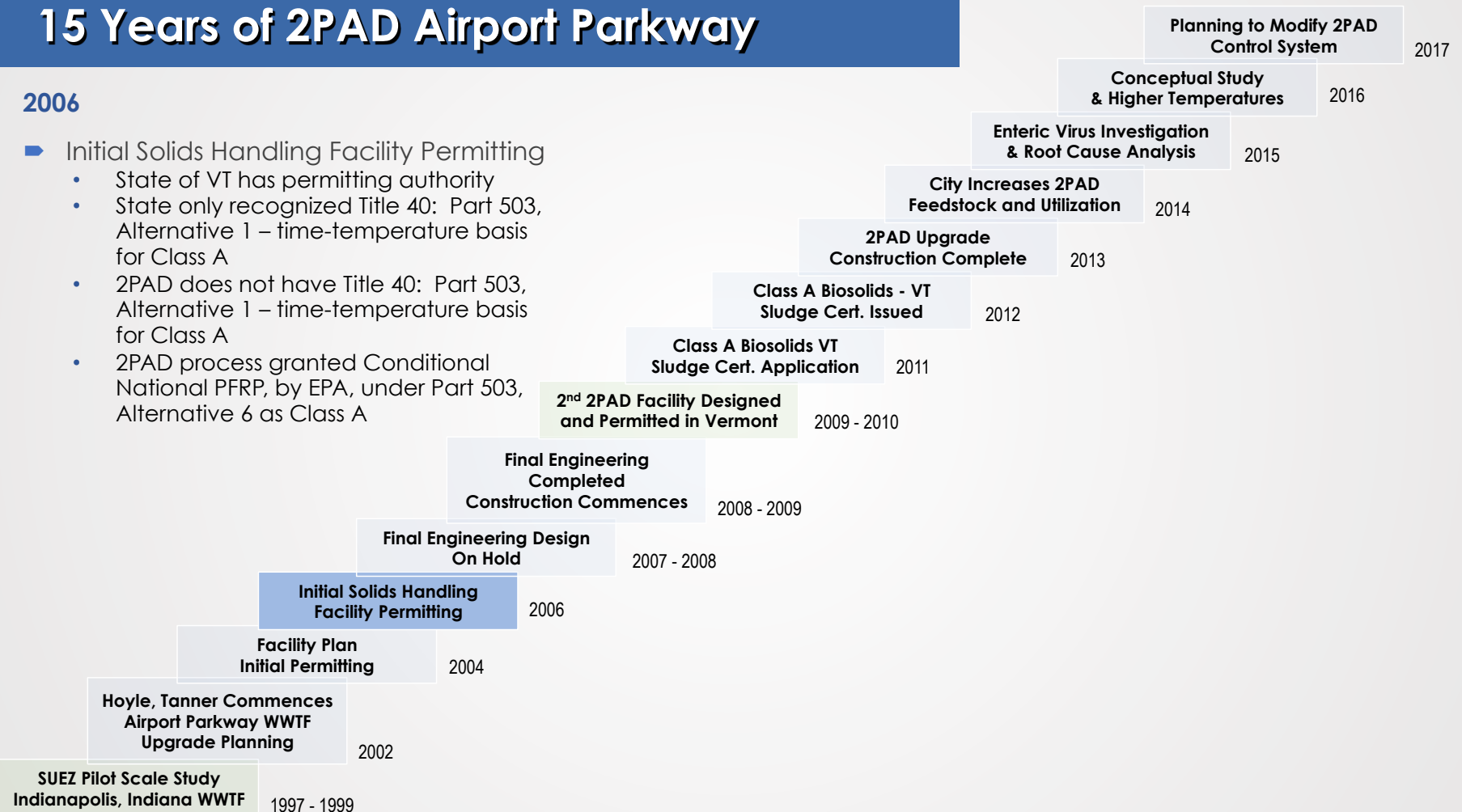
Initial Solids Handling Facility Permitting Begins



15 Years of 2PAD Airport Parkway

2006

- Initial Solids Handling Facility Permitting
 - State of VT has permitting authority
 - State only recognized Title 40: Part 503, Alternative 1 – time-temperature basis for Class A
 - 2PAD does not have Title 40: Part 503, Alternative 1 – time-temperature basis for Class A
 - 2PAD process granted Conditional National PFRP, by EPA, under Part 503, Alternative 6 as Class A

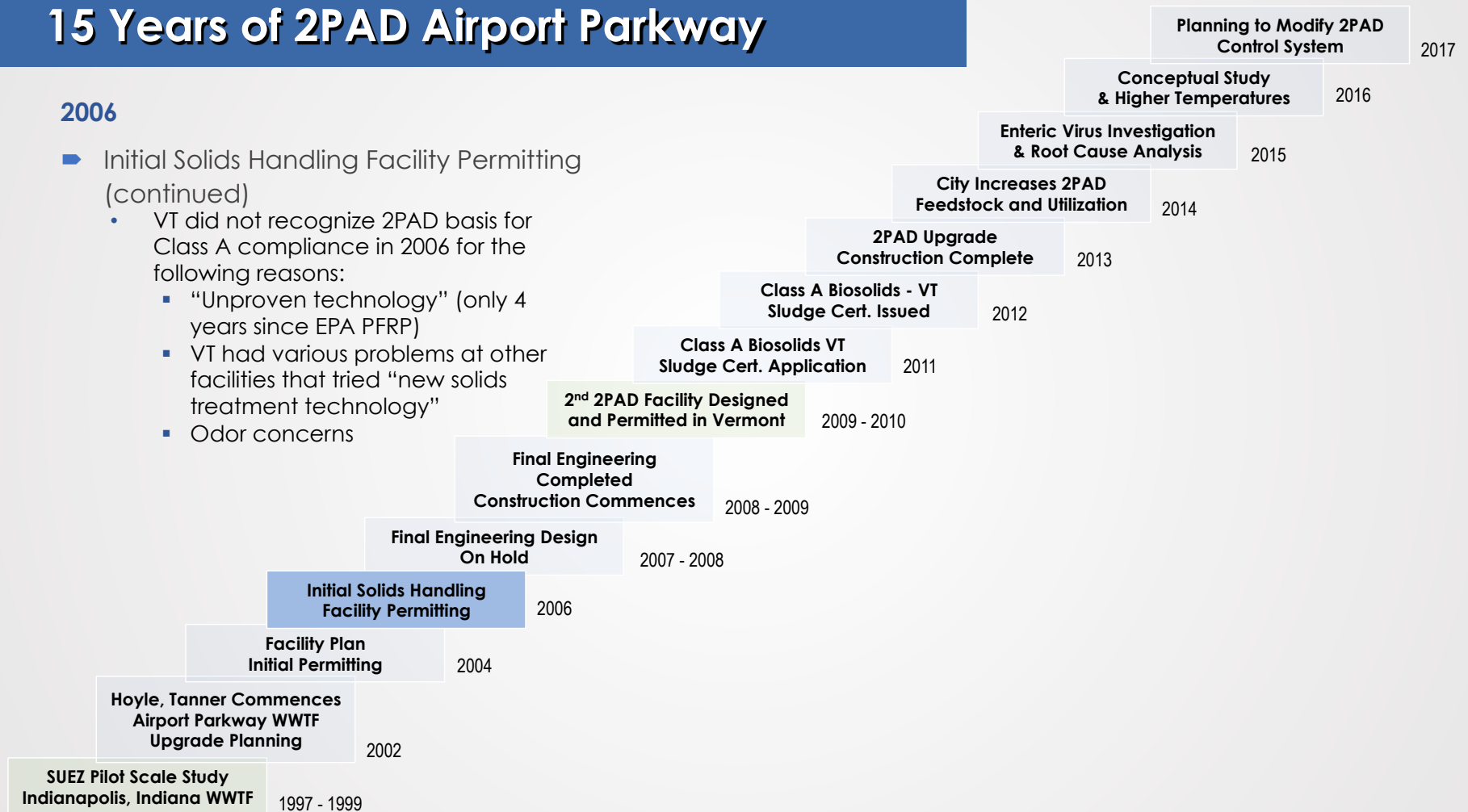


15 Years of 2PAD Airport Parkway

2006

► Initial Solids Handling Facility Permitting (continued)

