

PFAS: A View On Assessment, Treatment, & Remediation From Jacobs (JEC)

Investor Teleconference

August 26, 2019

JACOBS®

www.jacobs.com | worldwide

Forward-Looking Statement Disclaimer

Certain statements contained in this presentation constitute forward-looking statements as such term is defined in Section 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended, and such statements are intended to be covered by the safe harbor provided by the same. Statements made in this presentation that are not based on historical fact are forward-looking statements. Although such statements are based on management's current estimates and expectations, and currently available competitive, financial, and economic data, forward-looking statements are inherently uncertain, and you should not place undue reliance on such statements as actual results may differ materially. We caution the reader that there are a variety of risks, uncertainties and other factors that could cause actual results to differ materially from what is contained, projected or implied by our forward-looking statements. For a description of these and other risks, uncertainties and other factors that may occur that could cause actual results to differ from our forward-looking statements see our Annual Report on Form 10-K for the year ended September 28, 2018, our Quarterly Reports on Form 10-Q for the quarters ended December 28, 2018, March 29, 2019 and June 28, 2019, as well as our other filings with the SEC. We are not under any duty to update any of the forward-looking statements after the date of this presentation to conform to actual results, except as required by applicable law.

Non-GAAP Financial Measures

To supplement the financial results presented in accordance with generally accepted accounting principles in the United States (“GAAP”), we present certain non-GAAP financial measures within the meaning of Regulation G under the Securities Exchange Act of 1934, as amended. These measures are not, and should not be viewed as, substitutes for GAAP financial measures. The non-GAAP financial measures used herein include: net revenue, adjusted net earnings, adjusted EPS, adjusted operating profit, adjusted operating profit margin and adjusted EBITDA. These measures are not, and should not be viewed as, substitutes for GAAP measures. More information about these non-GAAP financial measures and reconciliations of these non-GAAP financial measures to the most directly comparable GAAP financial measures can be found at the end of this presentation. Reconciliation of the adjusted EPS and adjusted pro forma EBITDA outlook for fiscal 2019 to the most directly comparable GAAP measure is not available without unreasonable efforts because the Company cannot predict with sufficient certainty all of the components required to provide such reconciliation, including with respect to the costs and charges relating to transaction expenses, restructuring and integration to be incurred in fiscal 2019.

Pro Forma Figures

During this presentation, we may discuss comparisons of current quarter results to prior periods on a pro forma adjusted basis. The pro forma adjusted figures for the first quarter of fiscal 2018 were calculated by using revenue and income from continuing operations of the combined Jacobs and CH2M entities as if the acquisition of CH2M had occurred prior to the first quarter of fiscal 2018, as adjusted for (i) the exclusion of restructuring and other related charges, (ii) the deconsolidation of CH2M’s investment in Chalk River as if deconsolidated on October 1, 2016 and (iii) the exclusion of the revenue and operating results associated with CH2M’s MOPAC project. In addition, the prior fiscal periods are presented as if the divestiture of the ECR business had occurred prior to the first quarter of fiscal 2018. In addition, each quarterly period of fiscal 2018 has been recast to reflect the new segment realignment, backlog methodology and pension cost changes and the updated fiscal 2019 corporate cost allocation methodology, in addition to the other adjustments described on the Non-GAAP Financial Measures slides at the end of this presentation. We believe this information helps provide additional insight into the underlying trends of our business when comparing current performance against prior periods. Readers should consider this information together with a comparison to Jacobs’ historical financial results as reported in Jacobs’ filings with the SEC.

