

PFAS WAITING GAME CONTINUES IN 2022

While water and waste management is the foundation of an environmental industry that spans more than a century, it was air quality, hazardous waste and remediation that coalesced the core of environmental services in the environmental industry we know today. And while energy transition and climate change represent a whole new era in environmental industry evolution, many see a new era of its own in hazardous waste management and remediation driven by PFAS.

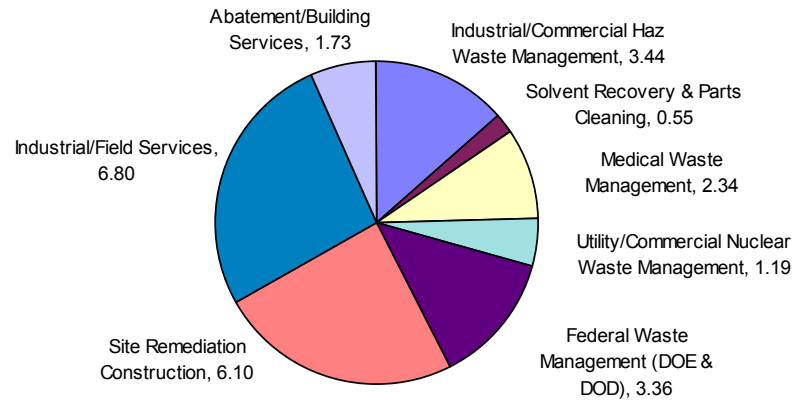
MARKETS & INDUSTRIES

For the purposes of distinguishing it from environmental consulting & engineering, Environmental Business Journal defines environmental contracting as the sum of two of its environmental ‘industry’ segments: Hazardous Waste Management and Remediation/Industrial Services. These two segments and their respective eight sub-segments represent \$25.5 billion in revenues out of the \$448 billion U.S. environmental industry in 2021, as portrayed on the chart at the right and the table on page 2.

Remediation as a process of identifying and cleaning up environmental contamination, or an environmental media vertical on the page 2 table, is a different ‘market’ and includes revenue contribution from environmental testing, C&E, specialty equipment and analytical and monitoring instrumentation and information systems ‘industry’ segments.

Site remediation markets, which include ‘front-end’ consulting, engineering, site characterization and design; and ‘back-end’ contracting, construction, closure and monitoring is a different market still. For the business strategist it is a matter of how you define the competitive gameboard of market nad industry segments. The \$8.6

Environmental Contracting: Remediation & Haz Waste Segments of the Environmental Industry in 2021 (\$bil)



Source: EBI annual models of Remediation/Industrial Services and Hazardous Waste Management segments

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HALEY & ALDRICH ANTICIPATES STRONG DEMAND FOR PFAS WORK IN DOD AND PRIVATE MARKETS

H&A continues R&D and implementation of PFAS remediation technology.

With over 700 engineers and scientists operating across 30 offices, **Haley & Aldrich** (San Jose, Calif.) draws on experts around the country for creative collaboration and expert perspectives. Haley & Aldrich's vision is to be the company most sought after to integrate technology and human potential to tackle tough issues. Since founding in 1957, Haley & Aldrich has pioneered new services and practices from the first geotechnical work in complex underground conditions in Boston to novel approaches for managing today's emerging contaminants.

Elie H. Haddad, P.E., Principal Consultant, has directed and supervised multi-party remedial investigations/feasibility studies (RI/FS), including large air sampling programs. This required coordinating among regulatory agencies, property tenants and owners, citizen groups, and various responsible parties including their consultants and attorneys. His extensive work on Superfund sites helped the U.S. Environmental Protection Agency establish national standards.

EBJ: Have you seen any change in demand for remediation services in 2022 as a result of economic upheavals, including inflation, gasoline prices, supply chain issues, stock market sways, interest rates and property values or any other uncertainties?

Elie Haddad: Yes, we have been affected by increased prices, delays in certain instrumentation because of supply chain issues, delays in work because of availability of human resources, and an increased demand for redevelopment.

EBJ: What is your perspective on the Inflation Reduction Act and Infrastructure Investment and Jobs Act and their impacts on remediation markets—and your client base in particular?

Elie Haddad: Most notable is the increased spending on infrastructure, which may generate more business from our local and state government clients.

EBJ: What branches of the federal government are most likely to increase remediation expenditures over the next five years?

Elie Haddad: DOD is the most promising market. The major focus will be on PFAS assessment and remediation.

Some clients are expanding their PFAS service demand into preventative measures such as AFFF replacement, in addition to remediating PFAS released into the environment.

EBJ: In private markets how much does long-term corporate liability drive remediation investments compared to state and federal regulatory requirements?

Elie Haddad: This is market-specific. For example, aerospace companies have government contracts and are proactive in limiting their liabilities and are reactive to compliance requirements. Other larger corporations, such as in the tech industry, may be proactive because of PR. Smaller manufacturing firms are more likely to be reactive to regulatory requirements. Large developers and municipalities are incorporating resiliency and climate change into their planning.

EBJ: How has the attention on PFAS manifested itself in the kind of work that Haley & Aldrich has been doing in

remediation or water/wastewater treatment projects over the last few years? Or has more work arisen in technology development, demonstration for treatment, characterization or analytical methods?

Elie Haddad: We are investing in PFAS destruction technologies and receiving substantial grants in PFAS-related applier research. Some clients are expanding their PFAS service demand into preventative measures such as AFFF [aqueous film forming foam] replacement, in addition to remediating PFAS released into the environment. Some clients are using our expertise to create enterprise-level strategies to deal with PFAS liabilities.

EBJ: Can PFAS be compared to past emerging contaminants or regulatory phases throughout the history of the remediation business?

Elie Haddad: The one that comes to mind in most recent memory is 1,4-dioxane. Technologies were developed to deal with it (and we invested in such technologies), but regulations and public attention did not measure up to what PFAS is receiving these days; 1,4-D did not generate the same levels of litigation as PFAS. With a few exceptions, the industry is reactive when dealing with 1,4-D.

EBJ: How has digitalization or increased automation of project management impacted how Haley & Aldrich manages remediation portfolios or plans future business in the industry?

Elie Haddad: Automation has become standard in collecting data (that is sunk immediately into the database) or monitoring treatment systems. Early detections and alarms significantly reduce the chances of compliance violations.

EBJ: What other potentially disruptive technologies could play a role in the evolution of the remediation industry in the future?

Elie Haddad: In-situ and ex-situ destruction of PFAS. Machine learning and data analytics that can be used to help with solutions based on data. □