- VT did not recognize 2PAD basis for Class A compliance in 2006 for the following reasons:
 - "Unproven technology" (only 4 years since EPA PFRP)
 - VT had various problems at other facilities that tried "new solids treatment technology"
 - Odor concerns

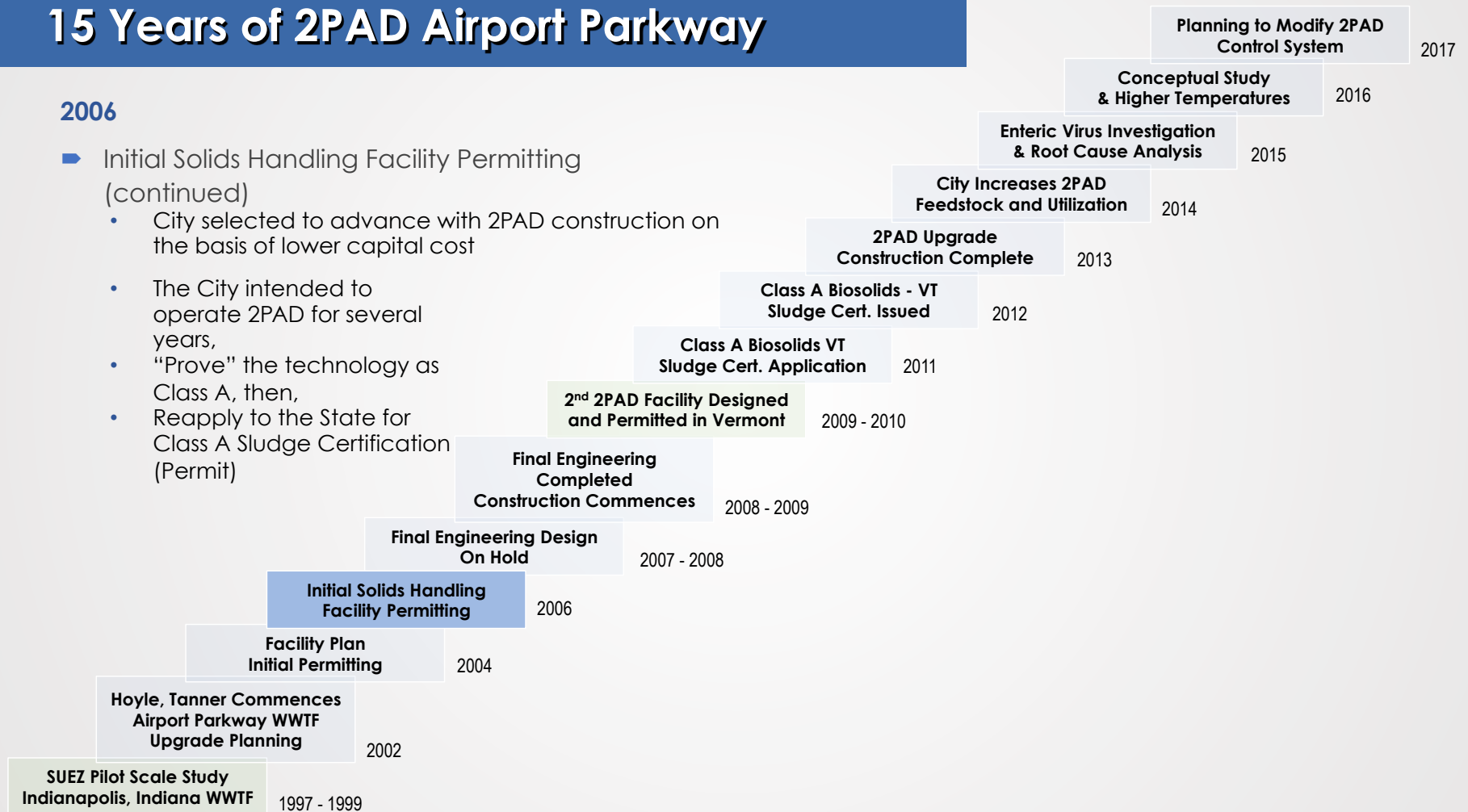


15 Years of 2PAD Airport Parkway

2006

► Initial Solids Handling Facility Permitting
(continued)

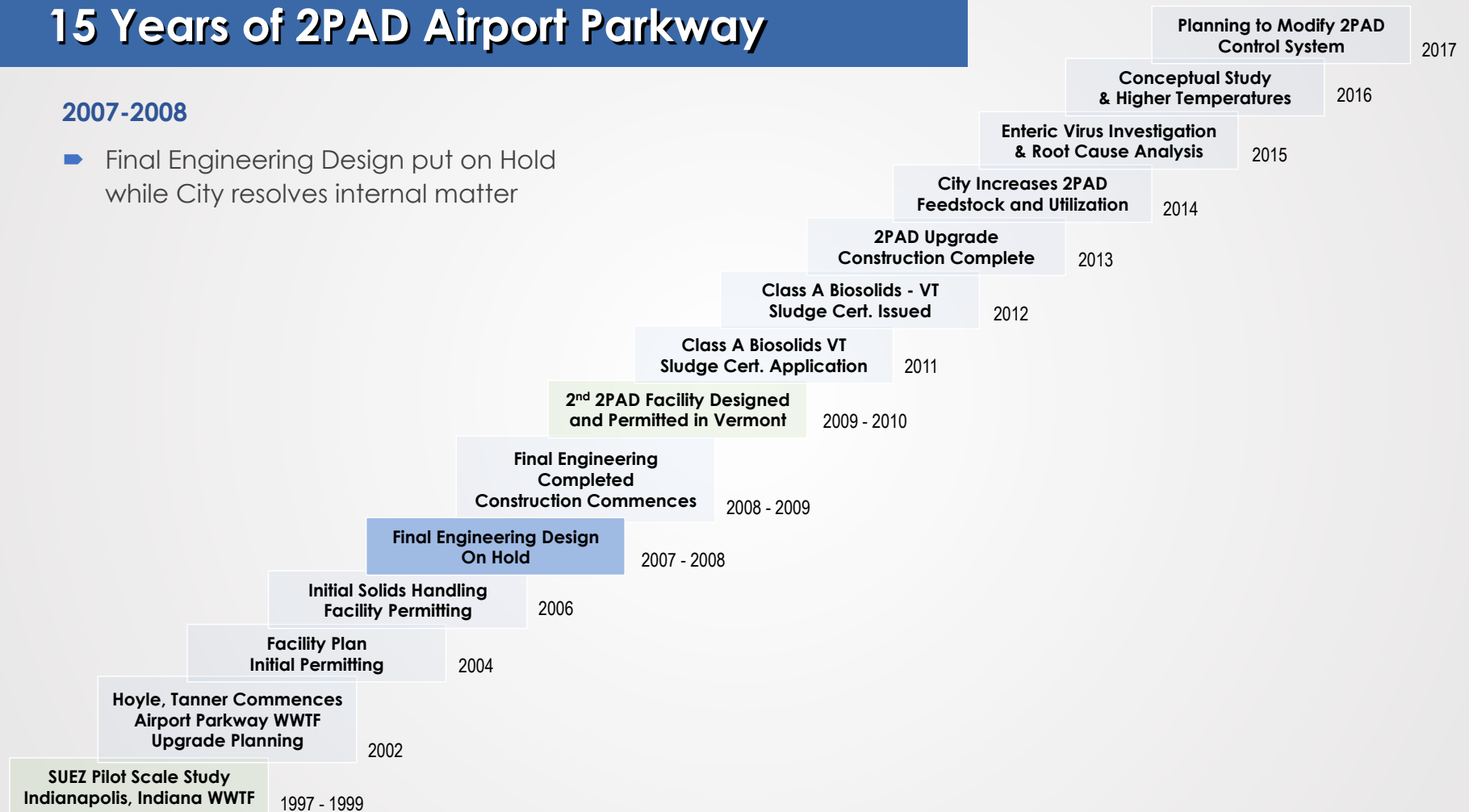
- City selected to advance with 2PAD construction on the basis of lower capital cost
- The City intended to operate 2PAD for several years,
- "Prove" the technology as Class A, then,
- Reapply to the State for Class A Sludge Certification (Permit)