JACOBS®

Jacobs Guest Speakers



Bob Pragada
Chief Operating Officer and President - Buildings, Infrastructure and Advanced Facilities



Jan Walstrom
Global Environmental Market Director and Senior Vice President & General Manager, Global Environmental Solutions



Bill DiGuiseppi
Principal Hydrogeologist & Global Emerging Contaminants Leader

JACOBS

Jacobs: Delivering Innovative Solutions & Disciplined Execution

U.S./Int'l Mix
74%/26%

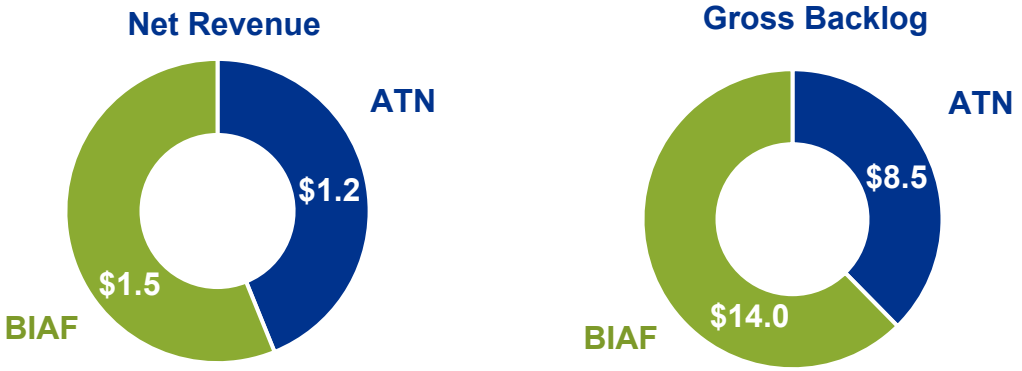
Talent Base
~52,000

Reimbursable and Lower Risk Fixed Price Services
~94%

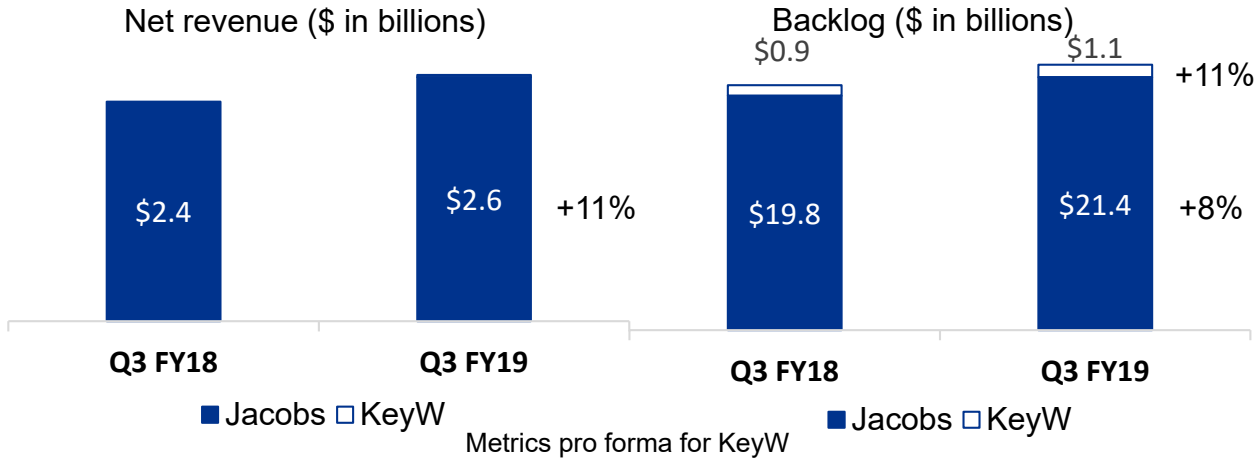
Public/Private Sector
65%/35%

- Increasing portfolio mix in high value markets
- Aligning around national government priorities
- Solving sustainable infrastructure challenges
- Focusing on technology-enabled delivery

Q3 FY19 ($ in billions)



Strong Top-Line Growth



Metrics pro forma for KeyW

Buildings, Infrastructure and Advanced Facilities (BIAF)

Aligned To Secular Growth Trends

- Urbanization driving global infrastructure investments
- Sustainability and resiliency – numerous multi-decade opportunities
- Favorable Electronics and Life Sciences CAPEX environment
- PFAS contaminants present global environmental remediation opportunity

