PRECISION COATING™

RAMBOLL

Case Study: A PFAS Investigation and Remediation at a Massachusetts Medical Device Coating Operation

MCTA Annual Meeting

Sturbridge, MA

November 7, 2024

Ramboll in brief

- Independent architecture, engineering, and consultancy company
- Founded 1945 in Denmark
- 18,500 experts globally – 2,150 in the Americas
- Present in 35 countries
- Particularly strong presence in the Nordics, the UK, North America, Continental Europe, and Asia Pacific
- Creating sustainable solutions across Buildings, Transport, Energy, Environment & Health, Water, Management Consulting, and Architecture & Landscape.
- EUR 2.2 billion revenue
- Owned by Rambøll Fonden – The Ramboll Foundation

Sustainable, comprehensive, and integrated solutions

Americas markets:

Water

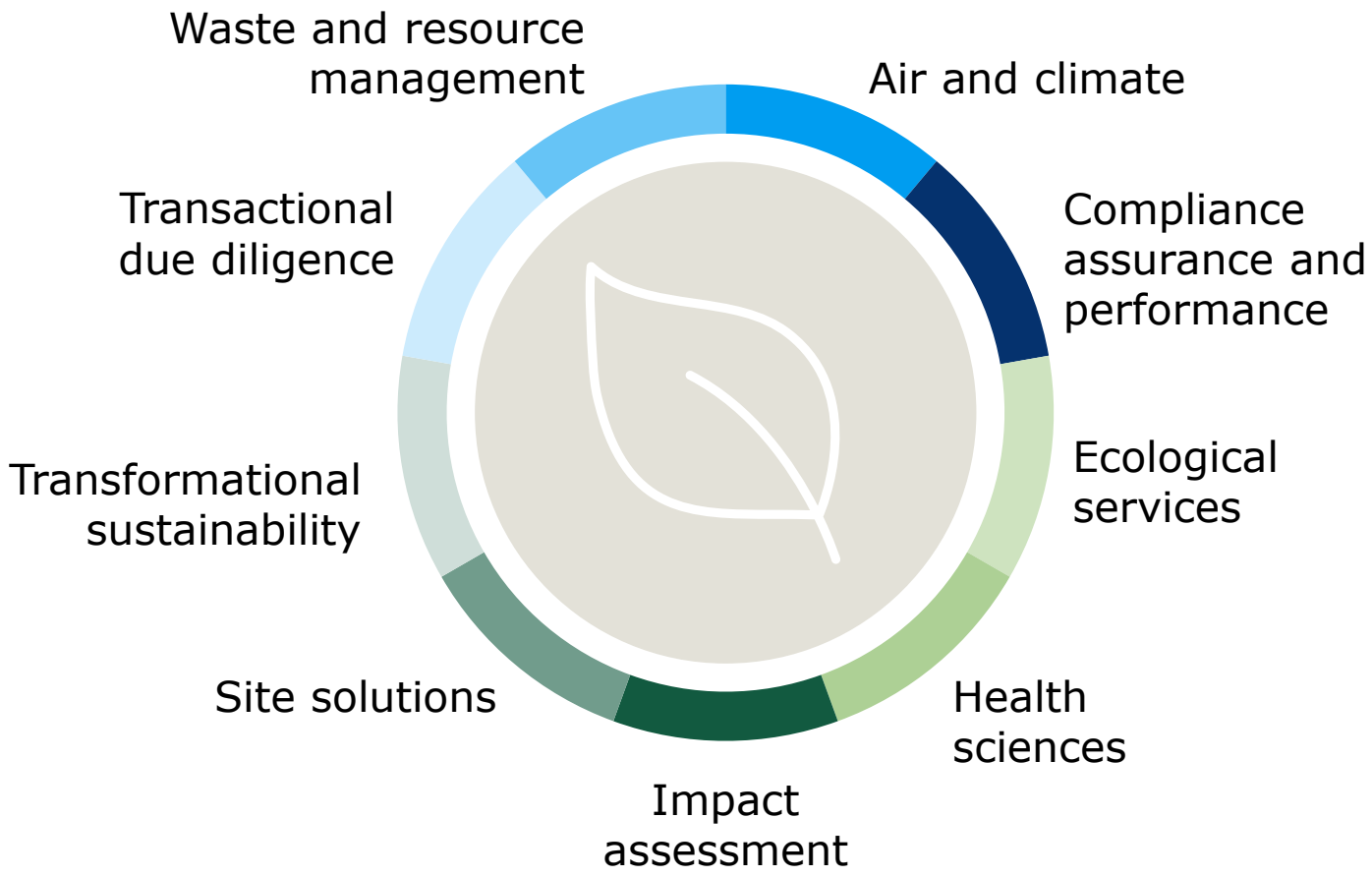
Advanced Manufacturing

Environment & Health

Energy

Management Consulting

Environment & Health services



About Precision Coating

Medical Device & Products Focused

- Leading provider of *highly-engineered, mission critical surface & coating technologies* to enable production of medical devices & products
- *Deep material science expertise* across application of coatings and surface modification technologies on diverse substrates