15 Years of 2PAD Airport Parkway

2007-2008

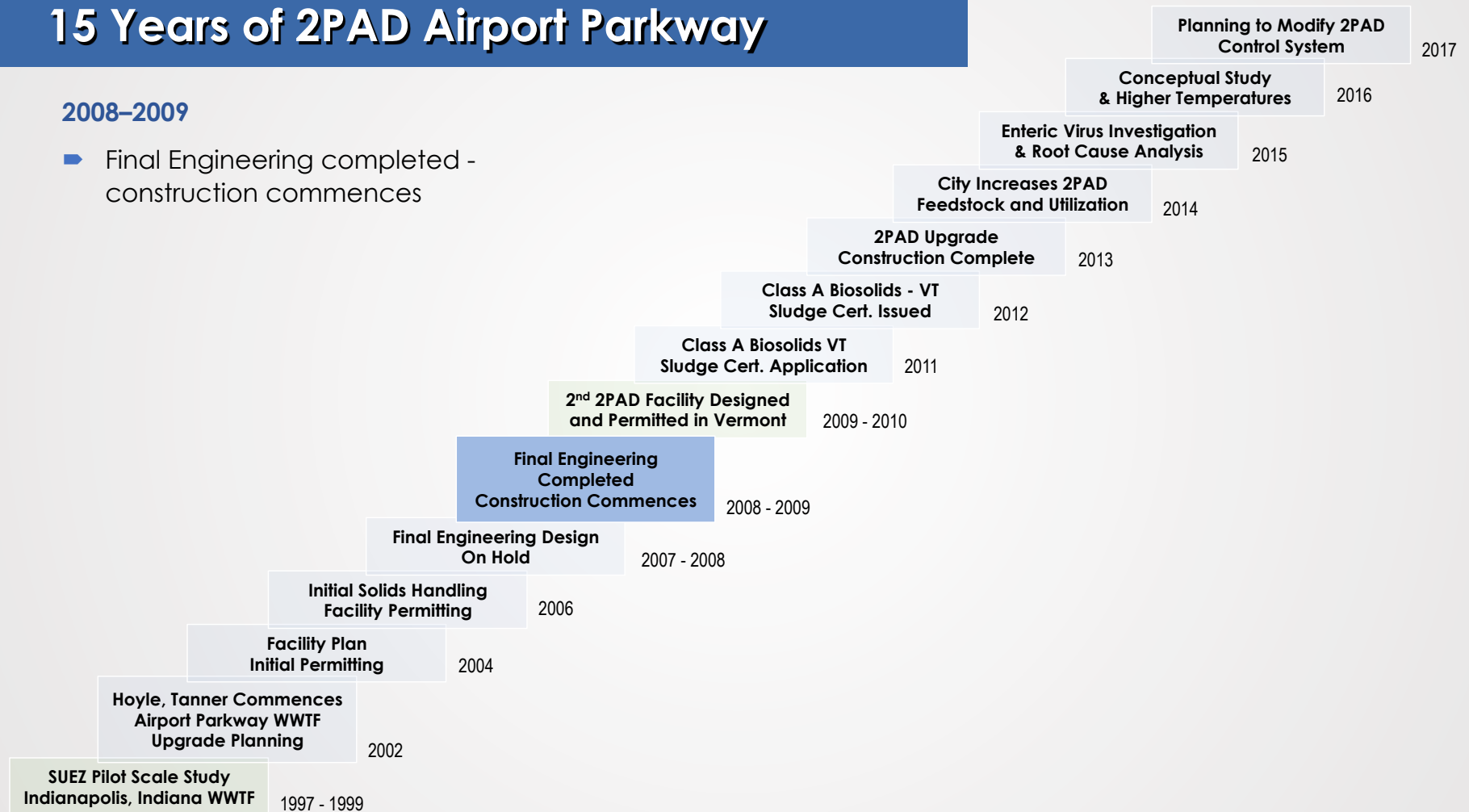
- Final Engineering Design put on Hold while City resolves internal matter