Deep Technology Expertise at Scale in High Value Sectors

- ENR rankings demonstrate industry leadership across key sectors
- Market convergence increases demand for deep and broad expertise
- Digitally-enabled solutions continue to be a differentiator
- Jacobs and CH2M revenue synergies accelerating in backlog
- Global delivery model resonating in strong win rates and efficiency

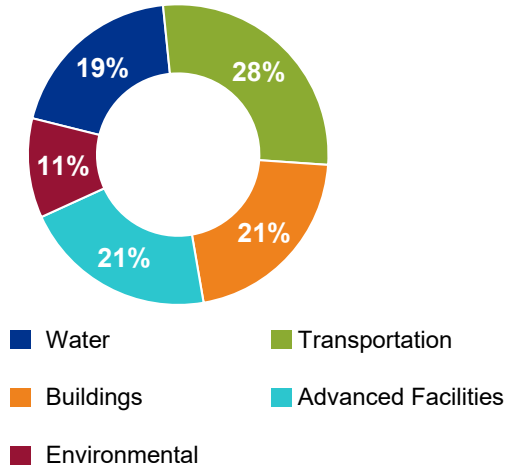
Recent Customer Wins

- FEMA Nebraska Flood Services – Environmental
- Mordeialloc Bypass (Melbourne) – Transportation
- Confidential Life Sciences – Gene Therapy
- Confidential Electronics – Microelectronics

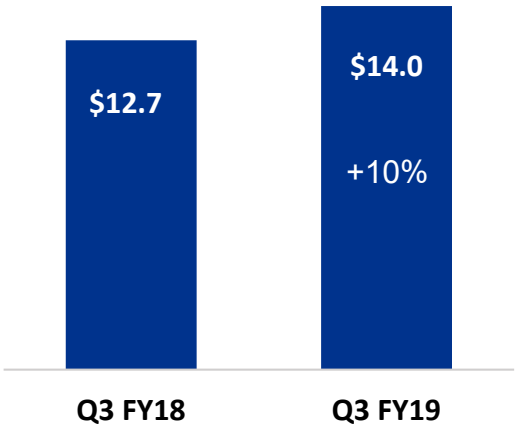
BIAF Snapshot

U.S./International	66% / 34%
Public / Private Sector	54% / 46%
Reimbursable and Lower Risk Fixed Price Services	~92%
Talent Force	~34k

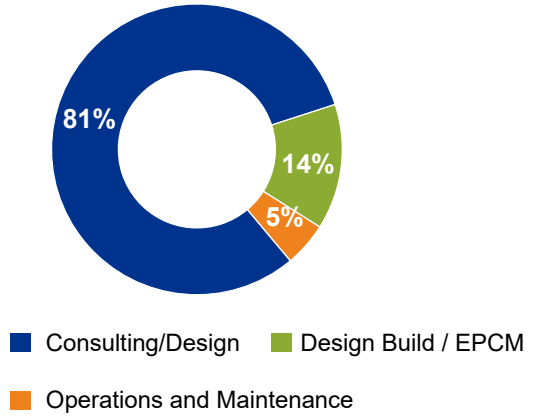
YTD Gross Revenue by Sector



Backlog ($ in Billions)