- *Purpose-built center of excellence* facilities in key Med Tech global hubs of New England (4 locations) and Costa Rica
- *Scalable solutions* from design to prototyping to fully automated, high-volume production

Surface Treatment & Coating Technology

Fluoropolymer

InfiNiTiCoat™
GlideLine™
EcoGlide™

Anodic Coatings

Micralox™ ULTRA
Micralox™ LUMINA

PVD/Ion Treatment

IonGuard®
Ion Beam Assisted Deposition (IBAD)
Ti360™

Laser Processing

Femtosecond
Nanosecond
5-axis Technology

Support Devices Across the Full Anatomy

Neurovascular
- Brain aneurysm repair

Dental
- Orthodontics

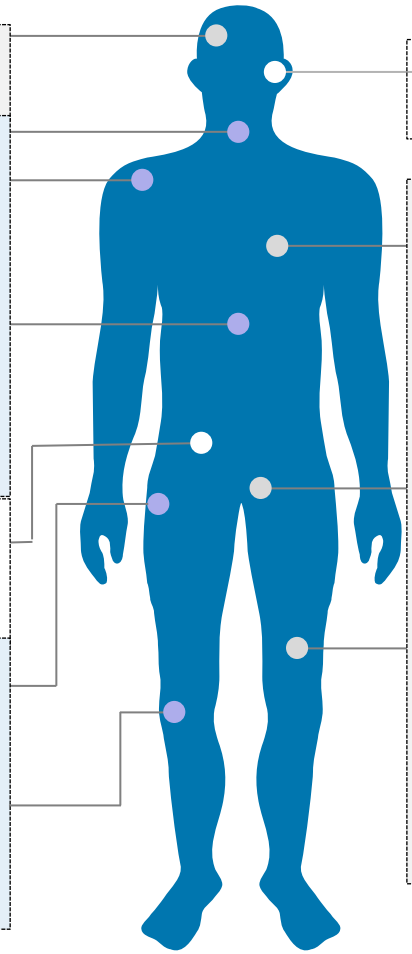
Extremities
- Reconstructive
- Arthroscopy
- Endoscopy

Spine
- Spacers
- MIS spine
- Surgical navigation

Gastrointestinal
- Colonoscopy
- Biopsy
- Kidney stone management

Hip
- Arthroscopy
- Ortho reconstructive
- Surgical navigation

Knee
- Arthroscopy
- Ortho reconstructive
- Surgical navigation



ENT
- Myringotomy tubes

Cardiovascular
- Pacemaker placement
- Cardiac ablation
- Structural heart / TAVR
- IVUS / FFR
- PTCA & stenting
- Grafts
- Electrophysiology

Urology / Gynecology
- BPH
- Biopsy
- Endoscopy

Peripheral Vascular
- PTA & stenting
- BPH
- Biopsy
- Grafts

Orthopedics | **Interventional** | **Advanced Surgical**

The Surface is only the beginning.