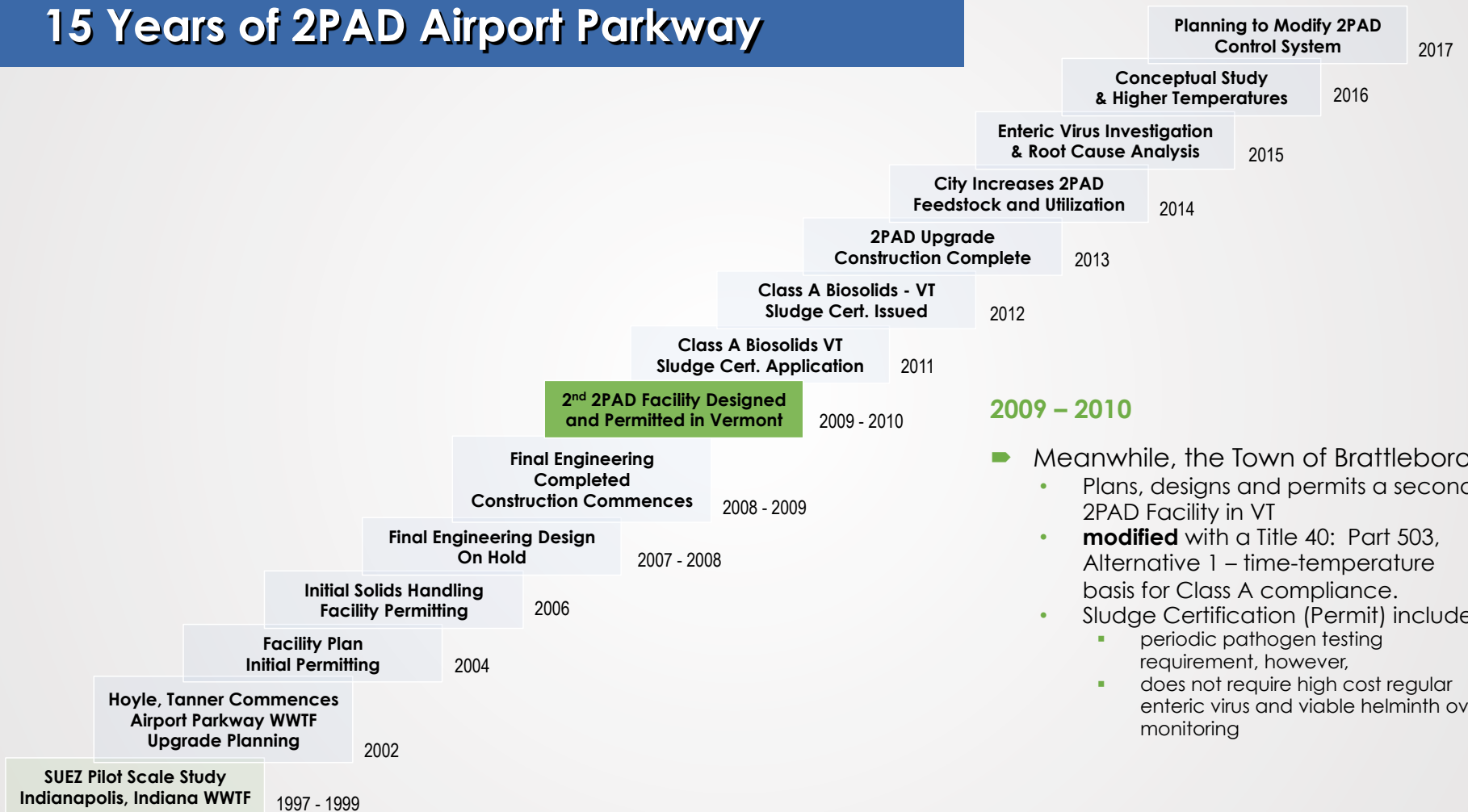
15 Years of 2PAD Airport Parkway

2008–2009

- Final Engineering completed - construction commences



15 Years of 2PAD Airport Parkway



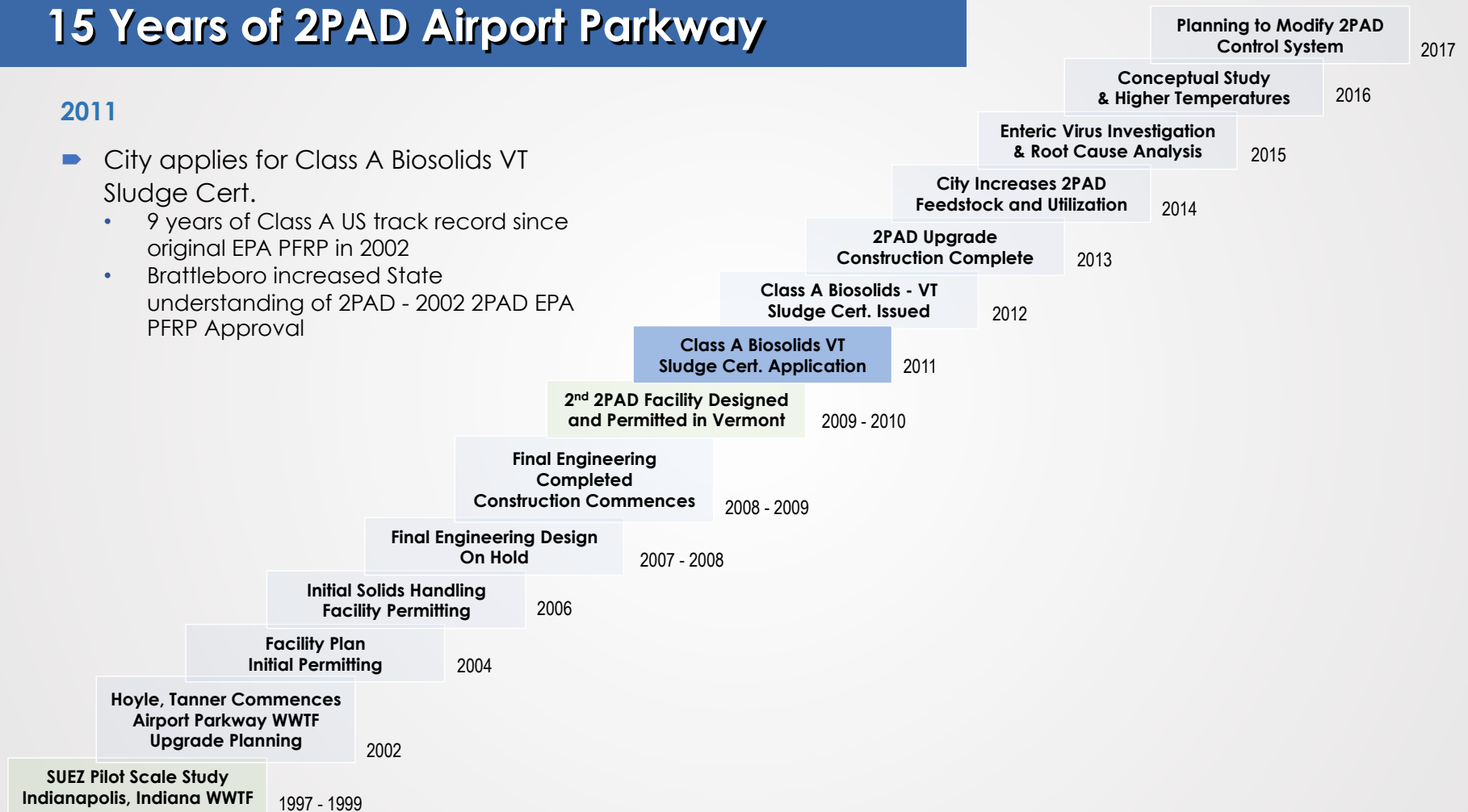
2009 – 2010

- Meanwhile, the Town of Brattleboro
 - Plans, designs and permits a second 2PAD Facility in VT
 - **modified** with a Title 40: Part 503, Alternative 1 – time-temperature basis for Class A compliance.
 - Sludge Certification (Permit) includes:
 - periodic pathogen testing requirement, however,
 - does not require high cost regular enteric virus and viable helminth ova monitoring