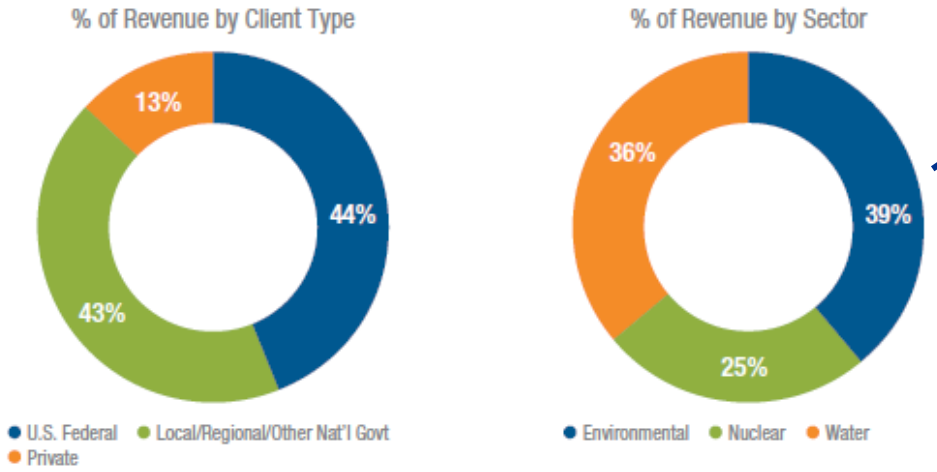


Q3 FY19 Gross Revenue by Type



Jacobs Environmental Market Overview

Environmental Business Revenue: $3.8 Billion in 2018



Note: Nuclear waste cleanup/management is aligned with ATN line of business

Engineering News-Record (ENR) Rankings

- #2 in Top 200 Environmental Firms
- #1 in Site Assessment & Compliance
- #1 in Hazardous Waste
- #3 in Chemical & Soil Remediation
- #1 in Wastewater Treatment Plants
- #1 in Sewer & Waste
- #3 in Water Treatment
- #3 in Water Supply

Environmental Market Growth Priorities

- Remediation & Revitalization
- Planning & Permitting
- Sustainability & Compliance

Delivering Critical Outcomes for our Clients

Managing Environmental Liabilities



New Bedford Harbor Superfund Site, Environmental Remediation and Restoration, Bristol County, MA



Australian Department of Defence, PFAS Investigation & Management Program

Enabling Capital Projects



Queensferry Crossing, Environmental Statement, Community Engagement and Compliance Monitoring, Scotland, UK



Enbridge Line 3 Replacement Program, Environmental and Socio-Economic Assessment, Alberta, Saskatchewan and Manitoba, Canada

Assuring Operating Asset Compliance



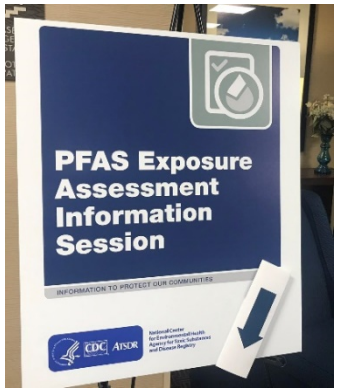
NASA Marshall Space Flight Center, Environmental Engineering Support Services, Huntsville, AL



Rio Tinto Kennecott Utah Copper, Air Permitting and Compliance, South Jordan, UT

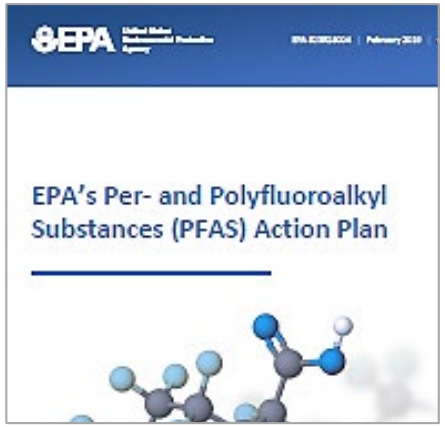
PFAS as a Growing Concern





Interstate Technology & Regulatory Council






Esper creates task force to deal with cancer-causing chemicals on military installations

By: Howard Altman and Aaron Mehta July 24

Why now? → **5.5 million people with drinking water impacts** → **Public concern, media attention and political action** → **Regulatory Activity** → **Mitigation Measures**

EPA required roughly 5,000 water systems (that serve approximately 82% of U.S. population) to monitor for six PFAS—including PFOA and PFOS—between January 2013 and December 2015