Case Study: Chemistry and Facility History

Hudson PTFE coating facility found to have contaminated site with PFOA from 1979-2013

Chemistry

- Two types of PFAS
  - High molecular weight: fluoropolymers (PTFE, FEP, PFA)
  - Low molecular weight: fluorosurfactants (PFOA, PFOS)
- Fluoropolymers
  - Polymers of low concern
  - Historically made using PFOA as a processing aid and can be “dragged along” with the fluoropolymer in liquid dispersions & coatings

Facility History

- 51,000 sq ft facility on 13 acres coating medical devices with fluoropolymers
- From 1979 to 2013, Boyd Coatings Research applied PTFE coatings that contained high levels of PFOA, which over time contaminated the Boyd manufacturing site in Hudson, MA
- Precision Coating purchases Boyd Coating Research on December 15, 2015
- Site contamination not identified until investigation began in August 2016.

Case Study: Facility Investigation and Regulatory Timeline

PFAS testing in public drinking wells started in 2013 and intensified in 2016 kicking off investigation

Facility Events

State Actions or Regulations

Select Federal Actions or Regulations

Increasing awareness of PFAS

The Surface is only the beginning.

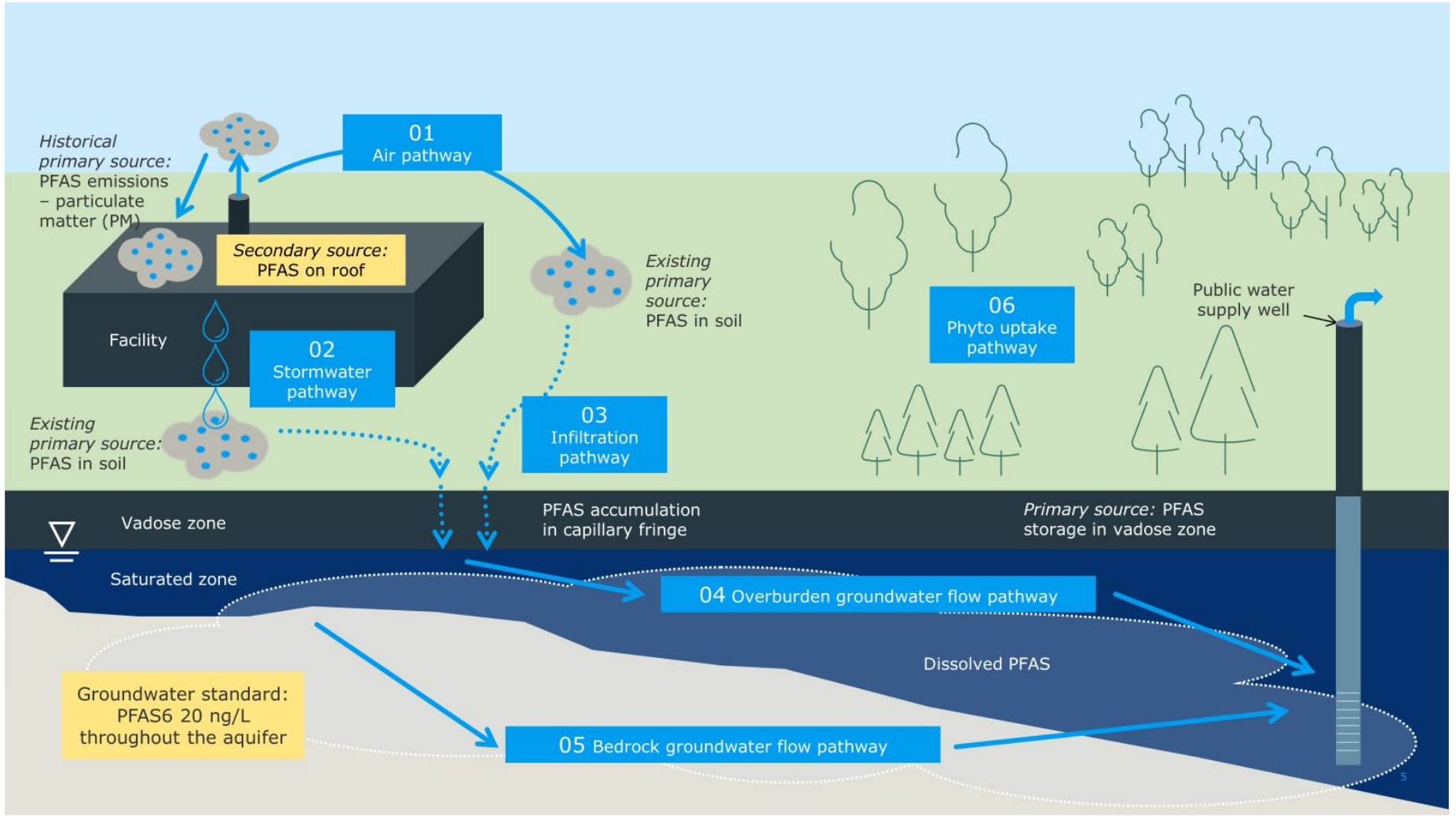
Case Study: Investigation under MCP Process (2019 onwards)