15 Years of 2PAD Airport Parkway

2011

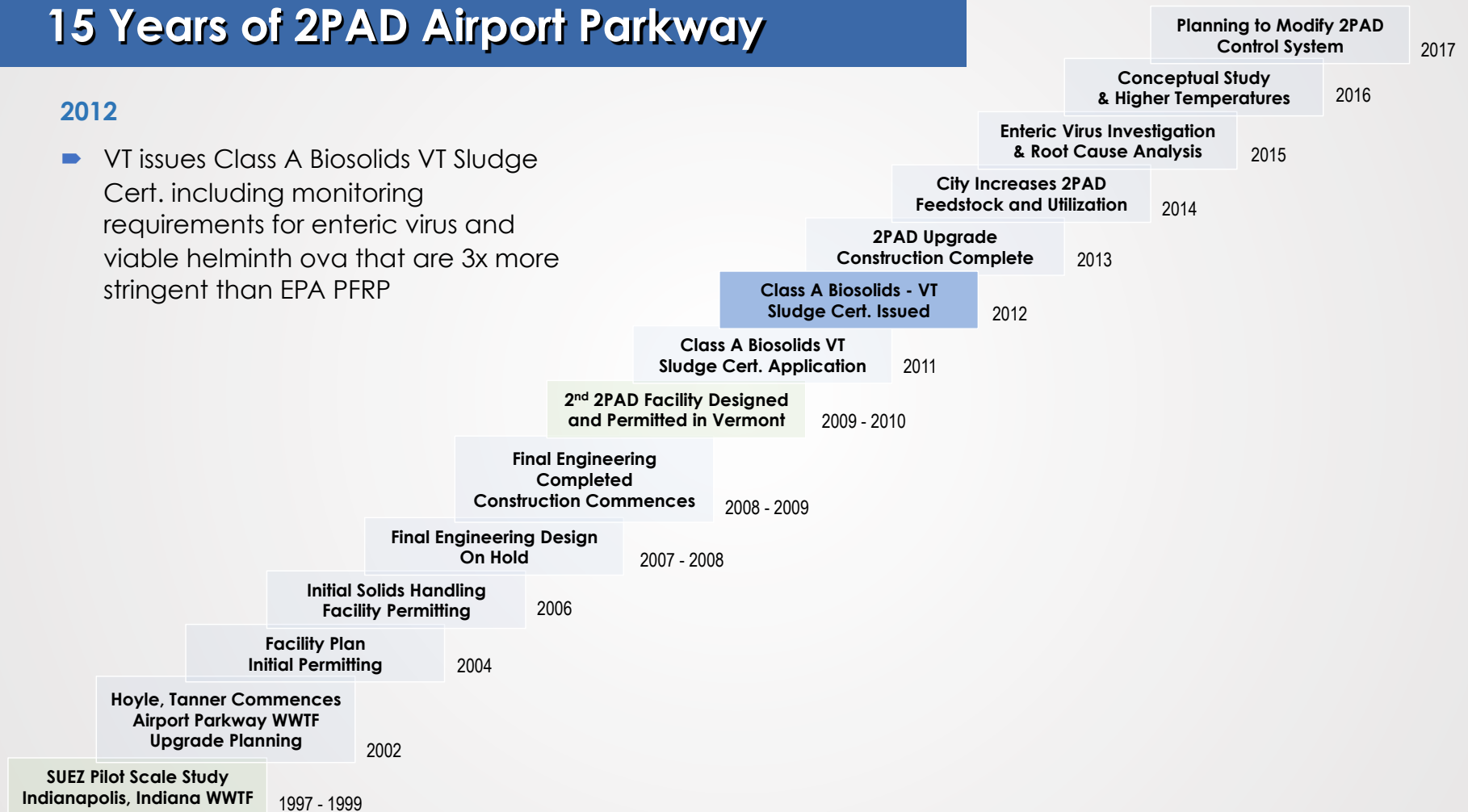
- City applies for Class A Biosolids VT Sludge Cert.
 - 9 years of Class A US track record since original EPA PFRP in 2002
 - Brattleboro increased State understanding of 2PAD - 2002 2PAD EPA PFRP Approval



15 Years of 2PAD Airport Parkway

2012

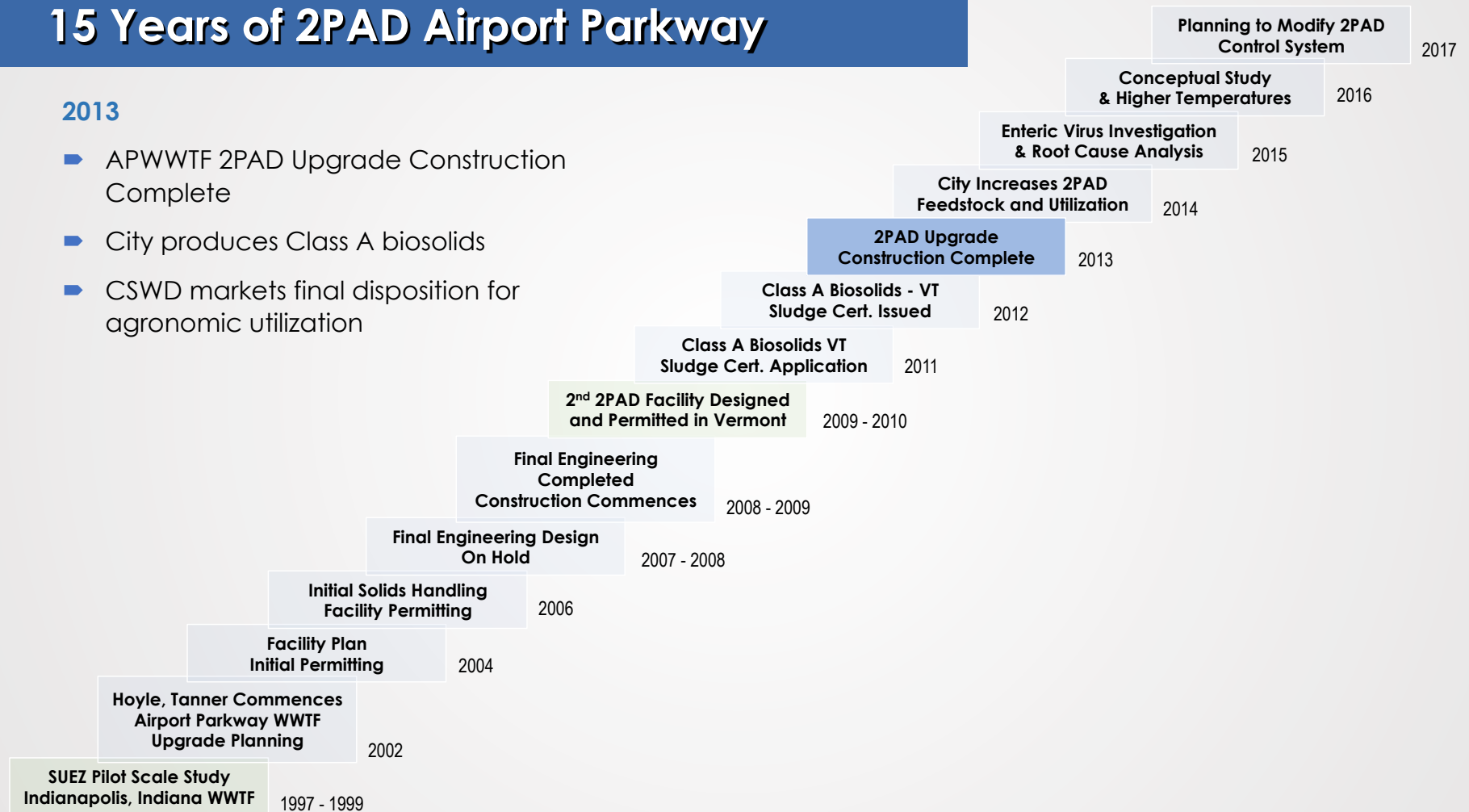
- VT issues Class A Biosolids VT Sludge Cert. including monitoring requirements for enteric virus and viable helminth ova that are 3x more stringent than EPA PFRP