NATIONAL

As Federal Regulations Lag, States Take Action Against PFAS Chemicals

July 16, 2019 · 5:06 AM ET

Heard on Morning Edition



Solution Timeline in Years

2014-2019

2014 Widespread discovery

2016 Initial Assessment

2017 Remediation Experimentation and Technology

2019 On-going Investigations

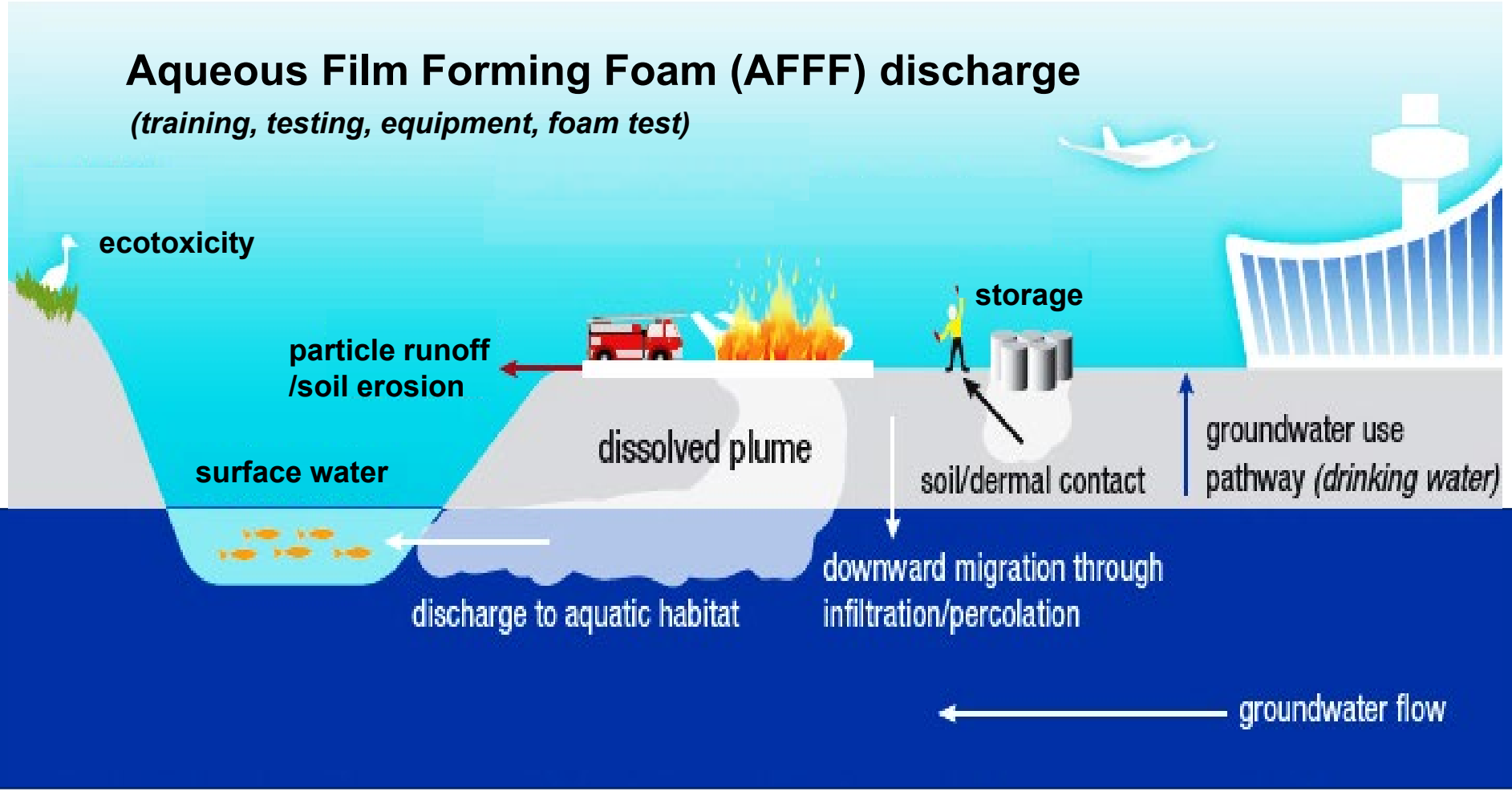
2020-2030

Improvements needed in:

- **Toxicology**
- **Fate & Transport**
- **Remedial Solutions**

JACOBS

PFAS Challenges

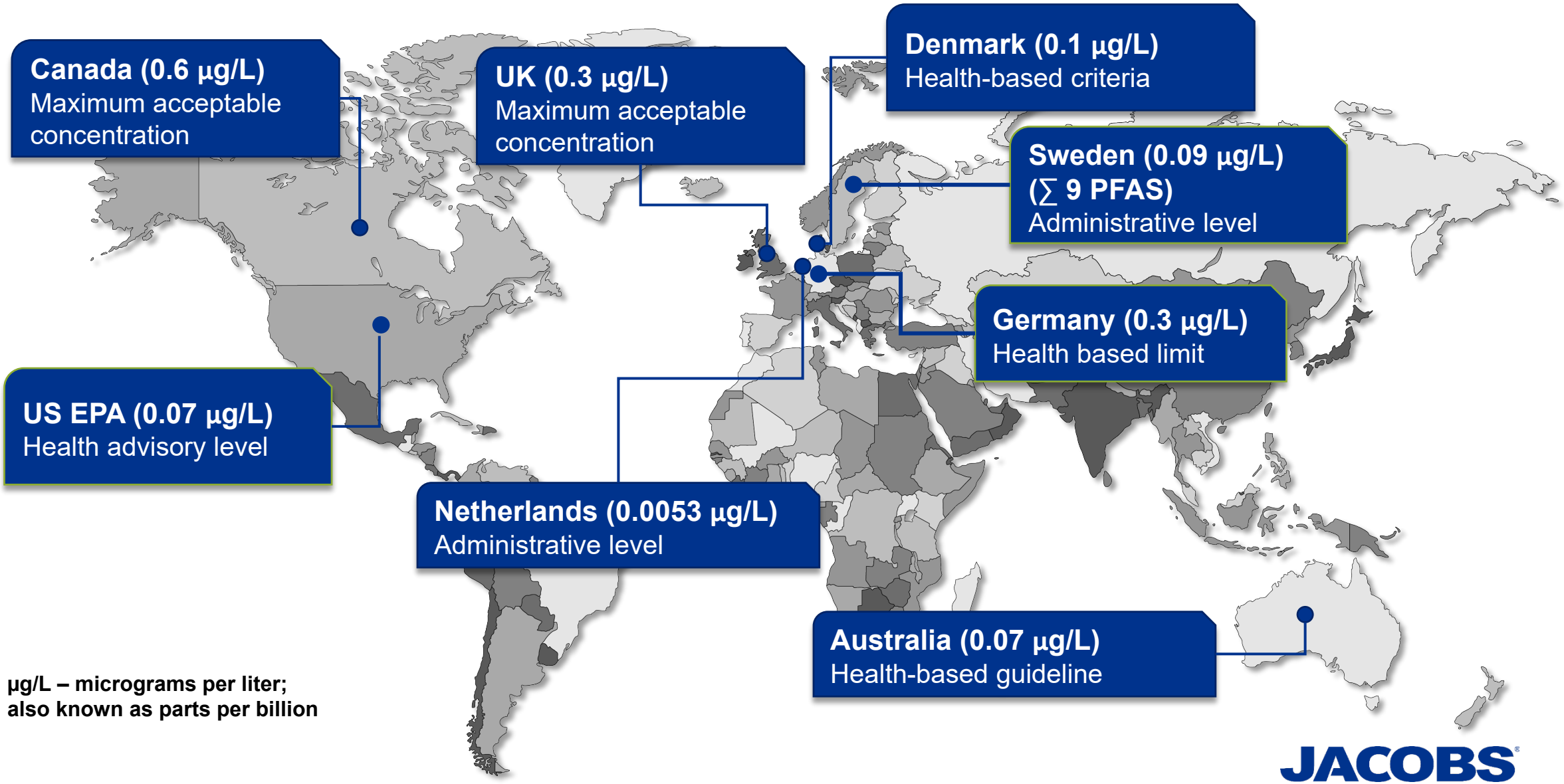


Adapted from: The National Academies Press, Use and Potential Impacts of AFFF Containing PFASs at Airports (2017)