Charted an unknown course employing and developing a myriad of methods to characterize the site

- Phase I: Initial site investigation (2018)
- Phase II: Root cause analysis (2019-2022)
  - Conceptual Site Model
  - Disposal site boundary demarcation
  - Drilling of monitoring wells and four seasons of monitoring data required for final MCP Phase II submission (43 wells)
  - Air emissions study
  - Spray booth filtration study
  - Fate & transport study: plume identified
  - Multivariate Analysis (Fingerprint): PFOA site vs. PFAS soup throughout the region
  - Human health and ecological risk assessments
- Phase III: Remedial alternatives (2023)
  - Comprehensive analysis of remedial alternatives for clean-up of impacted soil and groundwater at the site
  - Cranberry Bog Well GAC system is the remedial action!

Case Study: Conceptual Site Model

Developed new techniques to bring a broader understanding of PFAS site contamination



Case Study: Immediate Response Actions & Remediation

Remediation activities took place prior to completing the Comprehensive Site Assessment

- Immediate Response Actions (IRAs) (2018-2023)
  - Cranberry Bog Well treatment installed with 80,000 lbs of granular activated carbon
    - PFAS non-detect since July 2019
  - Exhaust filtration study completed / higher efficiency exhaust filters and booth modifications also completed (December 2019)
  - Roof replacement completed (March 2020)
  - Water connections (38) / POET system installation (11) completed for 49 homes within the disposal site boundary previously on private wells (Nov 2020 - July 2023)
  - Stormwater capture and treatment system installed and operational (July 2023)
- Phase IV Remedy Implementation (2023-2024)
  - Completed with all IRAs in advance of the actual MCP Phase IV implementation
- Phase V: Monitoring & Reporting (2024-)
  - Achieved Temporary Solutions Status in September 2024

Case Study: Lessons Learned

What we do not know, can be very important

SDSs/MSDSs might not list specific PFAS

- "Proprietary ingredients"
- "Fluorinated surfactants"
- "Fluoropolymers are not surfactants"

"PFOA free" may not be "PFOA free"

- "Trace" levels or unintentionally added PFAS may still be present
- "Precursor PFAS" may contribute to PFOA and other PFAS through transformation

While certain PFAS are phased out in the US, many may still be manufactured in other countries and unknowingly imported

"Non-traditional" sources and ubiquitous occurrence in background/ambient environment

Fingerprinting can assist in identifying potential sources!

Concrete next steps

PFAS are here to stay!

Develop a working group of key internal stakeholders (technical, business, legal, communications, investor relations) and external experts

Conduct a PFAS Operational Assessment: Understand your inputs and outputs and what could be related to PFAS

Keep Up with Regulatory Requirements and Developments

Questions