15 Years of 2PAD Airport Parkway

2013

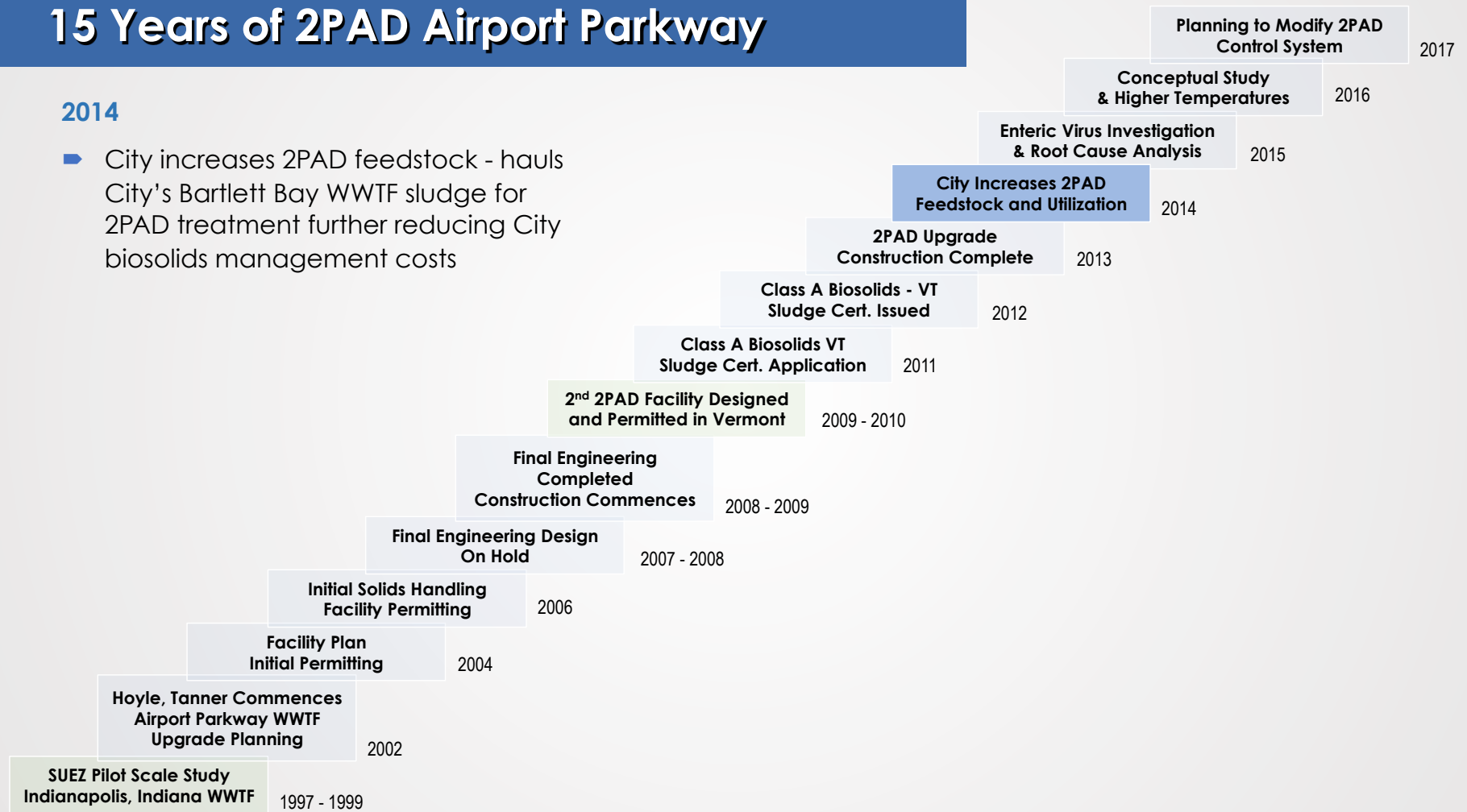
- APWWTF 2PAD Upgrade Construction Complete
- City produces Class A biosolids
- CSWD markets final disposition for agronomic utilization



15 Years of 2PAD Airport Parkway

2014

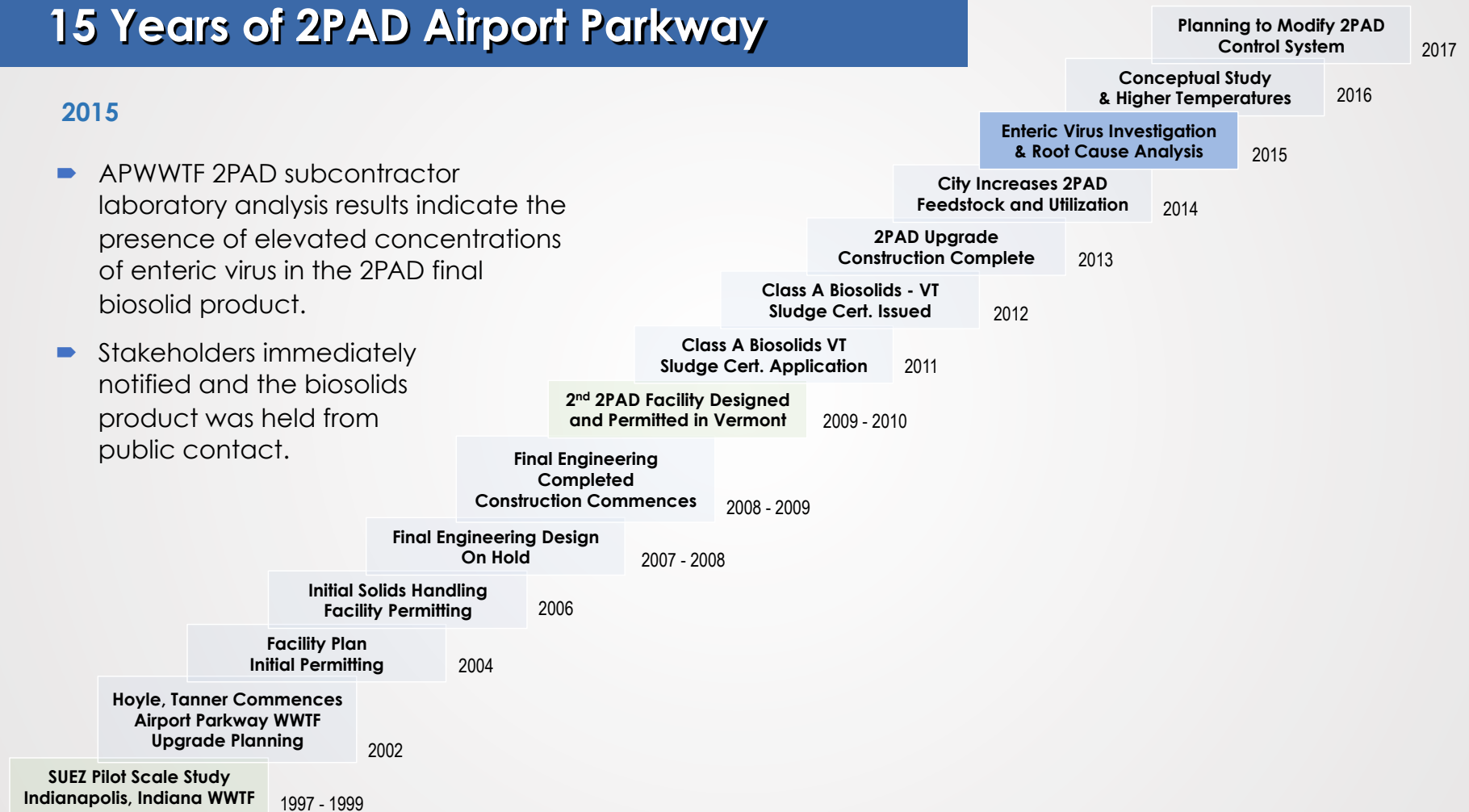
- City increases 2PAD feedstock - hauls City's Bartlett Bay WWTF sludge for 2PAD treatment further reducing City biosolids management costs