JACOBS

How Other Countries are Addressing PFAS

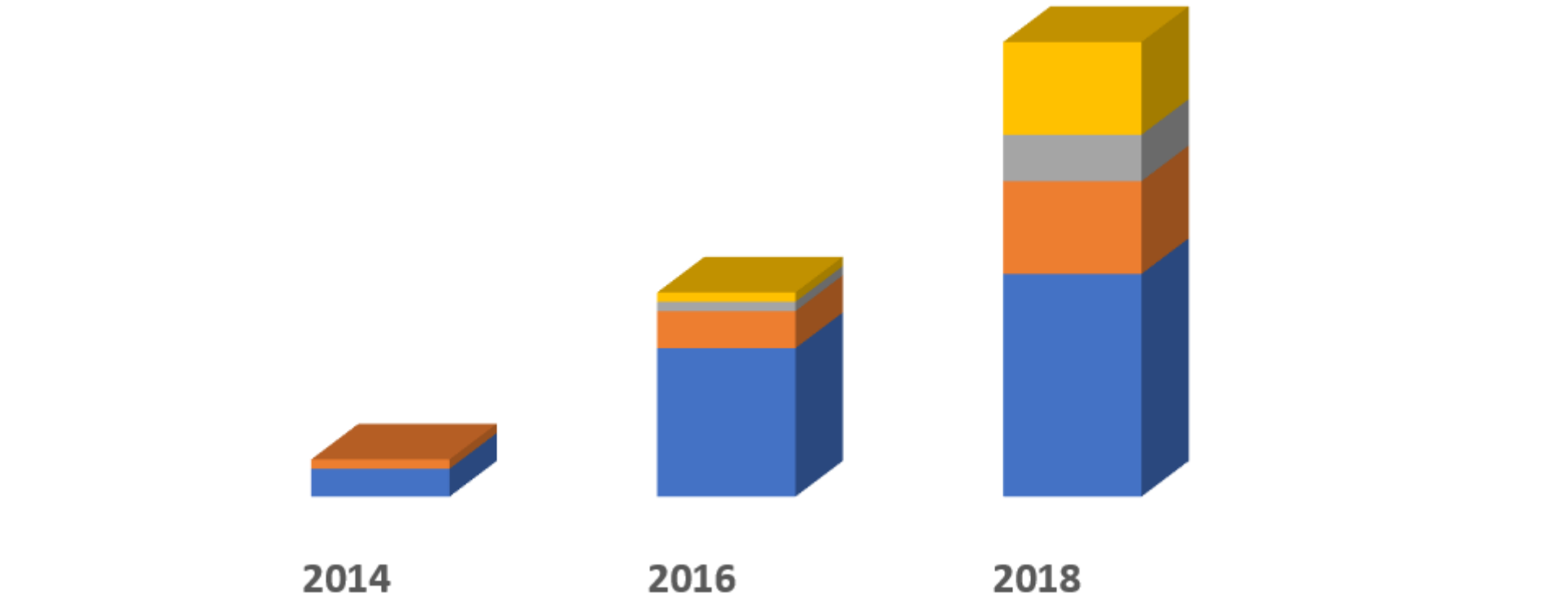
(example Drinking Water guidance and requirements for PFOS)