15 Years of 2PAD Airport Parkway

2015

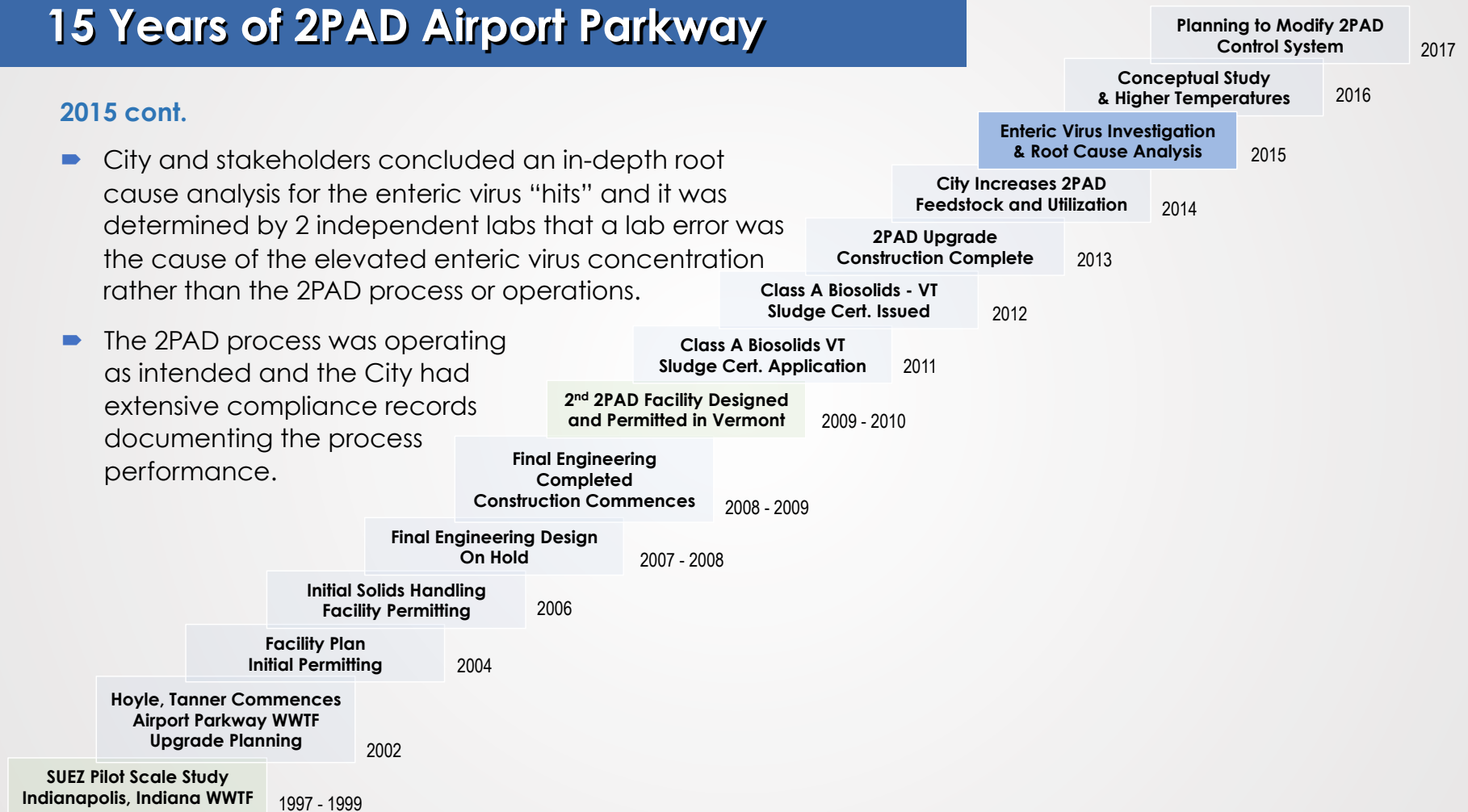
- APWWTF 2PAD subcontractor laboratory analysis results indicate the presence of elevated concentrations of enteric virus in the 2PAD final biosolid product.
- Stakeholders immediately notified and the biosolids product was held from public contact.



15 Years of 2PAD Airport Parkway

2015 cont.

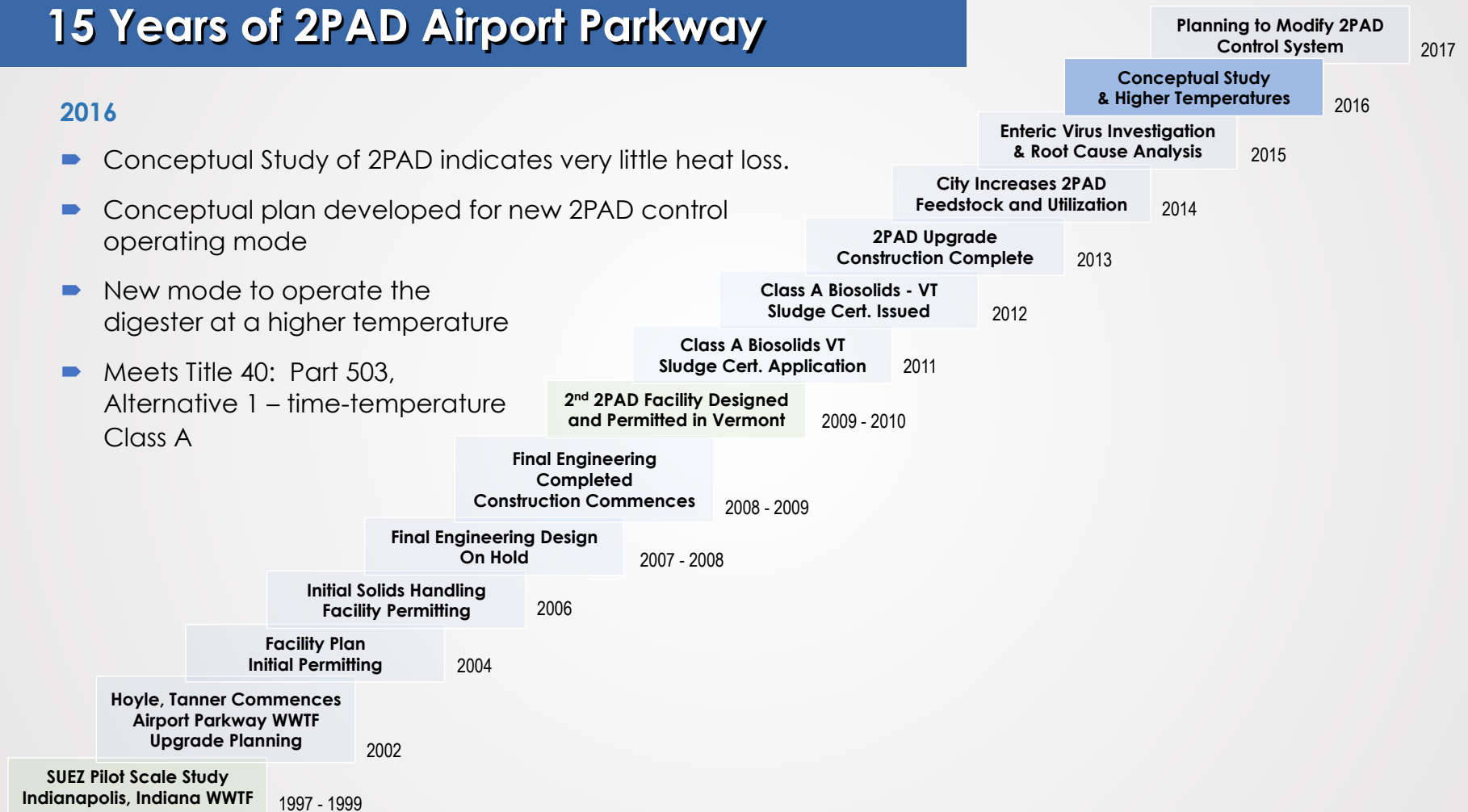
- City and stakeholders concluded an in-depth root cause analysis for the enteric virus “hits” and it was determined by 2 independent labs that a lab error was the cause of the elevated enteric virus concentration rather than the 2PAD process or operations.
- The 2PAD process was operating as intended and the City had extensive compliance records documenting the process performance.



15 Years of 2PAD Airport Parkway

2016

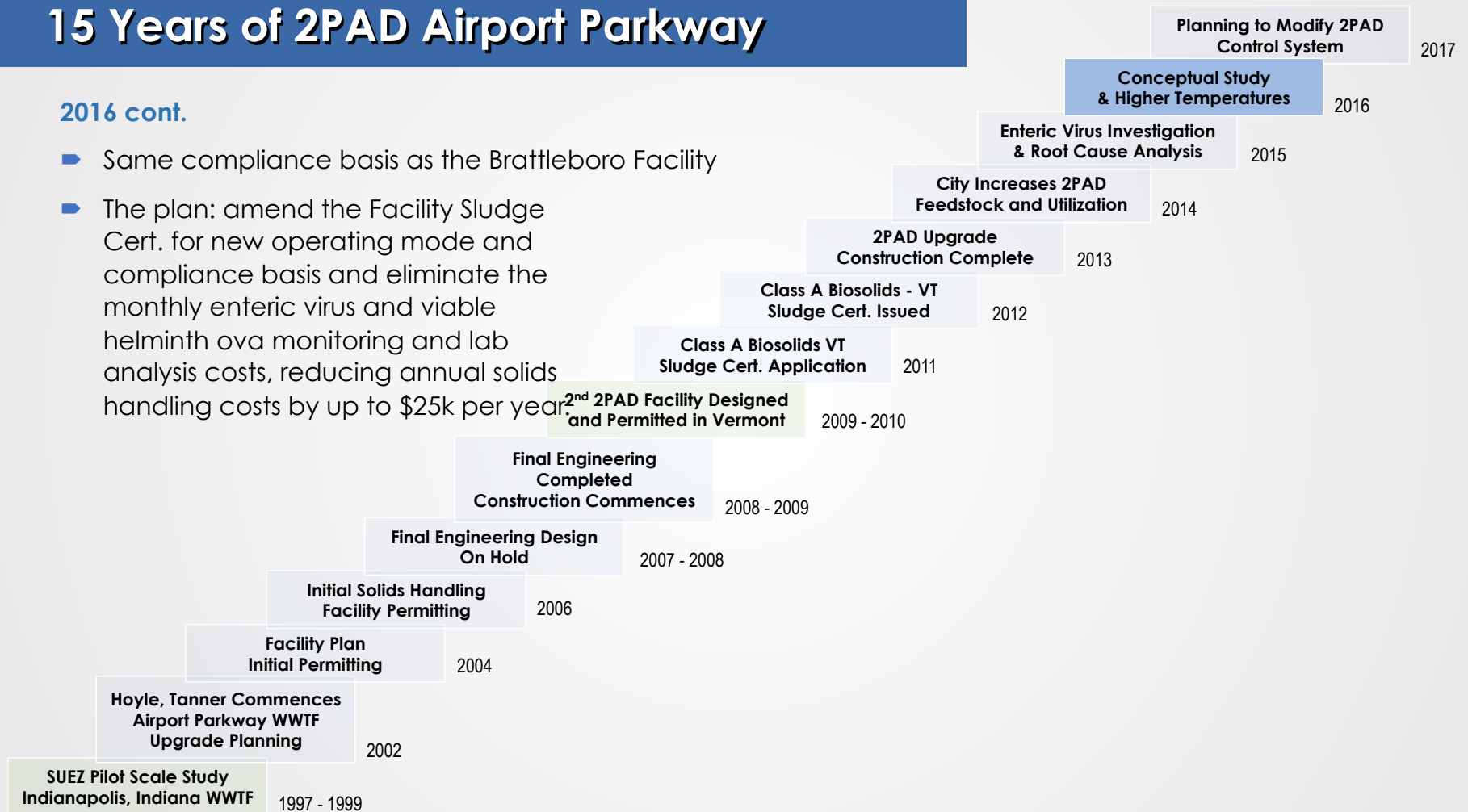
- Conceptual Study of 2PAD indicates very little heat loss.
- Conceptual plan developed for new 2PAD control operating mode
- New mode to operate the digester at a higher temperature
- Meets Title 40: Part 503, Alternative 1 – time-temperature Class A



15 Years of 2PAD Airport Parkway

2016 cont.

- Same compliance basis as the Brattleboro Facility
- The plan: amend the Facility Sludge Cert. for new operating mode and compliance basis and eliminate the monthly enteric virus and viable helminth ova monitoring and lab analysis costs, reducing annual solids handling costs by up to \$25k per year.



15 Years of 2PAD Airport Parkway

2017

- ▶ Ongoing Preliminary Engineering Planning to modify 2PAD control system with a time-temperature mode for Class A biosolids compliance

Planning to Modify 2PAD Control System

2017

Conceptual Study & Higher Temperatures

2016

Enteric Virus Investigation & Root Cause Analysis

2015

City Increases 2PAD Feedstock and Utilization

2014

2PAD Upgrade Construction Complete

2013

Class A Biosolids - VT Sludge Cert. Issued

2012

Class A Biosolids VT Sludge Cert. Application

2011

2nd 2PAD Facility Designed and Permitted in Vermont

2009 - 2010

Final Engineering Completed Construction Commences

2008 - 2009

Final Engineering Design On Hold

2007 - 2008

Initial Solids Handling Facility Permitting

2006

Facility Plan Initial Permitting

2004

Hoyle, Tanner Commences Airport Parkway WWTF Upgrade Planning

2002

SUEZ Pilot Scale Study Indianapolis, Indiana WWTF

1997 - 1999



15 Year Summary of 2PAD in VT

1997-2002 – 5 Years – From 2PAD Pilot Study to EPA PFRP Approval

2009-2010 – 2 Years – Brattleboro Permits modified 2PAD for Class A biosolids production and time-temperature compliance basis

2004-2012 – 8 Years - VT Permits S. Burlington 2PAD Class A including monitoring requirements for enteric virus and viable helminth ova that are 3 x more stringent than the EPA PFRP approval.

2013-2014 – 2 Years of Class A Biosolids Production at Airport Parkway WWTF

2015- Enteric virus exceedance turns out to be a lab error

2016-2017 – Airport Parkway WWTF Plans modified 2PAD control mode to meet time-temperature basis and eliminate COSTly enteric virus and helminth ova testing.

Airport Parkway WWTF 2PAD Results

2PAD – Simple Economic Results

- Chittenden Solid Waste District manages final Biosolids disposition
- Class A biosolids 2013-2017 Land Application: 8,613 wet tons
- Avg. 2013-2017 Landfill biosolids disposal rate: \$89.85/wet ton
- Avg. 2013-2017 Class A land application rate: \$38.07/wet ton
- Avg. 2013-2017 final disposal rate difference: \$51.78/wet ton
- 2013-2017 simple savings: \$445,981
- Microturbine electricity produced 2013-2017: 1,000 MWh
- Average GMP Power Cost : ~\$0.13/KWh
- Simple value of electrical power produced: \$130,000

15 Year of 2PAD at Airport Parkway WWTF

Lessons learned from bringing an advanced solids treatment process to VT

1. Advanced treatment processes can have a long time horizon
2. Provide immediate response to permit excursions or other concerns
3. Secure adequate feedstock quantity and quality
4. Cultivate good stakeholder relationships

Acknowledgements

- City of South Burlington
 - Justin Rabidoux, Director of Public Works
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- Dan Marks, PE, Hoyle, Tanner & Associates, Inc.
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- SUEZ (formerly Infilco Degremont and Ondo Degremont)
- PCC Construction, Inc.

Thank You

Questions?

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