µg/L – micrograms per liter; also known as parts per billion

JACOBS

Client Momentum



JACOBS

Current/Conventional PFAS Treatment

Water Treatment

Conventional	Description	Jacobs Research
Carbon Sorption	Carbon sorption is a physical and chemical process by which one substance becomes attached to another. Regulated PFAS sorb well to carbon; some unregulated ones do not.	✔
Ion Exchange Sorption	Ion exchange media, or proprietary blends of those materials and/or clays or polymers, are more effective sorbents for PFAS than carbon at the molecular level, but are not necessarily the lowest life cycle cost.	✔
Membrane Filtration	Membrane Filtration, including reverse osmosis, is a common water purification process that uses a partially permeable membrane to remove ion, such as PFAS. Can be effective but costly with high energy usage.	✔
Coagulation	Coagulation/flocculation involves the addition of polymers that clump the small, destabilized particles together into larger aggregates so that they can settle out from the water. Best for high concentration PFAS.	✔

Soil Remediation

Conventional	Description
Capping	Capping involves placing a cover over contaminated material to prevent migration of precipitation into and migration of leachate out of a mass of contaminated soil or other waste materials. Soil (and liability) remains on site in perpetuity.
Disposal	Excavation and transport offsite to a permitted landfill. Landfills starting to refuse PFAS wastes.
Incineration	Incineration is the process of burning hazardous materials at temperatures high enough to destroy contaminants. Highest cost option, depending on volume and distance to facility. No permitted PFAS incinerators yet in the US.
Stabilization	Stabilization involves mixing waste with binding agents like clays, or other proprietary blends to make them less likely to be released into the environment. Questions remain about permanence. Soil (and liability) remains on site in perpetuity.

JACOBS

Developing PFAS Treatment Solutions

Water Treatment

Developing	Description	Jacobs Research
Oxidation	Oxidation involves adding chemical reagents either aboveground or into the subsurface to destroy organic contaminants. There is some evidence of PFAS oxidation; no full-scale field demonstrated technologies yet.	✔
Biotreatment	Biotreatment is the processing of waste or hazardous substances using living organisms such as bacteria, fungi or protozoa. There is some evidence of PFAS degradation under certain conditions; unlikely to be a complete solution, but perhaps a green portion of an optimized treatment train.	✔
In Situ Sequestration	In situ sequestration involves the injection of colloidal activated carbon, polymers, or combinations to prevent plume migration. PFAS sorption moved underground, used as a containment option. No field tests yet.	✔

Soil Remediation

Developing	Description	Jacobs Research
Thermal Desorption	Thermal desorption utilizes heat to increase the volatility of contaminants such that they can be removed (separated) from the solid matrix (typically soil, sludge or filter cake). Demonstrated in field; offers potential for on-site destruction.	✔
Biopiles	Biopiles are an ex situ, solid-phase biological process for converting contaminants to low-toxicity byproducts. Similar to considering biotreatment for water, this approach needs further development, but could be part of a greener solution.	✔

JACOBS

Historical Perspective on Addressing Pollutants

- Public, regulatory and political expectations are to achieve in 5-10 years what took the industry and academia 50 years to accomplish for previous pollutants.
- Progress is being made, but it is a uniquely complex challenge.
- Leveraging experience/lessons learned.

Solution Timeline in Decades (e.g., trichloroethylene)



1970's	1980's	1990's	2000's	2010's	2020's
Widespread discovery	**Initial assessment**	**Investigation and feasibility studies**	**Implementation of initial remedies**	**Optimization of remedies**	**Widespread availability of good solutions**

JACOBS

Historical Perspective on Addressing Pollutants

Solution Timeline in Decades (e.g., trichloroethylene)



Solution Timeline in Years (PFAS)



2014
Widespread discovery

2016
Initial Assessment

2017
Remediation Experimentation and Technology

2019
On-going Investigations

Improvements needed in:
- **Toxicology**
- **Fate & Transport**
- **Remedial Solutions**

JACOBS

Questions and Answers

© Copyright Jacobs
August 25, 2019

JACOBS®

www.jacobs.com | worldwide

Thank you

© Copyright Jacobs
August 25, 2019

JACOBS®

www.jacobs.com | worldwide